



Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER OS | RELEASE 4.0
SERVICES GUIDE

Alcatel-Lucent assumes no responsibility for the accuracy of the information presented, which is subject to change without notice.

Alcatel, Lucent, Alcatel-Lucent and the Alcatel-Lucent logo are trademarks of Alcatel-Lucent. All other trademarks are the property of their respective owners.

Copyright 2010 Alcatel-Lucent.
All rights reserved.

Disclaimers

Alcatel-Lucent products are intended for commercial uses. Without the appropriate network design engineering, they must not be sold, licensed or otherwise distributed for use in any hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life-support machines, or weapons systems, in which the failure of products could lead directly to death, personal injury, or severe physical or environmental damage. The customer hereby agrees that the use, sale, license or other distribution of the products for any such application without the prior written consent of Alcatel-Lucent, shall be at the customer's sole risk. The customer hereby agrees to defend and hold Alcatel-Lucent harmless from any claims for loss, cost, damage, expense or liability that may arise out of or in connection with the use, sale, license or other distribution of the products in such applications.

This document may contain information regarding the use and installation of non-Alcatel-Lucent products. Please note that this information is provided as a courtesy to assist you. While Alcatel-Lucent tries to ensure that this information accurately reflects information provided by the supplier, please refer to the materials provided with any non-Alcatel-Lucent product and contact the supplier for confirmation. Alcatel-Lucent assumes no responsibility or liability for incorrect or incomplete information provided about non-Alcatel-Lucent products.

However, this does not constitute a representation or warranty. The warranties provided for Alcatel-Lucent products, if any, are set forth in contractual documentation entered into by Alcatel-Lucent and its customers.

This document was originally written in English. If there is any conflict or inconsistency between the English version and any other version of a document, the English version shall prevail.

Table of Contents

Preface	33
Getting Started	37
Alcatel-Lucent 7705 SAR Services Configuration Process	37
Notes on 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F	39
Services Overview	41
Introduction to Services on the 7705 SAR	42
Service Types	43
Service Policies	45
Alcatel-Lucent Service Model	46
Service Entities	47
Customers	48
Service Types	48
Service Access Points (SAPs)	48
SAP Encapsulation Types and Identifiers	49
SAP Configuration Considerations	52
Service Destination Points (SDPs)	53
SDP Binding	54
Spoke and Mesh SDPs	55
SDP Encapsulation Types	55
Spoke SDP Terminations	60
SDP Ping	61
SDP Keepalives	62
Mobile Solutions	63
HSDPA Offload	63
Failure Detection	65
ETH-CFM (802.1ag and Y.1731)	66
802.1ag and Y.1731 Terminology	67
MDs, MD Levels, MAs, and MEPs (802.1ag)	68
MEG Levels, MEGs, and MEPs (Y.1731)	69
ETH-CFM Frame Format	70
ETH-CFM OAMPDU	71
CFM Frame Processing	72
MEG-ID and ICC-Based Format	73
ETH-CFM Functions and Tests	75
ETH-CFM Ethernet OAM Tests	76
MEP Support (802.1ag and Y.1731)	82
802.1ag MEP Support on Ethernet SAPs	82
802.1ag MEP Support on Ethernet Spoke SDPs	83
Y.1731 MEP Support on Ethernet SAPs	85
Priority Mapping (802.1ag and Y.1731)	86
Priority Mapping for SAP Up MEPs	86
Priority Mapping for SAP Down MEPs	88
Service Creation Overview	89
Port and SAP CLI Identifiers	91

Table of Contents

Reference Sources	91
Configuring Global Service Entities with CLI.	93
Service Model Entities.	94
Basic Configuration.	95
Common Configuration Tasks.	97
Configuring Customer Accounts	97
Configuring SDPs	98
SDP Configuration Considerations.	98
Configuring an SDP	99
ETH-CFM (802.1ag and Y.1731) Tasks	101
Configuring ETH-CFM Parameters (802.1ag and Y.1731)	101
Applying ETH-CFM Parameters	103
Service Management Tasks	105
Modifying Customer Accounts	105
Deleting Customers	106
Modifying SDPs	106
Deleting SDPs	107
Deleting LSP Associations	107
Global Service Command Reference	109
Command Hierarchies	109
Command Descriptions	113
Global Service Configuration Commands	114
Show Commands	132
VLL Services	143
ATM VLL (Apipe) Services	145
ATM VLL for End-to-End ATM Service	145
ATM SAP-to-SAP Service	146
ATM Traffic Management Support	147
Network Ingress Classification	147
ATM Access Egress Queuing and Shaping	147
Control Word	147
Circuit Emulation VLL (Cpipe) Services	148
Cpipe Service Overview	148
TDM SAP-to-SAP Service	149
Cpipe Service Modes	149
TDM PW Encapsulation	153
Circuit Emulation Parameters and Options.	155
Error Situations.	165
Ethernet VLL (Epipe) Services	166
Epipe Service Overview	166
Ethernet Access Egress Queuing and Scheduling.	168
Ethernet SAP-to-SAP	168
Ethernet OAM.	168
Control Word.	169
MTU	169
Raw and Tagged Modes.	169
IP Filters	174

IP Interworking VLL (Ipipe) Services	175
Ipipe Service Overview	175
IP Interworking VLL Datapath	176
Control Word	177
IP Filters	178
Pseudowire Switching	180
Pseudowire Switching with Pseudowire Redundancy	182
Pseudowire Switching Behavior	183
Pseudowire Switching With IP Tunnels	185
Pseudowire Switching TLV	186
VLL Service Considerations	187
Service Support	187
SDPs	188
SDP Statistics for VLL Services	188
SAP Encapsulations and Pseudowire Types	188
ATM PWE3 N-to-1 Cell Mode Encapsulation	190
QoS Policies	192
IP Filter Policies	192
MTU Settings	193
Targeted LDP and MTU	196
Pseudowire Control Word	197
Pseudowire Redundancy	197
PW Redundancy Operation	198
Selecting the Active Spoke SDP for PW Redundancy Configuration	200
Active/Standby Mode for Pseudowire Redundancy (Standby Signaling)	202
Configuring a VLL Service with CLI	205
Common Configuration Tasks	206
Configuring VLL Components	207
Creating an Apipe Service	208
Configuring Apipe SAP Parameters	209
Configuring Apipe SDP Bindings	211
Creating a Cpipe Service	212
Configuring Cpipe SAP Parameters	212
Configuring Cpipe SDP Bindings	214
Creating an Epipe Service	215
Configuring Epipe SAP Parameters	216
Configuring Epipe Spoke SDP Bindings	218
Creating an Ipipe Service	221
Configuring Ipipe SAP Parameters	221
Configuring Ipipe SDP Bindings	222
Configuring PW Switching	223
Configuring Ingress and Egress SAP Parameters	225
Using the Control Word	226
Configuring PW Redundancy	227
Configuring PW Redundancy – Standby Signaling	228
Service Management Tasks	229
Modifying Service Parameters	229
Disabling a Service	231
Re-enabling a Service	233

Table of Contents

Deleting a Service	233
VLL Services Command Reference	235
Command Hierarchies	235
Command Descriptions	242
VLL Service Configuration Commands	243
Show Commands	282
Clear Commands	337
VPLS	339
VPLS Overview	341
VPLS Packet Walkthrough	343
Bridged Mobile Backhaul	348
Multi-Tenant Unit (MTU) Termination	350
VPLS Features	352
VPLS Enhancements	352
Fabric Mode	353
Subscriber VLAN	354
ATM Encapsulated Residential SAP	354
VPLS over MPLS	355
VPLS MAC Learning and Packet Forwarding	356
Pseudowire Control Word	356
Agent Circuit ID Insertion	356
MAC Filters	358
FDB Table Management	359
FDB Size	359
FDB Size Alarms	359
Local and Remote Aging Timers	360
Unknown MAC Discard	360
VPLS and Rate Limiting Via QoS Policy	361
MAC Move	361
Split Horizon Groups (SAP and Spoke SDP)	362
Residential Split Horizon Groups	363
VPLS Service Considerations	364
SAP Encapsulations	364
VLAN Processing	364
Ingress VLAN Swapping	365
Ingress VLAN Translation	366
Configuration Notes	367
Reference Sources	367
Configuring a VPLS Service with CLI	369
Basic Configuration	370
Common Configuration Tasks	372
Configuring VPLS Components	372
Creating a VPLS Service	373
Creating a Split Horizon Group	373
Enabling MAC Move	374
Configuring a VPLS SAP	375
Local VPLS SAPs	375
Distributed VPLS SAPs	376
Configuring VPLS SAPs with Split Horizon	377

Configuring SDP Bindings	378
Configuring Mesh SDP Bindings	380
Configuring Spoke SDP Bindings	380
Configuring VPLS Spoke SDPs with Split Horizon	382
Configuring Selective MAC Flush	382
ATM PVC Access and Termination on a VPLS Service	383
Service Management Tasks	384
Modifying VPLS Service Parameters	384
Deleting a VPLS Service	385
Disabling a VPLS Service	385
Re-enabling a VPLS Service	386
VPLS Command Reference	387
Command Hierarchies	387
Command Descriptions	394
VPLS Service Configuration Commands	395
VPLS Show Commands	437
VPLS Clear Commands	490
VPLS Debug Commands	496
Internet Enhanced Service	499
IES for In-band Management	500
Setting Up Connections Between the 5620 SAM and the 7705 SAR	500
Encapsulation	501
Layer 2 and Layer 3 Traffic Management	501
Troubleshooting and Fault Detection Services	502
IES for Customer Traffic	503
DHCP Relay and DHCPv6 Relay	504
DHCP Relay	505
DHCPv6 Relay	506
IPCP	507
Troubleshooting and Fault Detection Services	507
SAPs	508
Encapsulations	508
QoS Policies	508
IP Filter Policies	508
Spoke SDP Termination to IES	509
Configuring IES with CLI	513
Common Configuration Tasks	514
Configuring IES Components	515
Creating an IES Service	515
Configuring Interface Parameters	516
Configuring IES SAP Parameters	521
Configuring IES Spoke SDP Parameters	523
Service Management Tasks	525
Modifying IES Service Parameters	525
Disabling an IES Service	525
Re-enabling an IES Service	526
Deleting an IES Service	526
IES Command Reference	527
Command Hierarchies	527

Table of Contents

Command Descriptions	533
IES Management Configuration Commands	534
IES Service Configuration Commands	546
Show Commands	574
Clear Commands	597
Debug Commands	599
VPRN Services	601
VPRN Service Overview	602
Routing Prerequisites	603
BGP Support	604
Route Distinguishers	604
Route Reflector	605
CE to PE Route Exchange	605
VPRN Features	608
IP Interfaces	608
DHCP Relay	609
IPCP	610
Troubleshooting and Fault Detection Services	610
SAPs	611
Encapsulations	611
QoS Policies	611
CoS Marking for Self-generated Traffic	611
Filter Policies	612
CE to PE Routing Protocols	612
PE to PE Tunneling Mechanisms	612
Per-VRF Route Limiting	612
Spoke SDPs	613
Spoke SDP Termination to VPRN	613
Configuring a VPRN Service with CLI	619
Basic Configuration	620
Common Configuration Tasks	621
Configuring VPRN Components	622
Creating a VPRN Service	622
Configuring Global VPRN Parameters	623
Configuring Router Interfaces	623
Configuring BGP for VPRN	624
Configuring Route Reflection	624
Configuring a VPRN Interface	624
Configuring VPRN Interface SAP Parameters	627
Configuring VPRN Interface Spoke SDP Parameters	629
Service Management Tasks	631
Modifying VPRN Service Parameters	631
Deleting a VPRN Service	632
Disabling a VPRN Service	632
Re-enabling a VPRN Service	633
VPRN Services Command Reference	635
Command Hierarchies	635
Command Descriptions	642
VPRN Service Configuration Commands	643

Show Service Commands	681
Show Router Commands	720
Clear Service Commands	736
Clear Router Commands	737
Debug Service Commands	739
Debug Router Commands	741
Standards and Protocol Support	743

List of Tables

Getting Started	37
Table 1: 7705 SAR Configuration Process	37
Table 2: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison	39
Services Overview	41
Table 3: Pseudowire Service Types	44
Table 4: Service Types and SAP Encapsulations	51
Table 5: GRE Header Descriptions	57
Table 6: GRE Pseudowire Payload Packet Descriptions	58
Table 7: IP Pseudowire Payload Packet Descriptions	60
Table 8: Spoke SDP Termination Support (1)	61
Table 9: 802.1ag Terminology	67
Table 10: Y.1731 Terminology	68
Table 11: CFM Frame Processing	72
Table 12: FC and VLAN Priority Mappings for Up and Down MEPs as per Frame Type	87
Table 13: SDP Echo Reply Response Conditions	124
Table 14: Show Customer Command Output Fields	133
Table 15: Show Service SDP Output Fields	135
Table 16: Show Service SDP-Using Output Fields	138
Table 17: Show Service service-using Output Fields	141
VLL Services	143
Table 18: T1 Framing for CAS (RBS) Support in a T1 ESF Multiframe	152
Table 19: Unstructured Payload Defaults	156
Table 20: Default and Minimum Payload Size for CESoPSN without CAS	157
Table 21: Payload Size for T1 and E1 CESoPSN with CAS	160
Table 22: Control Word Bit Descriptions	163
Table 23: Ingress SAP Tagging Rules	171
Table 24: Egress SAP Tagging Rules	172
Table 25: Ethernet VLL Encapsulation Translation	173
Table 26: Supported Pseudowire Switching Options	182
Table 27: Pseudowire Switching TLV Field Descriptions	186
Table 28: MTU Points and Descriptions	194
Table 29: MTU Calculator – Service Creation (Worst Case)	195
Table 30: Matching MTU or Payload Values for Signaled VLL Services	196
Table 31: Maximum Transmission Unit Values	252
Table 32: SAP ID Configurations	254
Table 33: Port and Encapsulation Values	255

List of Tables

Table 34:	Show Service-ID All Command Output Fields	285
Table 35:	Show Service-ID Base Output Fields	309
Table 36:	Show Service Egress Label Output Fields	312
Table 37:	Show Service Ingress Label Output Fields	313
Table 38:	Service-ID Endpoint Output Fields	314
Table 39:	Service-ID Labels Output Fields	316
Table 40:	Service-ID SAP Output Fields	318
Table 41:	Show Service SAP-Using Output Fields	330
Table 42:	SDP Output Fields	332
VPLS		339
Table 43:	Show Service Service-MTU Output Fields	411
Table 44:	Show Service Egress Labels Output Fields	438
Table 45:	Show Service FDB-Info Output Fields	439
Table 46:	Show Service FDB-MAC Output Fields	441
Table 47:	Show Service Service-ID (All) Output Fields	450
Table 48:	Show Service Service-ID (Base) Output Fields	452
Table 49:	Show Service Service-ID (DHCP Statistics) Output Fields	455
Table 50:	Show Service Service-ID (DHCP Summary) Output Fields	456
Table 51:	Show Service Service-ID (Endpoint) Output Fields	458
Table 52:	Show Service Service-ID (FDB) Output Fields	461
Table 53:	Show Service Service-ID (Labels) Output Fields	464
Table 54:	Show Service Service-ID (MAC Move) Output Fields	465
Table 55:	Show Service ID (SAP) Output Fields	471
Table 56:	Show Service ID (SDP) Output Fields	479
Table 57:	Show Service ID (Split Horizon Group) Output Fields	484
Table 58:	Show Service Ingress-Label Output Fields	487
Table 59:	Show Service SAP-Using Output Fields	489
Internet Enhanced Service		499
Table 60:	SAP ID Configurations	541
Table 61:	SAP ID Configurations	566
Table 62:	Port and Encapsulation Values	567
Table 63:	Show Service Customer Output Fields	574
Table 64:	Show Service Egress Output Fields	576
Table 65:	Show Service ID All Output Fields	579
Table 66:	Show Service ID ARP Output Fields	585
Table 67:	Show Service ID Base Output Fields	586
Table 68:	Show Service ID DHCP Statistics Output Fields	587
Table 69:	Show Service ID DHCP Summary Output Fields	589

Table 70:	Show Service ID Interface Output Fields	590
Table 71:	Show Service ingress Output Field	592
Table 72:	Show Service SAP-Using Output Fields	595
Table 73:	Show Service Service-Using Output Fields	596
VPRN Services		601
Table 74:	Route Distinguisher Type-Value Fields	605
Table 75:	Applications and Default Values for DSCP or dot1p Markings	650
Table 76:	VPRN Interface State and IP Address	660
Table 77:	Show Service Egress Output Fields	682
Table 78:	Show Service ID All Output Fields	686
Table 79:	Show Service ID ARP Output Fields	695
Table 80:	Show Service ID Base Output Fields	697
Table 81:	Show Service ID DHCP Statistics Output Fields	699
Table 82:	Show Service ID DHCP Summary Output Fields	700
Table 83:	Show Service ID Interface Detailed Output Fields	703
Table 84:	Show Service ID SAP Detailed Output Fields	709
Table 85:	Show Service ingress Output Field	713
Table 86:	Show Service ID SDP Detailed Output Fields	716
Table 87:	Show Service Service-Using Output Fields	719
Table 88:	Show ARP Table Output Fields	721
Table 89:	Show DHCP Statistics Output Fields	722
Table 90:	Show DHCP Summary Output Fields	724
Table 91:	Show IP Interface Output Fields	725
Table 92:	Show Route Table Output Fields	726
Table 93:	Application QoS Output Fields	729
Table 94:	DSCP-to-FC Mapping Output Fields	731
Table 95:	Show Static ARP Table Output Fields	732
Table 96:	Show Static Route Output Fields	733
Table 97:	Show Tunnel Table Output Fields	735

List of Figures

Services Overview	41
Figure 1: Service Entities and the Service Model	47
Figure 2: Service Access Point (SAP)	49
Figure 3: Multiple SAPs on a Single Port/Channel	50
Figure 4: SDP Tunnel Pointing from ALU-A to ALU-B	54
Figure 5: GRE Header	57
Figure 6: GRE Pseudowire Payload Packet over Ethernet	58
Figure 7: IP Example of Pseudowire Payload Packet over Ethernet	59
Figure 8: HSDPA Offload Example	64
Figure 9: MEPs and MAs	69
Figure 10: ETH-CFM Frame Format	70
Figure 11: ETH-CFM OAMPDU Message	72
Figure 12: ICC-based MEG-ID Format	74
Figure 13: Dot1ag Loopback Test	77
Figure 14: MEP on Ethernet Access	82
Figure 15: Down MEP at Ethernet SAP	83
Figure 16: Dot1ag Down MEPs on Spoke SDPs	84
Figure 17: Y.1731 MEP Support on the 7705 SAR	85
Figure 18: Service Creation and Implementation Flowchart	90
VLL Services	143
Figure 19: ATM VLL for End-to-End ATM Service	146
Figure 20: E1 Framing for CAS Support in an E1 Multiframe	151
Figure 21: SAToP MPLS Encapsulation	153
Figure 22: CESoPSN MPLS Encapsulation	153
Figure 23: CESoPSN Packet Payload Format for Trunk-Specific n x 64 kb/s (With and Without CAS Transport)	154
Figure 24: Control Word Bit Structure	163
Figure 25: Ethernet VLL Frame with MPLS Encapsulation	167
Figure 26: Epipe Service	167
Figure 27: Ethernet Frame Representations	172
Figure 28: IP Pseudowires Between SAR Nodes	176
Figure 29: Simplex to Simplex Pseudowire Switching	181
Figure 30: Simplex to Redundant Pseudowire Switching	183
Figure 31: Pseudowire Switching Network	184
Figure 32: Pseudowire Switching TLV	186
Figure 33: N-to-1 Cell Mode Encapsulation	190

List of Figures

Figure 34:	MTU Points on the 7705 SAR	193
Figure 35:	Pseudowire Redundancy	198
Figure 36:	Implicit and Explicit Endpoint Objects	199
Figure 37:	Pseudowire Redundancy with Four Spoke SDPs	201
Figure 38:	Active/Standby Mode for Redundant Pseudowires	202
Figure 39:	SDPs — Unidirectional Tunnels	218
VPLS		339
Figure 40:	VPLS Service Architecture	343
Figure 41:	Access Port Ingress Packet Format and Lookup	344
Figure 42:	Network Port Egress Packet Format and Flooding	345
Figure 43:	Access Port Egress Packet Format and Lookup	347
Figure 44:	Typical Pseudowire-based Mobile Backhaul	348
Figure 45:	Local VPLS on 7705 SAR in Mobile Backhaul	349
Figure 46:	Spoke SDP Termination to VPLS using 7705 SAR-18 Routers	351
Figure 47:	ATM and IP DSLAM Backhaul	353
Figure 48:	PPPoE Initialization and Agent-Id Push Function	357
Figure 49:	Agent Circuit ID Information	357
Figure 50:	Ingress VLAN Swapping	365
Figure 51:	Ingress VLAN Translation	366
Figure 52:	SDPs — Unidirectional Tunnels	379
Figure 53:	Example of ATM PVC Access and Termination on a VPLS	383
Internet Enhanced Service		499
Figure 54:	IES for Customer Access to the Internet	503
Figure 55:	SDP ID and VC Label Service Identifiers (Conceptual View of the Service)	509
Figure 56:	IES Spoke SDP Termination	510
Figure 57:	Pseudowire-Based Backhaul (Spoke SDP Termination at 7750 SR)	511
VPRN Services		601
Figure 58:	Virtual Private Routed Network	603
Figure 59:	Route Distinguisher Structure	604
Figure 60:	Directly Connected IP Target	606
Figure 61:	Multiple Hops to IP Target	607
Figure 62:	SDP ID and VC Label Service Identifiers (Conceptual View of the Service)	613
Figure 63:	VPRN Spoke SDP Termination	614
Figure 64:	Pseudowire-Based Backhaul (Spoke SDP Termination at 7750 SR)	615
Figure 65:	VPRN in Mobile Backhaul Application	616
Figure 66:	Spoke-SDP Termination to VPRN	617

List of Acronyms

Acronym	Expansion
2G	second generation wireless telephone technology
3DES	triple DES (data encryption standard)
3G	third generation mobile telephone technology
5620 SAM	5620 Service Aware Manager
7705 SAR	7705 Service Aggregation Router
7710 SR	7710 Service Router
7750 SR	7750 Service Router
9500 MPR	9500 Microwave Packet Radio
ABR	available bit rate area border router
AC	alternating current attachment circuit
ACK	acknowledge
ACL	access control list
ACR	adaptive clock recovery
ADP	automatic discovery protocol
AFI	authority and format identifier
AIS	alarm indication signal
ANSI	American National Standards Institute
Apipe	ATM VLL
APS	automatic protection switching
ARP	address resolution protocol
A/S	active/standby
AS	autonomous system

Acronym	Expansion
ASAP	any service, any port
ASBR	autonomous system boundary router
ASN	autonomous system number
ATM	asynchronous transfer mode
ATM PVC	ATM permanent virtual circuit
B3ZS	bipolar with three-zero substitution
Batt A	battery A
B-bit	beginning bit (first packet of a fragment)
Bellcore	Bell Communications Research
BFD	bidirectional forwarding detection
BGP	border gateway protocol
BITS	building integrated timing supply
BMCA	best master clock algorithm
BMU	<p>broadcast, multicast, and unknown traffic</p> <p>Traffic that is not unicast. Any nature of multipoint traffic:</p> <ul style="list-style-type: none"> • broadcast (that is, all 1s as the destination IP to represent all destinations within the subnet) • multicast (that is, traffic typically identified by the destination address, uses special destination address); for IP, the destination must be 224.0.0.0 to 239.255.255.255 • unknown (that is, the destination is typically a valid unicast address but the destination port/interface is not yet known; therefore, traffic needs to be forwarded to all destinations; unknown traffic is treated as broadcast)
BOF	boot options file
BPDU	bridge protocol data unit
BRAS	Broadband Remote Access Server
BSC	Base Station Controller
BSTA	Broadband Service Termination Architecture

Acronym	Expansion
BTS	base transceiver station
CAS	channel associated signaling
CBN	common bonding networks
CBS	committed buffer space
CC	control channel continuity check
CCM	continuity check message
CE	customer edge circuit emulation
CEM	circuit emulation
CES	circuit emulation services
CESoPSN	circuit emulation services over packet switched network
CFM	connectivity fault management
CIDR	classless inter-domain routing
CIR	committed information rate
CLI	command line interface
CLP	cell loss priority
CoS	class of service
CPE	customer premises equipment
Cpipe	circuit emulation (or TDM) VLL
CPM	Control and Processing Module (CPM is used instead of CSM when referring to CSM filtering to align with CLI syntax used with other SR products). CSM management ports are referred to as CPM management ports in the CLI.
CPU	central processing unit
CRC	cyclic redundancy check
CRON	a time-based scheduling service (from chronos = time)

Acronym	Expansion
CSM	Control and Switching Module
CSNP	complete sequence number PDU
CSPF	constrained shortest path first
C-TAG	customer VLAN tag
CV	connection verification customer VLAN (tag)
CW	control word
DC	direct current
DC-C	DC return - common
DCE	data communications equipment
DC-I	DC return - isolated
DCO	digitally controlled oscillator
DDoS	distributed DoS
DES	data encryption standard
DF	do not fragment
DHB	decimal, hexadecimal, or binary
DHCP	dynamic host configuration protocol
DHCPv6	dynamic host configuration protocol for IPv6
DIS	designated intermediate system
DM	delay measurement
DNS	domain name server
DoS	denial of service
dot1p	IEEE 802.1p bits, found in Ethernet or VLAN ingress packet headers and used to map traffic to up to eight forwarding classes
dot1q	IEEE 802.1q encapsulation for Ethernet interfaces
DPI	deep packet inspection

Acronym	Expansion
DPLL	digital phase locked loop
DSCP	differentiated services code point
DSL	digital subscriber line
DSLAM	digital subscriber line access multiplexer
DTE	data termination equipment
DU	downstream unsolicited
DUID	DHCP unique identifier
DV	delay variation
e911	enhanced 911 service
EAP	Extensible Authentication Protocol
EAPOL	EAP over LAN
E-bit	ending bit (last packet of a fragment)
ECMP	equal cost multi-path
EFM	Ethernet in the first mile
EGP	exterior gateway protocol
EIA/TIA-232	Electronic Industries Alliance/Telecommunications Industry Association Standard 232 (also known as RS-232)
ELER	egress label edge router
E&M	ear and mouth earth and magneto exchange and multiplexer
Epipe	Ethernet VLL
EPL	Ethernet private line
ERO	explicit route object
ESD	electrostatic discharge
ESMC	Ethernet synchronization message channel
ETE	end-to-end

Acronym	Expansion
ETH-CFM	Ethernet connectivity fault management (IEEE 802.1ag)
EVDO	evolution - data optimized
EVPL	Ethernet virtual private link
EXP bits	experimental bits (currently known as TC)
FC	forwarding class
FCS	frame check sequence
FDB	forwarding database
FDL	facilities data link
FEAC	far-end alarm and control
FEC	forwarding equivalence class
FF	fixed filter
FIB	forwarding information base
FIFO	first in, first out
FNG	fault notification generator
FOM	figure of merit
FRR	fast reroute
FTN	FEC-to-NHLFE
FTP	file transfer protocol
GFP	generic framing procedure
GigE	Gigabit Ethernet
GRE	generic routing encapsulation
GSM	Global System for Mobile Communications (2G)
HCM	high capacity multiplexing
HDB3	high density bipolar of order 3
HEC	header error control
HMAC	hash message authentication code

Acronym	Expansion
HSDPA	high-speed downlink packet access
HSPA	high-speed packet access
HVPLS	hierarchical virtual private line service
IANA	internet assigned numbers authority
IBN	isolated bonding networks
ICMP	Internet control message protocol
ICMPv6	Internet control message protocol for IPv6
ICP	IMA control protocol cells
IEEE	Institute of Electrical and Electronics Engineers
IEEE 1588v2	Institute of Electrical and Electronics Engineers standard 1588-2008
IES	Internet Enhanced Service
IETF	Internet Engineering Task Force
IGP	interior gateway protocol
ILER	ingress label edge router
ILM	incoming label map
IMA	inverse multiplexing over ATM
IOM	input/output module
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
IPIP	IP in IP
Ipipe	IP interworking VLL
IPoATM	IP over ATM
IS-IS	Intermediate System-to-Intermediate System
IS-IS-TE	IS-IS-traffic engineering (extensions)
ISO	International Organization for Standardization

Acronym	Expansion
LB	loopback
lbf-in	pound force inch
LBM	loopback message
LBO	line buildout
LBR	loopback reply
LCP	link control protocol
LDP	label distribution protocol
LER	label edge router
LFIB	label forwarding information base
LIB	label information base
LLDP	link layer discovery protocol
LLDPDU	link layer discovery protocol data unit
LLF	link loss forwarding
LLID	loopback location ID
LM	loss measurement
LSA	link-state advertisement
LSDB	link-state database
LSP	label switched path link-state PDU (for IS-IS)
LSR	label switch router link-state request
LSU	link-state update
LT	linktrace
LTE	line termination equipment
LTM	linktrace message
LTN	LSP ID to NHLFE

Acronym	Expansion
LTR	linktrace reply
MA	maintenance association
MAC	media access control
MA-ID	maintenance association identifier
MBB	make-before-break
MBS	maximum buffer space maximum burst size media buffer space
MBSP	mobile backhaul service provider
MC-MLPPP	multi-class multilink point-to-point protocol
MD	maintenance domain
MD5	message digest version 5 (algorithm)
MDA	media dependent adapter
MDDDB	multidrop data bridge
MDL	maintenance data link
ME	maintenance entity
MED	multi-exit discriminator
MEF	Metro Ethernet Forum
MEG	maintenance entity group
MEG-ID	maintenance entity group identifier
MEN	Metro Ethernet network
MEP	maintenance association end point
MFC	multi-field classification
MHF	MIP half function
MIB	management information base
MIP	maintenance association intermediate point

Acronym	Expansion
MIR	minimum information rate
MLPPP	multilink point-to-point protocol
MP	merge point multilink protocol
MP-BGP	multiprotocol border gateway protocol
MPLS	multiprotocol label switching
MPR	see 9500 MPR
MRRU	maximum received reconstructed unit
MRU	maximum receive unit
MSDU	MAC Service Data Unit
MS-PW	multi-segment pseudowire
MTIE	maximum time interval error
MTSO	mobile trunk switching office
MTU	maximum transmission unit multi-tenant unit
M-VPLS	management virtual private line service
MW	microwave
N·m	newton meter
NBMA	non-broadcast multiple access (network)
NE	network element
NET	network entity title
NHLFE	next hop label forwarding entry
NHOP	next-hop
NLRI	network layer reachability information
NNHOP	next next-hop
NNI	network-to-network interface

Acronym	Expansion
Node B	similar to BTS but used in 3G networks — term is used in UMTS (3G systems) while BTS is used in GSM (2G systems)
NSAP	network service access point
NSSA	not-so-stubby area
NTP	network time protocol
OAM	operations, administration, and maintenance
OAMPDU	OAM protocol data units
OC3	optical carrier, level 3
ORF	outbound route filtering
OS	operating system
OSI	Open Systems Interconnection (reference model)
OSINLCP	OSI Network Layer Control Protocol
OSPF	Open Shortest Path First
OSPF-TE	OSPF-traffic engineering (extensions)
OSS	operations support system
OSSP	Organization Specific Slow Protocol
OTP	one time password
PADI	PPPoE active discovery initiation
PADR	PPPoE active discovery request
PAE	port authentication entities
PCP	priority point code
PDU	protocol data units
PDV	packet delay variation
PDVT	packet delay variation tolerance
PE	provider edge router
PHB	per-hop behavior

Acronym	Expansion
PHY	physical layer
PID	protocol ID
PIR	peak information rate
PLCP	Physical Layer Convergence Protocol
PLR	point of local repair
POP	point of presence
POS	packet over SONET
PPP	point-to-point protocol
PPPoE	point-to-point protocol over Ethernet
PRC	primary reference clock
PSN	packet switched network
PSNP	partial sequence number PDU
PTP	precision time protocol performance transparency protocol
PVC	permanent virtual circuit
PVCC	permanent virtual channel connection
PW	pseudowire
PWE	pseudowire emulation
PWE3	pseudowire emulation edge-to-edge
QL	quality level
QoS	quality of service
RADIUS	Remote Authentication Dial In User Service
RAN	Radio Access Network
RBS	robbed bit signaling
RD	route distinguisher
RDI	remote defect indication

Acronym	Expansion
RED	random early discard
RESV	reservation
RIB	routing information base
RJ-45	registered jack 45
RNC	Radio Network Controller
RRO	record route object
RS-232	Recommended Standard 232 (also known as EIA/TIA-232)
RSHG	residential split horizon group
RSTP	Rapid Spanning Tree Protocol
RSVP-TE	resource reservation protocol - traffic engineering
RT	receive/transmit
RTM	routing table manager
RTN	battery return
RTP	real-time protocol
R&TTE	Radio and Telecommunications Terminal Equipment
RTU	remote terminal unit
RU	rack unit
SAA	service assurance agent
SAP	service access point
SAR-8	7705 Service Aggregation Router - 8-slot chassis
SAR-18	7705 Service Aggregation Router - 18-slot chassis
SAR-F	7705 Service Aggregation Router - fixed form-factor chassis
SAToP	structure-agnostic TDM over packet
SCADA	surveillance, control and data acquisition
SCP	secure copy
SD	signal degrade

Acronym	Expansion
SDH	synchronous digital hierarchy
SDI	serial data interface
SDP	service destination point
SE	shared explicit
SF	signal fail
SFP	small form-factor pluggable (transceiver)
SGT	self-generated traffic
SHA-1	secure hash algorithm
SHG	split horizon group
SIR	sustained information rate
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SNPA	subnetwork point of attachment
SNTP	simple network time protocol
SONET	synchronous optical networking
S-PE	switching provider edge router
SPF	shortest path first
SPT	shortest path tree
SR	service router (includes 7710 SR, 7750 SR)
SRLG	shared risk link group
SSH	secure shell
SSM	synchronization status messaging
SSU	system synchronization unit
S-TAG	service VLAN tag
STM1	synchronous transport module, level 1
SVC	switched virtual circuit

Acronym	Expansion
SYN	synchronize
TACACS+	Terminal Access Controller Access-Control System Plus
TC	traffic class (formerly known as EXP bits)
TCP	transmission control protocol
TDEV	time deviation
TDM	time division multiplexing
TE	traffic engineering
TFTP	trivial file transfer protocol
TLDP	targeted LDP
TLV	type length value
ToS	type of service
T-PE	terminating provider edge router
TPID	tag protocol identifier
TPMR	two-port MAC relay
TTL	time to live
TTM	tunnel table manager
U-APS	unidirectional automatic protection switching
UBR	unspecified bit rate
UDP	user datagram protocol
UMTS	Universal Mobile Telecommunications System (3G)
UNI	user-to-network interface
V.35	V-series Recommendation 35
VC	virtual circuit
VCC	virtual channel connection
VCCV	virtual circuit connectivity verification
VCI	virtual circuit identifier

Acronym	Expansion
VID	VLAN ID
VLAN	virtual LAN
VLL	virtual leased line
VoIP	voice over IP
Vp	peak voltage
VP	virtual path
VPC	virtual path connection
VPI	virtual path identifier
VPLS	virtual private LAN service
VPN	virtual private network
VPRN	virtual private routed network
VRF	virtual routing and forwarding table
VSE	vendor-specific extension
VSO	vendor-specific option
WCDMA	wideband code division multiple access (transmission protocol used in UMTS networks)
WRED	weighted random early discard
WTR	wait to restore

Preface

About This Guide

This guide describes subscriber services support provided by the 7705 Service Aggregation Router (7705 SAR) and presents examples to configure and implement various protocols and services.

This document is organized into functional chapters and provides concepts and descriptions of the implementation flow, as well as Command Line Interface (CLI) syntax and command usage.

Audience

This guide is intended for network administrators who are responsible for configuring the 7705 SAR routers. It is assumed that the network administrators have an understanding of networking principles and configurations. Protocols, standards, and services described in this guide include the following:

- CLI concepts
- subscriber services

List of Technical Publications

The 7705 SAR OS documentation set is composed of the following guides:

- 7705 SAR OS Basic System Configuration Guide
This guide describes basic system configurations and operations.
- 7705 SAR OS System Management Guide
This guide describes system security and access configurations as well as event logging and accounting logs.
- 7705 SAR OS Interface Configuration Guide
This guide describes card and port provisioning.

- **7705 SAR OS Router Configuration Guide**
This guide describes logical IP routing interfaces, IP-based filtering, and routing policies.
- **7705 SAR OS MPLS Guide**
This guide describes how to configure Multiprotocol Label Switching (MPLS), Resource Reservation Protocol for Traffic Engineering (RSVP-TE), and Label Distribution Protocol (LDP).
- **7705 SAR OS Services Guide**
This guide describes how to configure service parameters such as service access points (SAPs), service destination points (SDPs), customer information, and user services.
- **7705 SAR OS Quality of Service Guide**
This guide describes how to configure Quality of Service (QoS) policy management.
- **7705 SAR OS Routing Protocols Guide**
This guide provides an overview of dynamic routing concepts and describes how to configure them.
- **7705 SAR OS OAM and Diagnostics Guide**
This guide provides information on Operations, Administration and Maintenance (OAM) tools.

Multiple PDF File Search

You can use Adobe Reader, Release 6.0 or later, to search multiple PDF files for a term. Adobe Reader displays the results in a display panel. The results are grouped by PDF file. You can expand the entry for each file.



Note: The PDF files in which you search must be in the same folder.

To search multiple PDF files for a term:

Step 1. Open Adobe Reader.

Step 2. Choose Edit – Search from the Adobe Reader main menu. The Search panel appears.

Step 3. Enter the term to search for.

Step 4. Select the All PDF Documents in radio button.

Step 5. Choose the folder in which to search using the drop-down menu.

Step 6. Select the following criteria if required:

- Whole words only
- Case-Sensitive
- Include Bookmarks
- Include Comments

Step 7. Click on the Search button.

Adobe Reader displays the search results. You can expand the entries for each file by clicking on the + symbol.

Step 8. Click on a search result to go directly to that location in the selected file.

Technical Support

If you purchased a service agreement for your 7705 SAR router and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, check this link for instructions to contact Support personnel:

Web: <http://support.alcatel-lucent.com>

Getting Started

In This Chapter

This chapter provides the process flow information required to configure services.

Alcatel-Lucent 7705 SAR Services Configuration Process

[Table 1](#) lists the tasks necessary to configure subscriber services. This guide is presented in an overall logical configuration flow. Each section describes a software area and provides CLI syntax and command usage to configure parameters for a functional area.

Table 1: 7705 SAR Configuration Process

Area	Task	Reference
Subscriber services	Configure subscriber services	
	Global entities	Configuring Global Service Entities with CLI on page 93
VLL services	Apipe service	ATM VLL (Apipe) Services on page 145
	Cpipe service	Circuit Emulation VLL (Cpipe) Services on page 148
	Epipe service	Ethernet VLL (Epipe) Services on page 166
	Ipipe service	IP Interworking VLL (Ipipe) Services on page 175
VPLS service	Configure VPLS service	VPLS on page 339
Internet Enhanced Service	Configure a routed-IP connectivity or Internet access service and configure in-band management of the 7705 SAR over ATM links	Internet Enhanced Service on page 499

Table 1: 7705 SAR Configuration Process (Continued)

Area	Task	Reference
VPRN	Configure a Layer 3 multipoint-to-multipoint VPN service as defined in RFC 2547bis	VPRN Services on page 601
Reference	List of IEEE, IETF, and other proprietary entities	Standards and Protocol Support on page 743

Notes on 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F

The 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F run the same operating system software. The main difference between the products is their hardware platforms.

The 7705 SAR-8 is an 8-slot chassis that supports 2 CSMs, a Fan module, and 6 adapter cards. The 7705 SAR-18 chassis has 18 slots; in Release 4.0, it supports 2 CSMs, a Fan module, an Alarm module, and 12 adapter cards.

The 7705 SAR-F chassis has a fixed hardware configuration. The 7705 SAR-F replaces the CSM, Fan module, and the 16-port T1/E1 ASAP Adapter card and 8-port Ethernet Adapter card with an all-in-one unit that provides comparable functional blocks, as detailed in [Table 2](#).

The fixed configuration of the 7705 SAR-F means that provisioning the router at the “card slot” and “type” levels is preset and is not user-configurable. Operators begin configurations at the port level.



Note: Unless stated otherwise, references to the terms “Adapter card” and “CSM” throughout the 7705 SAR OS documentation set include the equivalent functional blocks on the 7705 SAR-F.

Table 2: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison

7705 SAR-8, 7705 SAR-18	7705 SAR-F	Notes
CSM	Control and switching functions	The control and switching functions include the console and management interfaces, the alarm and fan functions, the synchronization interfaces, system LEDs, and so on.
Fan module	Integrated with the control and switching functions	

Table 2: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison (Continued)

7705 SAR-8, 7705 SAR-18	7705 SAR-F	Notes
16-port T1/E1 ASAP Adapter card	16 individual T1/E1 ports on the faceplate	<p>The T1/E1 ports on the 7705 SAR-F are equivalent to the T1/E1 ports on the 16-port T1/E1 ASAP Adapter card, version 1, except that the 16 T1/E1 ports on the 7705 SAR-F support multiple synchronization sources to support two timing references. The 16-port T1/E1 ASAP Adapter card, version 2, also supports two timing references.</p> <p>On the 7705 SAR-8 and 7705 SAR-18, the CLI indicates the MDA type for the 16-port T1/E1 ASAP Adapter card as <code>a16-chds1</code> for version 1 and <code>a16-chds1v2</code> for version 2.</p> <p>On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F ports as <code>i16-chds1</code>.</p>
8-port Ethernet Adapter card	8 individual Ethernet ports on the faceplate	<p>The –48 VDC versions of the 7705 SAR-8 support two versions of the 8-port Ethernet Adapter card, with version 2 having additional support for Synchronous Ethernet. The +24 VDC version of the 7705 SAR-8 supports only version 2 of the 8-port Ethernet Adapter card.</p> <p>The 7705 SAR-18 supports only version 2 of the card.</p> <p>The Ethernet ports on the 7705 SAR-F are functionally equivalent to the Ethernet ports on version 2 of the 8-port Ethernet Adapter card and support multiple synchronization sources to support two timing references.</p> <p>On the 7705 SAR-8, the CLI indicates the MDA type for the 8-port Ethernet Adapter card as <code>a8-eth</code> or <code>a8-ethv2</code>. On the 7705 SAR-18, the CLI indicates the MDA type as <code>a8-ethv2</code>. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F Ethernet ports as <code>i8-eth</code>.</p>
Requires user configuration at card (IOM) and MDA (adapter card) levels	Configuration at card (IOM) and MDA (adapter card) levels is preset and users cannot change these types	

Services Overview

In This Chapter

This chapter provides an overview of the 7705 SAR subscriber services, service model, and service entities. Additional details on the individual subscriber services are found in subsequent chapters.

Topics in this chapter include:

- [Introduction to Services on the 7705 SAR on page 42](#)
 - [Service Types on page 43](#)
 - [Service Policies on page 45](#)
- [Alcatel-Lucent Service Model on page 46](#)
- [Service Entities on page 47](#)
 - [Customers on page 48](#)
 - [Service Types on page 48](#)
 - [Service Access Points \(SAPs\) on page 48](#)
 - [Service Destination Points \(SDPs\) on page 53](#)
- [Mobile Solutions on page 63](#)
 - [HSDPA Offload on page 63](#)
- [ETH-CFM \(802.1ag and Y.1731\) on page 66](#)
 - [802.1ag and Y.1731 Terminology on page 67](#)
 - [ETH-CFM Frame Format on page 70](#)
 - [ETH-CFM Functions and Tests on page 75](#)
 - [MEP Support \(802.1ag and Y.1731\) on page 82](#)
 - [Priority Mapping \(802.1ag and Y.1731\) on page 86](#)
- [Service Creation Overview on page 89](#)
- [Port and SAP CLI Identifiers on page 91](#)
- [Configuring Global Service Entities with CLI on page 93](#)
- [Global Service Command Reference on page 109](#)

Introduction to Services on the 7705 SAR

A service is a type of telecommunications connection from one place to another. These telecommunications connections have the particular attributes and characteristics that are needed to provide a specific communications link through which an information flow or exchange can occur. The 7705 Service Access Router (7705 SAR) offers VLL services, Layer 2 multipoint VPN services (VPLS), Layer 3 MPLS VPN services (VPRN), and Layer 3 routed/IP services.

The 7705 SAR service model uses (logical) service entities to construct a service. These logical entities provide a uniform, service-centric configuration, management, and billing model for service provisioning (see [Alcatel-Lucent Service Model](#) for more information). Many services can be created on the same 7705 SAR at the same time, and each service is uniquely identified by a service ID.

The 7705 SAR offers Virtual Leased Line (VLL) services (also referred to as pseudowire (PW) services or pipes), which emulate a Layer 1/2 entity, such as a wire or a leased line. These emulated services provide connectivity between a service access point (SAP) on one 7705 SAR and on another SAP on the same router, or on a remote 7705 SAR, 7710 SR, or 7750 SR. VLL services offer SAP logical entities – such as a VLAN or a virtual connection – Layer 2 visibility or processing (IMA termination). A SAP is the point where customer traffic enters and exits the service.

When the connection is between two SAPs on the same router, this is known as local service. When the connection is between SAPs on a local and a remote router, this is known as distributed service. SAP-to-SAP connections are supported for ATM, Ethernet, and TDM VLLs.

Distributed services use service destination points (SDPs) to direct traffic from a local router to a remote router through a service tunnel. An SDP is created on the local router and identifies the endpoint of a logical unidirectional service tunnel. Traffic enters the tunnel at the SDP on the local router and exits the tunnel at the remote router. Hence, a service tunnel provides a path from a 7705 SAR to another service router, such as another 7705 SAR, a 7710 SR, or a 7750 SR. Because an SDP is unidirectional, two service tunnels are needed for bidirectional communication between two service routers (one SDP on each router).

SDPs are configured on each participating 7705 SAR or service router, specifying the address of the source router (the 7705 SAR participating in the service communication) and the address of the destination router, such as another 7705 SAR or service router. After SDPs are created, they are bound to a specific service. The binding process is needed to associate the far-end devices to the service; otherwise, far-end devices are not able to participate in the service.

The 7705 SAR also offers IES, VPLS, and VPRN services.

IES provides IP connectivity between customer access points. From the customer's perspective, IES provides direct IP connectivity. The customer is assigned an IP interface and a SAP designates the customer access point (where the customer IP device is connected) — one SAP binding per IP interface. Supported SAP encapsulations are MC-MLPPP, PPP/MLPPP and null/dot1q Ethernet. SDP binding is not required because traffic is routed rather than being encapsulated in a tunnel.

A Virtual Private Routed Network (VPRN) consists of a set of customer sites connected to one or more PE routers. VPRNs are based on RFC 2547bis, which details a method of distributing routing information and forwarding data to provide a Layer 3 Virtual Private Network (VPN) service to end customers. VPRN traffic is transported over LDP and RSVP-TE tunnels, as well as static LSPs.

A Virtual Private LAN Service (VPLS) enables Layer 2 multipoint connections within an enterprise infrastructure. Supported SAP encapsulations are null/dot1q Ethernet (8-port Ethernet Adapter card) and ATM (4-port OC3/STM1 Clear Channel Adapter card). VPLS traffic can also be transported over existing tunnel types like GRE tunnels, LDP tunnels, RSVP-TE tunnels, and static LSPs using SDPs. For the ATM SAPs, the Layer 2 Ethernet frames are encapsulated in llc-snap bridged PDUs, as per RFC 2684, widely referred to with the obsoleted RFC-1483.

Service Types

Services are commonly called customer or subscriber services. The 7705 SAR offers the following types of services, which are described in more detail in the referenced chapters:

- Virtual Leased Line (VLL) services
 - ATM VLL (Apipe) — a pseudowire emulation edge-to-edge (PWE3) ATM service over MPLS, GRE, or IP tunnels on 7705 SAR nodes. See [ATM VLL \(Apipe\) Services](#).
 - Circuit emulation VLL (Cpipe) — a PWE3 circuit emulation service over MPLS or GRE tunnels on 7705 SAR nodes. See [Circuit Emulation VLL \(Cpipe\) Services](#).
 - Ethernet VLL (Epipe) — a PWE3 Ethernet service over MPLS or GRE tunnels for Ethernet frames on 7705 SAR nodes. See [Ethernet VLL \(Epipe\) Services](#).
 - IP interworking VLL (Ipipe) — a PWE3 IP service between two hosts connected by any combination of point-to-point access circuits (PPP/MLPPP) with routed IPv4 encapsulation and Ethernet interface SAPs; for example, Ethernet SAP to Ethernet SAP, PPP SAP to MLPPP SAP, or Ethernet SAP to MLPPP SAP. See [IP Interworking VLL \(Ipipe\) Services](#).

- Internet Enhanced Service (IES)
 - IES is used both as a direct Internet access service where the customer is assigned an IP interface for routed connectivity and for in-band management of the 7705 SAR. See [Internet Enhanced Service](#).
- Virtual Private LAN Service (VPLS)
 - VPLS provides a Layer 2 multipoint VPN service to end customers. VPLS includes Hierarchical VPLS (H-VPLS), which is an enhancement of VPLS that extends pseudowire-style signaled or static virtual circuit labeling outside the fully meshed VPLS core. The 7705 SAR can participate in hierarchical VPLS. See [VPLS](#).
- Virtual Private Routed Network Service (VPRN)
 - VPRN provides a Layer 3 VPN service to end customers. VPRN services provide MP-BGP peering with other PEs, configurable QoS policy and filtering, VRF import and export policies, and SGT-QoS marking. See [VPRN Services](#).

[Table 3](#) lists the supported pseudowire (PW) service types. The values are as defined in RFC 4446.

Table 3: Pseudowire Service Types

PW Service Type (EtherType)	Value
IP Layer 2 transport	0x000B
Ethernet tagged mode	0x0004
Ethernet raw	0x0005
ATM N-to-one VCC cell mode ⁽¹⁾	0x0009
ATM N-to-one VPC cell mode	0x000A
SAToP E1	0x0011
SAToP T1	0x0012
CESoPSN basic mode	0x0015
CESoPSN TDM with CAS	0x0017

Note:

1. “N-to-one” is expressed as “N-to-1” throughout this guide.

Service Policies

Common to all 7705 SAR connectivity services are policies that are assigned to the service. Policies are defined at the global level, then applied to a service on the router. Policies are used to define 7705 SAR service enhancements.

The types of policies that are common to all 7705 SAR connectivity services are SAP Quality of Service (QoS) policies and accounting policies. Filter policies are supported on network interfaces, Epipes, Ipipes, VPLS SAPs and SDPs (mesh and spoke), VPRN SAPs, IES SAPs, and IES in-band management SAPs.

- SAP Quality of Service (QoS) policies allow for different classes of traffic within a service at SAP ingress and SAP egress.

QoS ingress and egress policies determine the QoS characteristics for a SAP. A QoS policy applied to a SAP specifies the number of queues, queue characteristics (such as forwarding class, committed information rates, and peak information rates) and the mapping of traffic to a forwarding class. A QoS policy must be created before it can be applied to a SAP. A single ingress and a single egress QoS policy can be associated with a SAP.

- Accounting policies define how to count the traffic usage for a service for billing purposes.

The 7705 SAR routers provide a comprehensive set of service-related counters. Accounting data can be collected on a per-service, per-forwarding class basis, which enables network operators to accurately measure network usage and bill each customer for each individual service using any of a number of different billing models.

- Filter policies, also referred to as access control lists (ACLs), allow selective blocking or forwarding of traffic that matches criteria that is set in the policy. The resulting action (block or forward) is applied to that traffic.

Filter policies control the traffic allowed into a SAP or SDP, and are based on IP or MAC match criteria. The ability to configure and apply a filter depends on the combination of service, traffic type and direction, and entity type (SAP or SDP). Assigning a filter policy to a SAP or SDP is optional. Filter policies are identified by a unique filter policy ID. A filter policy must be created before it can be applied. A single ingress and a single egress filter policy can be associated with a SAP (Ethernet only), and a single ingress filter policy can be assigned to an SDP or an ATM SAP with bridged llc-snap encapsulation bound to VPLS service.

For more information on provisioning QoS policies, including queuing behaviors, refer to the 7705 SAR OS Quality of Service Guide. For information on configuring IP and MAC filter policies, refer to the 7705 SAR OS Router Configuration Guide.

Alcatel-Lucent Service Model

The 7705 SAR routers are deployed at the provider edge (PE). Services are provisioned on the 7705 SAR and other network equipment in order to facilitate the transport of telecommunications data across an IP/MPLS provider's core network. The data is formatted so that it can be transported in encapsulation tunnels created using generic routing encapsulation (GRE), IP encapsulation, or MPLS label switched paths (LSPs).

The service model has four main logical components, referred to as (logical) service entities. The entities are: customers, service types, service access points (SAPs), and service destination points (SDPs) (see [Service Entities](#)). In accordance with the service model, the operator uses the (logical) service entities to construct an end-to-end service. The service entities are designed to provide a uniform, service-centric model for service provisioning. This service-centric design implies the following characteristics.

- Many services can be bound to a single customer.
- Many services can be bound to a single tunnel.
- Tunnel configurations are independent of the services they carry.
- Changes are made to a single service entity rather than to multiple ports on multiple devices. It is easier to change one tunnel rather than several services.
- The operational integrity of a service entity (such as a service tunnel or service endpoint) can be verified by one operation rather than through the verification of dozens of parameters, thereby simplifying management operations, network scalability, and performance.
- A failure in the network core can be correlated to specific subscribers and services.
- The following policies are applied to each service:
 - QoS policies
 - accounting policies
 - IP filter policies (Epipe SAPs, Ipipe SAPs, IES SAPs, VPLS, and VPRN services, and IES Management SAPs). IPv4 filter policies can be applied to VPLS SDPs (mesh and spoke).
 - MAC filter policies (VPLS SAPs and VPLS SDPs [mesh and spoke])

Additional properties can be configured for bandwidth assignments, class of service, and accounting and billing on the appropriate entity.

Service Entities

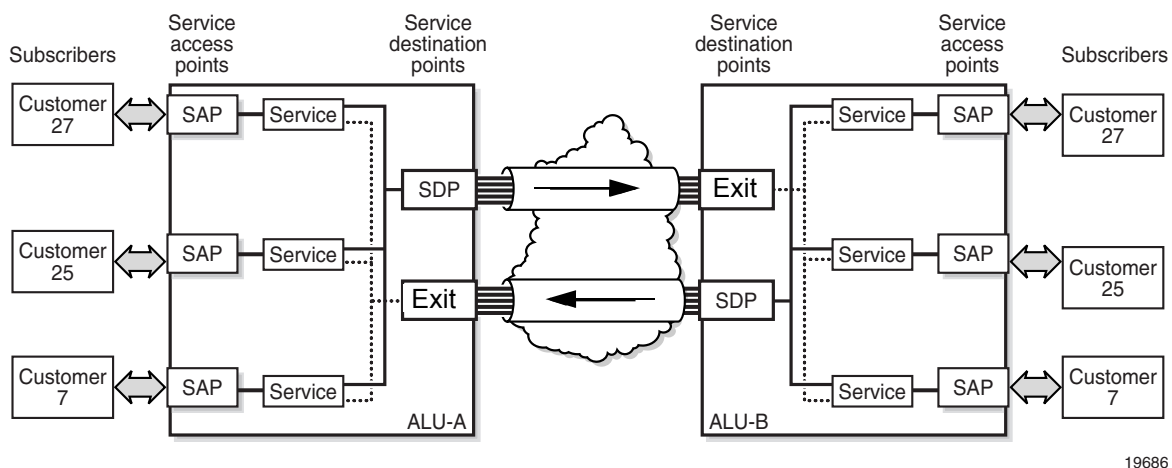
The basic (logical) service entities in the service model used to construct an end-to-end service are:

- [Customers](#)
- [Service Types](#)
- [Service Access Points \(SAPs\)](#)
- [Service Destination Points \(SDPs\)](#)

[Figure 1](#) shows an example of how the service entities relate to the service model. A subscriber (or customer) attachment circuit connects to a SAP. SDPs define the entrance and exit points of unidirectional service tunnels, which carry one-way traffic between the two routers (ALU-A and ALU-B). After SDPs have been configured, they are bound to a service, which is the final step in making the end-to-end service connection. In [Figure 1](#), the entrance point is labeled SDP and the exit point is labeled Exit.

Traffic encapsulation occurs at the SAP and SDP. The SAP encapsulation types are SONET/SDH, Ethernet, and TDM. The SDP encapsulation types are MPLS, GRE, and IP. For information on SAP encapsulation types, see [SAP Encapsulation Types and Identifiers](#). For information on SDP encapsulation types, see [SDP Encapsulation Types](#).

Figure 1: Service Entities and the Service Model



19686

Customers

The terms customers and subscribers are used synonymously. Every customer account must have a customer ID, which is assigned when the customer account is created. To provision a service, a customer ID must be associated with the service at the time of service creation.

Service Types

Service types provide the traffic adaptation needed by customer attachment circuits (ACs). This (logical) service entity adapts customer traffic to service tunnel requirements. The 7705 SAR provides four types of VLL service (that is, point-to-point MPLS-based emulation service, also called Virtual Private Wire Service (VPWS)): ATM VLL (Apipe), circuit emulation VLL (Cpipe), Ethernet VLL (Epipe), and IP interworking VLL (Ipipe) service types. The 7705 SAR also provides Ethernet (MAC-based) layer VPLS service, as well as IP layer VPRN and Internet Enhanced Services, that offer any-to-any connectivity within a Virtual Routing Domain or Generic Routing Domain, respectively.

Service Access Points (SAPs)

A service access point (SAP) is the point at which a service begins (ingress) or ends (egress) and represents the access point associated with a service. A SAP may be a physical port or a logical entity within a physical port. For example, a SAP may be a channel group within a DS1 or E1 frame, an ATM endpoint, an Ethernet port, or a VLAN that is identified by an Ethernet port and a VLAN tag. Each subscriber service connection on the 7705 SAR is configured to use only one SAP.

A SAP identifies the customer interface point for a service on a 7705 SAR router. [Figure 2](#) shows one customer connected to two services via two SAPs. The SAP identifiers are 1/1/5 and 1/1/6, which represent the physical ports associated with these SAPs. The physical port information should be configured prior to provisioning a service. Refer to the 7705 SAR OS Interface Configuration Guide for more information on configuring a port. See [Port and SAP CLI Identifiers](#) for more information on identifiers.

The 7705 SAR supports the following services types: ATM pseudowires (Apipe), TDM pseudowires (Cpipe), IP pseudowires (Ipipe), Ethernet pseudowires (Epipe), IES, VPLS, and VPRN services. Customer access to these services is given via SAPs. For each service type, the SAP has slightly different parameters.

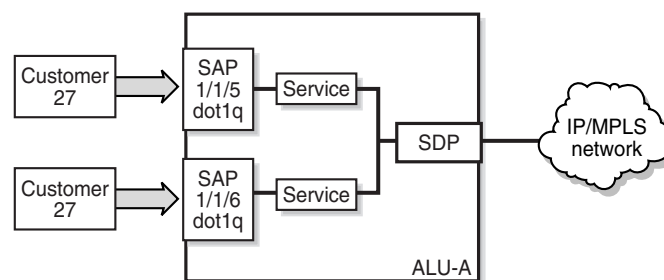
In general, SAPs are logical endpoints that are local to the 7705 SAR and are uniquely identified by:

- the physical Ethernet port, SONET/SDH port, or TDM channel group
- the encapsulation type for the service (for example, ATM)
- the encapsulation identifier (ID), which is, for example, the optional VLAN ID for Epipes, or the channel group ID for Cpipes

Depending on the encapsulation, a physical port or channel can have more than one SAP associated with it (for example, a port may have several circuit groups, where each group has an associated SAP). SAPs can only be created on ports or channels designated as “access” in the physical port configuration.

SAPs cannot be created on ports designated as core-facing “network” ports because these ports have a different set of features enabled in software.

Figure 2: Service Access Point (SAP)



19479

SAP Encapsulation Types and Identifiers

The SAP encapsulation type is an access property of the Ethernet port, SONET/SDH port, or TDM channel group used for the service. It identifies the protocol that is used to provide the service. The 7705 SAR supports three SAP encapsulation types: Ethernet, SONET/SDH, and TDM. Encapsulation types may have more than one option to choose from. For example, the options for TDM encapsulation type are “cem” (for circuit emulation service) and “atm” (for ATM service).

The encapsulation ID is an optional suffix that is appended to a *port-id* to specify a logical sub-element for a SAP. For example, a port can be tagged to use IEEE 802.1Q encapsulation (referred to as dot1q), where each individual tag can identify with an individual service. The encapsulation ID for an ATM SAP is a special case because it requires that a channel group identifier (which always uses the value 1) precede the VPI/VCI value.



Notes:

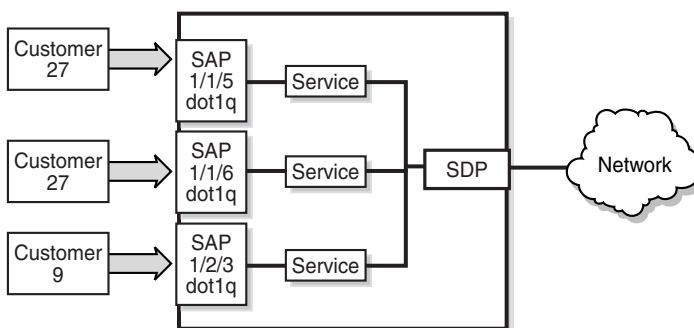
- Throughout this guide, the term “channel group” is often simplified to “channel”.
- Do not confuse the term “encapsulation ID” (described here) with the term “Encapsulation ID”, which is used with the SNMP and MIBs for the 7705 SAR.

Ethernet Encapsulations

The following encapsulation service options are available on Ethernet ports:

- null — supports a single service on the port; for example, where a single customer with a single service customer edge (CE) device is attached to the port.
- dot1q — supports multiple services for one customer or services for multiple customers (see [Figure 3](#)). An example of dot1q use might be the case where the Ethernet port is connected to a multi-tenant unit device with multiple downstream customers. The encapsulation ID used to distinguish an individual service is the VLAN ID in the IEEE 802.1Q header.

Figure 3: Multiple SAPs on a Single Port/Channel



19480

SONET/SDH Encapsulations

The following service encapsulation option is available on SONET/SDH ports:

- atm — supports multiple service instances for one customer, as well as bridged llc-snap encapsulated ATM SAP termination to VPLS

TDM Encapsulations

The following service encapsulation options are available on TDM ports:

- atm — supports multiple services for one customer
- cem — supports multiple services for one customer. Structured cem service (circuit emulation service over packet switched network (CESoPSN ($n \times$ DS0))) and unstructured cem service (structure-agnostic TDM over packet (SAToP)) are supported.
- ipcp — supports a single IP service per TDM channel group on channelized interfaces. This is typically used for router interconnection using the point-to-point protocol (PPP).

Service Types and SAP Encapsulations — Summary

[Table 4](#) lists the SAP encapsulations available to 7705 SAR service types. These encapsulations apply to access-facing ports. The service (port) type and encapsulations are configured at the port level.

Table 4: Service Types and SAP Encapsulations

Service (Port) Type	Encapsulation Option
Ethernet	null
Ethernet	dot1q
SONET/SDH	atm
TDM	cem
TDM	atm
TDM	ipcp

SAP Configuration Considerations

In addition to being an entry or exit point for service traffic, a SAP has to be configured for a service and, therefore, has properties. When configuring a SAP, consider the following.

- A SAP is a local entity and is only locally unique to a given device. The same SAP ID value can be used on another 7705 SAR.
- There are no default SAPs. All subscriber service SAPs must be created.
- The default administrative state for a SAP at creation time is administratively enabled.
- When a SAP is deleted, all configuration parameters for the SAP are also deleted.
- A SAP is owned by and associated with the service in which it is created.
- An Ethernet port or channel with a dot1q encapsulation type means that the traffic for the SAP is identified based on a specific IEEE 802.1Q VLAN ID value. The VLAN ID is stripped off at SAP ingress and the appropriate VLAN ID is placed on at SAP egress. As a result, VLAN IDs only have local significance, so the VLAN IDs for the SAPs for a service need not be the same at each SAP.
- A TDM circuit emulation service (for example, CESoPSN) requires a channel group. The channel group must be created before it can be assigned to a SAP.
- An ATM service (for example, ATM N-to-1 VCC cell transport) on a 16-port T1/E1 ASAP Adapter card or a 2-port OC3/STM1 Channelized Adapter card requires a channel group. For this case, the channel group requires the assignment of all 24 timeslots (T1) or 30 timeslots (E1). The timeslot assignments are made automatically after a channel group is configured for ATM encapsulation.
- If a port or channel is administratively shut down, all SAPs on that port or channel will be operationally out of service.
- A SAP cannot be deleted until it has been administratively disabled (shut down).
- Each SAP can have one of the following policies assigned to it:
 - Ingress QoS policy
 - Egress QoS policy
 - Accounting policy
 - Ingress filter policy (for Epipe SAPs, Ipipe SAPs, VPLS, VPRN, IES SAPs, and IES in-band management SAPs)
 - Egress filter policy (for Ethernet VPLS ports only)

Service Destination Points (SDPs)

An SDP identifies the endpoint of a logical unidirectional service tunnel. The service tunnel provides a path from one 7705 SAR to another network device, such as another 7705 SAR, a 7710 SR, or a 7750 SR.

In more general terms, SDP refers to the service tunnel itself. The SDP terminates at the far-end router, which is responsible for directing the flow of packets to the correct service egress SAPs on that device.



Note: In this document and in command line interface (CLI) usage, SDP is defined as Service Destination Point. However, it is not uncommon to find the term SDP defined in several different ways, as in the following list. All variations of SDP have the same meaning:

- Service Destination Point
- Service Distribution Point
- Service Destination Path
- Service Distribution Path
- Service Delivery Path

When an SDP is bound to a service, the service is referred to as a distributed service. A distributed service consists of a configuration with at least one SAP on a local node, one SAP on a remote node, and an SDP binding that binds the service to the service tunnel.

An SDP has the following characteristics.

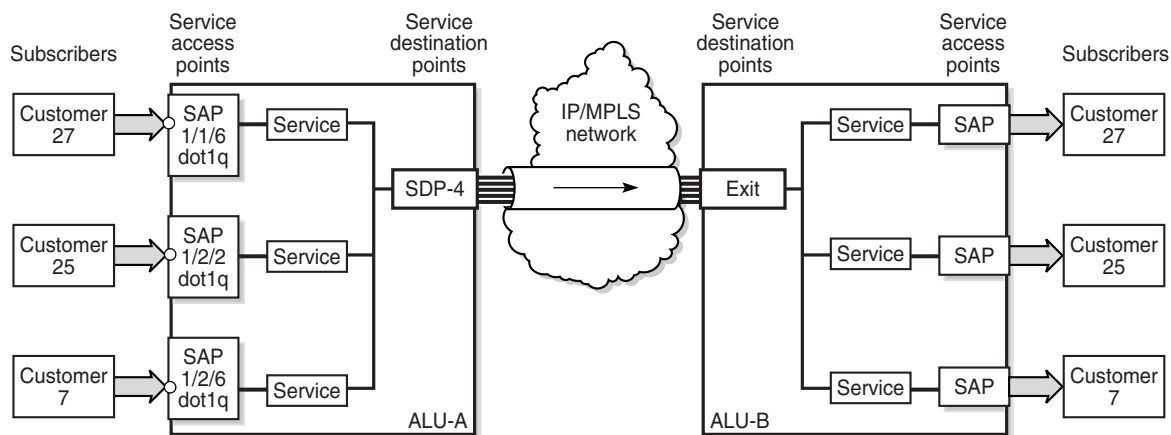
- An SDP is locally unique to a participating 7705 SAR. The same SDP ID can appear on other 7705 SAR routers.
- An SDP uses the system IP address of the far-end edge router to locate its destination.
- An SDP is not specific to any one service or to any type of service. Once an SDP is created, services are bound to the SDP. An SDP can also have more than one service type associated with it.
- All services bound to an SDP use the same SDP (transport) encapsulation type defined for the SDP (GRE, IP, or MPLS).
- An SDP is a service entity used for service management. Even though the SDP configuration and the services carried within it are independent, they are related objects. Operations on the SDP affect all the services associated with the SDP. For example, the operational and administrative state of an SDP controls the state of services bound to the SDP.

- An SDP tunnel from the local device (typically, a 7705 SAR) to the far-end device (router) requires a return SDP tunnel from the far end back to the local device. Each device must have an SDP defined for every remote router to which it wants to provide service. The SDP must be created before a distributed service can be configured.
- An SDP can be used to provide PW redundancy, where up to four spoke SDPs can be assigned to a service endpoint that acts as the managing entity to ensure service connection. See [Pseudowire Redundancy](#).

SDP Binding

To configure a distributed service pointing from ALU-A to ALU-B, the SDP ID on the ALU-A side (see [Figure 4](#)) must be specified during service creation in order to bind the service to the tunnel (the SDP). Otherwise, service traffic is not directed to a far-end point and the far-end 7705 SAR device(s) cannot participate in the service (there is no service). To configure a distributed service pointing from ALU-B to ALU-A, the SDP ID on the ALU-B side must be specified.

Figure 4: SDP Tunnel Pointing from ALU-A to ALU-B



19687

Spoke and Mesh SDPs

There are two types of SDPs: spoke and mesh. The type of SDP defines how flooded traffic (or broadcast traffic, such as an ARP request) is propagated. For point-to-point PW/VLL services, spoke SDPs are the only way to bind services to the far-end router. For VPLS, mesh and spoke SDP bindings are allowed.

A spoke SDP that is bound to a service operates like a traditional bridge port. Flooded traffic that is received on the spoke SDP is transmitted to all the spoke SDPs to which it is connected. Flooded traffic is not transmitted back toward the port from which it was received.

In contrast, a mesh SDP that is bound to a service operates like a single bridge port. Flooded traffic received on a mesh SDP is transmitted to all spoke SDPs and SAPs to which it is connected. Flooded traffic is not transmitted to any other mesh SDPs or back toward the port from which it was received. This property of mesh SDPs is important for multi-node networks; mesh SDPs are used to prevent the creation of routing loops.

SDP Encapsulation Types

The Alcatel-Lucent service model uses encapsulation tunnels (also referred to as service tunnels) through the core to interconnect 7705 SAR and SR routers. An SDP is a logical way of referencing the entrance to an encapsulation tunnel.

In Release 4.0, the following encapsulation types are supported:

- Layer 2 within multiprotocol label switching ([MPLS Encapsulation](#))
- Layer 2 or Layer 3 within generic routing encapsulation ([GRE Encapsulation](#))
- Layer 2 within IP ([IP Encapsulation](#))

Each SDP service tunnel has an entrance and an exit point for the pseudowires contained within it.

MPLS Encapsulation

Multiprotocol label switching (MPLS) encapsulation has the following characteristics.

- An MPLS 7705 SAR router supports both signaled and non-signaled LSPs through the network.
- Non-signaled paths are defined at each hop through the network.

An SDP has an implicit Maximum Transmission Unit (MTU) value because services are carried in encapsulation tunnels and an SDP is an entrance to the tunnel. The MTU is configurable (in octets), where the transmitted frame can be no larger than the MTU.

With MPLS, the MTU for the network port permits the addition of labels for transmission across the MPLS network. Ethernet frames that are sent out of a network port toward the MPLS core network (or a P router) are allowed to be oversized in order to include the MPLS labels without the need to fragment large frames. See [MTU Settings](#) for more information.

The following ways of configuring an MPLS tunnel are supported:

- LDP signaled
- RSVP-TE signaled
- user-configured (static LSP)

GRE Encapsulation

Generic routing encapsulation (GRE) is one of the most common tunneling techniques in the industry. GRE tunnels are used to transport various network layer packets and are especially useful for facilitating pseudowires over IP networks. Since MPLS is a Layer 2.5 protocol, MPLS packets cannot be natively transported over a Layer 3 (IP) network. Therefore, GRE is the ideal alternative for applications where traffic must travel over a Layer 3 network; for example, in DSL applications.

For the HSDPA offload application (see [HSDPA Offload](#)), ATM pseudowires are transported over IP using GRE tunneling. For other applications, Ethernet and TDM pseudowires over GRE are also supported.

GRE SDPs are supported on any port of the 8-port Ethernet Adapter card version 1 and version 2 for the 7705 SAR-8, any port of the 8-port Ethernet Adapter card version 2 for the 7705 SAR-18, or any Ethernet port on the 7705 SAR-F. Up to 512 GRE tunnels are supported per chassis.

GRE Format

In accordance with RFC 2784, a GRE encapsulated packet has the following format:

- delivery header
- GRE header
- payload packet

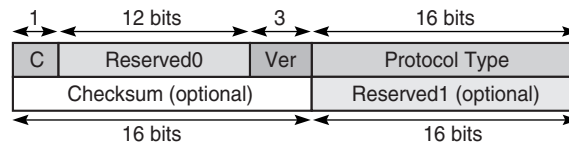
Delivery Header

The delivery header is always an IP header.

GRE Header

The GRE header format is shown in [Figure 5](#) and described in [Table 5](#).

Figure 5: GRE Header



19874

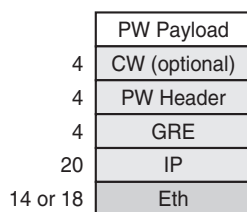
Table 5: GRE Header Descriptions

Field	Description
C	<p>Specifies whether there is a checksum in the header</p> <p>If set to 1, both the checksum and reserved1 fields must be present</p> <p>On the 7705 SAR, in the network egress (transmit) direction, the C bit is always set to 0; therefore, the checksum and reserved1 fields are omitted from the header. The GRE header is therefore always 4 bytes (32 bits) in the network egress direction.</p> <p>In the network ingress direction, the C bit validity is checked. If it is set to a non-zero value, the GRE packet is discarded and the IP discards counter is increased.</p>
Reserved0	<p>Indicates whether the header contains optional fields</p> <p>Not applicable to the 7705 SAR — first 5 bits of the field are always set to 0 and bits 6 to 12 are reserved for future use and also set to 0 by the 7705 SAR</p>
Ver	<p>Always set to 000 for GRE</p> <p>At network ingress, if a GRE packet is received with the version field set to any value other than 000, the packet is discarded and the IP discards counter is increased</p>
Protocol Type	<p>Specifies the protocol type of the original payload packet — identical to Ethertype with the only supported option being MPLS unicast (0x8847)</p>
Checksum (optional)	Not applicable
Reserved1 (optional)	Not applicable

Payload Packet

The payload encapsulation format for pseudowires over GRE is shown in [Figure 6](#) and described in [Table 6](#).

Figure 6: GRE Pseudowire Payload Packet over Ethernet



19873

Table 6: GRE Pseudowire Payload Packet Descriptions

Field	Description
Eth	The Layer 2 transport header In Release 4.0, the only Layer 2 protocol supported is Ethernet MTU size depends on the encapsulation type (14 bytes for null encapsulation and 18 bytes for dot1q encapsulation)
IP	Indicates the transport protocol The Ethertype is always set to IP (0x800), and in case of a mismatch, the unexpected or illegal Ethertype counters are increased ⁽¹⁾
GRE	Indicates the encapsulation protocol
PW header	The pseudowire header identifies a service within the GRE tunnel
CW (optional)	The pseudowire control word (CW) is a 32-bit (4-byte) field that is inserted between the VC label and the Layer 2 frame For more information on the control word, see Pseudowire Control Word
PW payload	The PW payload is the payload of the service being encapsulated (Ethernet, ATM, or TDM)

Note:

1. The only exception to the Ethertype is if the packets are address resolution protocol (ARP) packets. For information on ARP, refer to the 7705 SAR OS Router Configuration Guide.

When using GRE, the service MTU might have to be set to a value smaller than 2102 octets. For more information on MTU, see [MTU Settings](#).

At the network egress of the 7705 SAR, the source address of the IP header is always set to the system IP address. The destination IP address is set to the system IP address of the service router on which the GRE SDP is configured. Using the system IP addresses to bring up the GRE session ensures that any IP link between the two routers can be used to transport GRE/IP packets. It might therefore be necessary to use static IP address configuration over DSL networks to ensure connectivity between the routers (especially if the DSL modem is in bridge mode).

IP Encapsulation

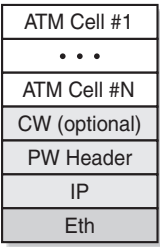
IP encapsulation is added to the SAR in response to a growing demand for more pseudowire-based solutions in mobile backhaul. IP encapsulation is similar to GRE encapsulation but allows pseudowires to be transported natively over IP packets. Only static pseudowires are supported for IP SDPs, because there is no label path to define except for the endpoints. The path is an IP routed path.

In Release 4.0, transport of pseudowires over IP tunnels is introduced. IP tunnels can be transported over Ethernet ports, VLAN interfaces in network mode, or over PPP or MLPPP network links. However, the typical application is expected to use Apipes over IP over Ethernet, as shown in [Figure 7](#).

Payload Packet

A typical payload encapsulation format for pseudowires over IP is shown in [Figure 7](#) and described in [Table 7](#).

Figure 7: IP Example of Pseudowire Payload Packet over Ethernet



20695

Table 7: IP Pseudowire Payload Packet Descriptions

Field	Description
Eth	The Layer 2 transport header The only Layer 2 protocol supported is Ethernet MTU size depends on the encapsulation type (14 bytes for null encapsulation and 18 bytes for dot1q encapsulation)
IP	Indicates the transport protocol The only supported option is MPLS in IP (0x89) The Ethertype is always set to IP (0x0800), and in case of a mismatch, the unexpected or illegal Ethertype counters are increased ⁽¹⁾
PW header	The pseudowire header identifies a service within the IP tunnel. The pseudowire header is like an MPLS header that has context only to the encapsulating and decapsulating LERs. This means that the IP transport network has no knowledge about the pseudowires that it carries. Only the edge LERs are aware of the pseudowire because the IPv4 Protocol Number field is set to 137 (0x89), indicating an MPLS unicast packet.
CW (optional)	The pseudowire control word (CW) is a 32-bit (4-byte) field that is inserted between the VC label and the Layer 2 frame For more information on the control word, see Pseudowire Control Word
ATM Cell #1 to ATM Cell #N	Indicates the payload of the service being encapsulated (ATM)

Note:

1. The only exception to the Ethertype is if the packets are address resolution protocol (ARP) packets. For information on ARP, refer to the 7705 SAR OS Router Configuration Guide.

Spoke SDP Terminations

The 7705 SAR supports spoke SDP as termination points for IES and VPRN services. [Table 8](#) shows which service interfaces and spoke SDPs can be connected to each other. For example, an Epipe spoke SDP can connect to an IES or VPRN interface. Refer to [Spoke SDP Termination to IES](#) and to [Spoke SDP Termination to VPRN](#) for more information.

Table 8: Spoke SDP Termination Support ⁽¹⁾

	Epip Spoke SDP	Epip Spoke SDP Redundancy (standby-signal-master enabled)	IES Interface	VPRN Interface	VPLS Spoke SDP	VPLS Spoke SDP Redundancy (suppress-standby-signaling disabled)
Epip Spoke SDP	✓	✓	✓	✓	✓	✓
Epip Spoke SDP Redundancy (standby-signal-master enabled)	✓	✓	✓	✓	✓	✓
IES Interface	✓	✓	✓	✓	✓	✓
VPRN Interface	✓	✓	✓	✓	✓	✓
VPLS Spoke SDP	✓	✓	✓	✓	✓	✓
VPLS Spoke SDP Redundancy (suppress-standby-signaling disabled)	✓	✓	✓	✓	✓	✓

Note:

1. Refer to the 7705 SAR Release Notes for the specific dates associated with the above termination options.

SDP Ping

Ping is an application that allows a user to test whether a particular host is reachable. SDP Ping is an application that allows a user to test whether a particular SDP endpoint is reachable.

SDP ping uses the SDP identifier that is stored in the 7705 SAR that originates the ping request. SDP ping responses can be configured to return through the corresponding return tunnel as a round-trip ping, or out-of band when unidirectional pings are requested. Refer to the 7705 SAR OS OAM and Diagnostics Guide, “SDP Ping”, for more information.

SDP Keepalives

The SDP keepalive application allows a system operator to actively monitor the SDP operational state using periodic Alcatel-Lucent SDP Echo Request and Echo Reply messages. Automatic SDP keepalives work in a manner that is similar to a manual SDP ping command. The SDP Echo Request and Echo Reply messages provide a mechanism for exchanging far-end SDP statuses.

SDP keepalive Echo Request messages are only sent after the SDP has been completely configured and is administratively up and the SDP keepalives are administratively up. If the SDP is administratively down, keepalives for the SDP are disabled.

SDP keepalive Echo Request messages are sent out periodically based on the configured Hello Time. An optional message length for the Echo Request can be configured.

The SDP is immediately brought operationally down when:

- the Max Drop Count Echo Request messages do not receive an Echo Reply
- a keepalive response is received that indicates an error condition

After a response is received that indicates the error has cleared and the Hold Down Time interval has expired, the SDP is eligible to be put into the operationally up state. If no other condition prevents the operational change, the SDP enters the operational state.

Configuring SDP keepalives on a given SDP is optional. SDP keepalives have the following configurable keepalive parameters:

- Hello Time
- Message Length
- Max Drop Count
- Hold Down Time
- Timeout

For information about configuring keepalive parameters, refer to [Configuring an SDP](#).

Mobile Solutions

The Mobile Radio Access Network (RAN) is rapidly growing to meet the increased demand in mobile services. This in turn increases demands on carriers to provide high-bandwidth, mobile broadband services. Today, at a typical cell site, 2G and 3G base stations are connected to high-cost, T1/E1 leased lines that are used to backhaul both voice and data traffic to the MTSO. For mission-critical, delay-sensitive, and low-bandwidth traffic such as voice, signaling, and synchronization traffic, it is vital that the high availability of these leased lines is ensured. SLA agreements also promise a high level of availability for customers.

Currently, however, best-effort traffic such as high-speed downlink packet access (HSDPA) is also switched over these SLA-enabled leased lines. HSDPA is a 3G mobile telephony communications service that allows UMTS networks to have higher data transfer speeds and capacity, allowing the mobile customer (end user) to browse the Internet or to use the mobile device. The increasing use of HSDPA is having a dramatic impact on the ability of the T1/E1 leased lines to scale with the traffic growth as well as on the operating costs of these lines.

Similar issues confront CDMA EVDO networks today.

Alcatel-Lucent provides a solution that enables mobile operators to keep their existing infrastructure (circuit-based leased lines), while gradually migrating to a packet-based infrastructure that will allow scalability, decrease costs, and ease the transition to the next-generation, all-IP network solutions.

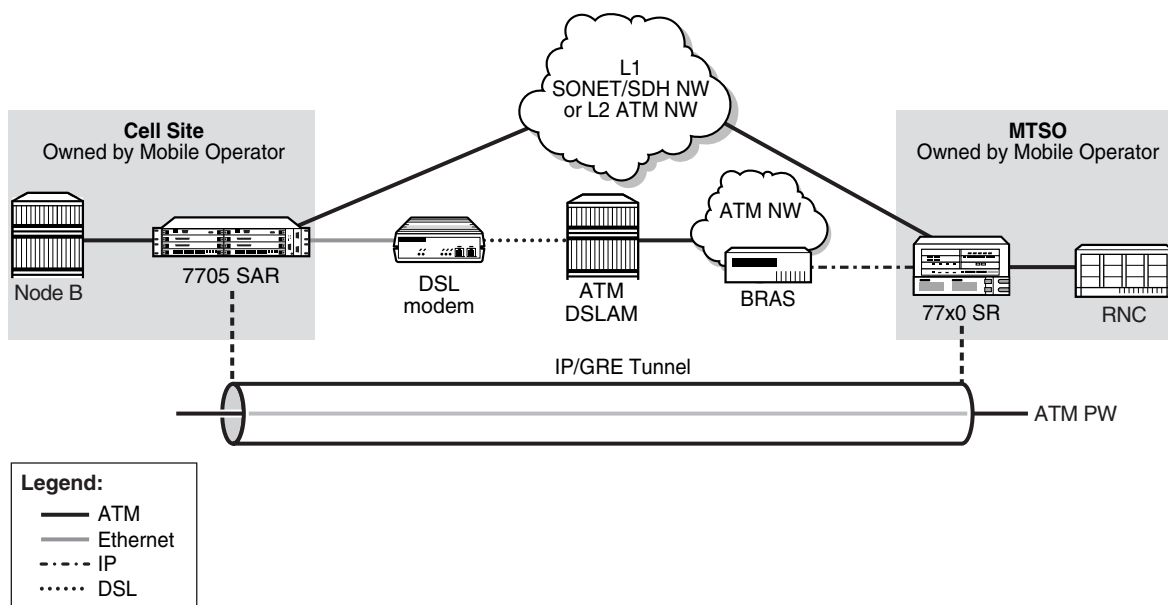
HSDPA Offload

The Alcatel-Lucent solution is to make use of widely available DSL networks and split the traffic being backhauled. Mission-critical traffic (voice, signaling, synchronization) remains on the T1/E1 leased line circuits, while the best-effort, bandwidth-hungry HSDPA traffic is offloaded to DSL networks.

The 7705 SAR-F is an ideal candidate for this scenario. The 7705 SAR-F is a small-scale, fixed version of the 7705 SAR product family. It is optimized for use in standalone small or midsized sites where traffic aggregation from multiple cell sites is not needed. For more information on the 7705 SAR-F, refer to the 7705 SAR-F Chassis Installation Guide.

Figure 8 shows a typical example of HSDPA offload.

Figure 8: HSDPA Offload Example



19872

A 3G Node B is connected to a 7705 SAR over an ATM/IMA access port (SAP endpoint). An ATM SAP-to-SAP connection is set up in the 7705 SAR and a pseudowire is configured between the two endpoints to emulate local ATM switching. Traffic from the Node B enters an ATM/IMA port, the VCs transporting mission-critical traffic are locally switched (SAP-to-SAP) to another ATM/IMA port (SAP endpoint), and then switched over the leased lines to the MTSO.



Note: ATM SAP-to-SAP connections are supported between any T1/E1 ASAP port that is in access mode with ATM/IMA encapsulation and another port with the same encapsulation configuration. One endpoint of a SAP connection can be an IMA group, while the other endpoint can be on a single ATM port.

ATM SAP-to-SAP connections are also supported between any two OC3/STM1 ports and between any T1/E1 ASAP port and OC3/STM1 port, as long as both SAPs support ATM.

For non-mission-critical traffic, for example, HSDPA traffic, an Ethernet interface on the 7705 SAR is connected to an external DSL modem. HSDPA traffic is interworked to ATM pseudowires and transported over the DSL network to the BRAS, then forwarded to the service router at the MTSO.

Failure Detection

Failure of the GRE SDP or the IP network it rides over can be detected by OAM tools as well as by BFD. With SAA, OAM tools can be configured to run periodically in order to facilitate faster failure detection. If a failure occurs, the ATM SAPs must be rerouted by the 5620 SAM to the ATM ports used for backhauling the traffic. The mission-critical traffic is still serviced before the best-effort HSDPA traffic.

For information on OAM and SAA tools, refer to the 7705 SAR OS OAM and Diagnostics Guide. For information on BFD, refer to the 7705 SAR OS Router Configuration Guide.

ETH-CFM (802.1ag and Y.1731)

Ethernet Connectivity Fault Management (ETH-CFM) is defined in two complementary standards: IEEE 802.1ag (dot1ag) and ITU-T Y.1731. Both standards specify protocols, procedures, and managed objects in support of transport fault management, including discovery and verification of the path, and detection and isolation of a connectivity fault for each Ethernet service instance.

Dot1ag and Y.1731 provide fault management (FM) functions for loopback, linktrace, and connectivity checks, as well as Up and Down MEP support for Ethernet SAPs and Down MEP support for spoke SDPs (dot1ag only).

Y.1731 fault management (Y.1731 FM) extends dot1ag CFM by providing functions for alarm indication signal (AIS) and ETH-Test testing. Furthermore, Y.1731 provides performance management (Y.1731 PM) functions for delay and loss measurements. For more information on Y.1731 PM, refer to the “ITU-T Y.1731 Performance Monitoring (PM)” section in the 7705 SAR OS OAM and Diagnostics Guide.

For information on running Ethernet OAM tests, refer to the “ETH-CFM (802.1ag and Y.1731)” section in the 7705 SAR OS OAM and Diagnostics Guide.

CFM uses Ethernet frames that are distinguished by their Ethertype value and special Ethernet multicast address. For more information on the Ethernet frame, and the Ethertype and Ethernet multicast address values, see [ETH-CFM Frame Format](#).

Using CFM, interoperability can be achieved between different vendor equipment in the service provider network, up to and including customer premises bridges.



Note: In the 7705 SAR CLI command hierarchy, commands for 802.1ag and Y.1731 are found under the `eth-cfm` context that appears at the following levels:

- `global (config>eth-cfm)`
- `Epipe service (config>service>epipe>sap>eth-cfm)`
- `show (show>eth-cfm)`
- `oam (oam eth-cfm)`

802.1ag and Y.1731 Terminology

Table 9 defines 802.1ag terms. Table 10 illustrates the similarities and differences between Y.1731 and 802.1ag terms.

Table 9: 802.1ag Terminology

Term	Expansion	Definition
MA	Maintenance Association	A grouping of maintenance entities (MEs) that need to be managed as part of a given service Typically, on the 7705 SAR, the MEs are a pair of MEPs (one local and one remote)
MA-ID	Maintenance Association Identifier	A unique combination of <i>md-index</i> , <i>MD level</i> and <i>ma-index</i> , where <i>md-index</i> , <i>level</i> , and <i>ma-index</i> are user-configured values An MA is identified by its MA-ID
MD	Maintenance Domain	A set of Ethernet network elements or ports that are controlled by an operator, where boundaries are set by MEPs
MD level	Maintenance Domain level	A user-configured value of 0 to 7 representing a level of hierarchy within a CFM architecture. The value 7 is the highest MD level and 0 is the lowest. The MD level is transmitted as part of the Ethernet CFM frame. A CFM message is said to have a higher MD level when its MD level value is higher than the MD value configured on the receiving MEP 7705 SAR. Higher-level CFM messages are relayed as data frames by MEPs and ignored by the MEP entity
ME	Maintenance Entity	An Ethernet port or endpoint that is managed as part of dot1ag OAM An endpoint can be a SAP or a spoke SDP
MEP	Maintenance Association End Point	An (edge) endpoint that can terminate, respond to, or initiate the OAM messages for a configured MD-MA combination
MEP-ID	Maintenance Association End Point Identifier	A MEP is identified by its MEP-ID, which is a unique combination of <i>md-index</i> and <i>ma-index</i> , where <i>md-index</i> and <i>ma-index</i> are user-configured values
MIP	Maintenance Association Intermediate Point	An intermediate point that can respond to OAM messages initiated by MEPs in the same MD. Connectivity fault management (CFM) messages destined for other MIPs or the destination MEP are transparent to MIPs. MIPs are not supported on the 7705 SAR

Table 10: Y.1731 Terminology

Term	Expansion	Definition
MEG	Maintenance Entity Group	Same as MA but applies to Y.1731
MEG-ID	Maintenance Entity Group Identifier	Same as MA-ID but applies to Y.1731
MEG level	Maintenance Entity Group Level	Same as MD level but applies to Y.1731 Note that although MEG level and MD level are equivalent terms, there is no Y.1731 equivalent to an MD
MEP	Maintenance Association End Point	Same as MEP for 802.1ag

MDs, MD Levels, MAs, and MEPs (802.1ag)

Maintenance domains (MDs) and maintenance associations (MAs) are configured at the global level. Maintenance association endpoints (MEPs) are configured at the service level.

An MD is a set of network elements that have a common CFM OAM purpose. MDs are identified by their MD index and can be given an MD name. An MD is assigned a maintenance domain level (MD level). There are eight MD levels. Use MD levels to set up a messaging hierarchy for the CFM architecture.

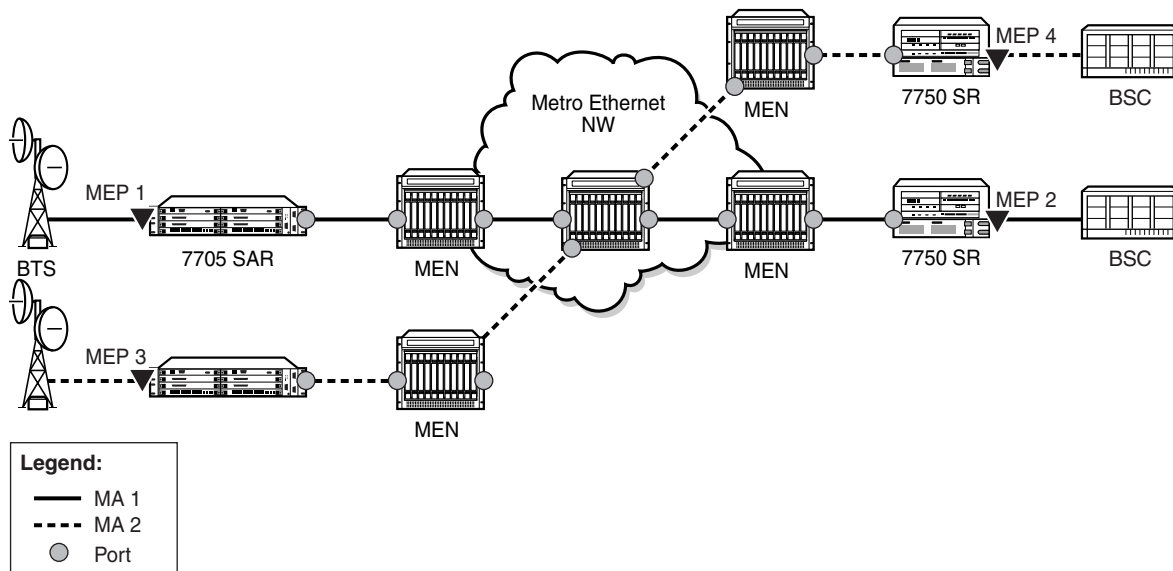
An MA consists of a pair of maintenance endpoints (one local and one remote MEP) that are managed as part of an Ethernet VLL service. The MA and the VLL service are associated by configuring the MA's bridge identifier parameter to have the same value as the VLL service ID parameter of the VLL service that supports the MEPs. MAs are identified by their MA index and can be given an MA name. The MA is used to verify the integrity of a single service instance.

A MEP is configured as part of an Ethernet SAP or spoke SDP. MEPs can generate or terminate CFM OAM messages. MEPs only communicate within the same MD level, where the value of the MD level (0 to 7) is carried in a CFM OAMPDU. MEPs are identified by their MEP identifier and MA-ID. The MA-ID is configured at the global level.

[Figure 9](#) depicts a high-level view of MEPs in a CFM-enabled network. Two MAs are shown. The endpoints of MA 1 are MEPs 1 and 2, while MEPs 3 and 4 are the endpoints for MA 2.

For more information on MEP support, see [Ethernet OAM](#).

Figure 9: MEPs and MAs



20497

MEG Levels, MEGs, and MEPs (Y.1731)

On the 7705 SAR, the implementation of Y.1731 Fault Management (FM) is similar to that of dot1ag CFM, except that Y.1731 does not have a maintenance domain (MD). For Y.1731 and 802.1ag, the following terms are equivalent:

- MEG level is equivalent to MD level
- MEG is equivalent to MA
- a Y.1731 MEP is equivalent to a dot1ag MEP

To access Y.1731 functions, including Y.1731 Performance Management (PM) functions, configure a MEP to have the domain format set to **none** and the association format set to **icc-based**.

ETH-CFM Frame Format

ETH-CFM OAMPDU messages for 802.1ag and Y.1731 use a standard Ethernet frame (see [Figure 10](#)). The parts of the frame are described below.

Figure 10: ETH-CFM Frame Format

Destination MAC
Source MAC
T = 8100
Vlan / Dot1p
T = 8902
ETH-CFM OAMPDU
FCS

20472

Destination and Source Addresses

The destination and source MAC addresses of the CFM message must match at the send and the receive routers. For example, a 7705 SAR-initiated ETH-CFM message would use the spoke SDP MAC address of the 7705 SAR as the source MAC address and the spoke SDP MAC address of the far-end router as the destination MAC address. At the far end, the source and destination MAC addresses would be the reverse of the near end.

An exception to the matching source-destination MAC address requirement occurs for linktrace and continuity messages, where the destination MAC address is set to a multicast group address. The designated multicast group address for linktrace and CCM is 01-80-C2-00-00-3x; where *x* represents the maintenance domain (MD) level (for 802.1ag) or the MEG level (for Y.1731). For example, a dot1ag CCM message destined for 01-80-C2-00-00-31 corresponds to MD level 1.

CCM packets using source-destination multicast MAC addresses are for user-initiated messages only (that is, loopbacks).

Ethertype (T)

If dot1q encapsulation is not configured, then the Ethertype value is 0x8902 and there is no VLAN tag. If dot1q encapsulation is configured, the VLAN tag (Ethertype value 0x8100) is present and is followed by the Ethertype value of 0x8902, which indicates ETH-CFM messages. The Ethertype is not hard-coded to 0x8100 and can be changed via the port configuration command.

VLAN/dot1p

This is the VLAN dot1p identifier. If null encapsulation is configured (for Ethernet SAPs or spoke SDP bindings to a VC-type, `ether` or `vlan`), the frame is tagged with NULL.

ETH-CFM OAMPDU

The contents of the Ethernet OAMPDU depend on whether dot1ag or Y.1731 standards are being used. For details on the dot1ag or Y.1731 OAMPDU, see [ETH-CFM OAMPDU](#).

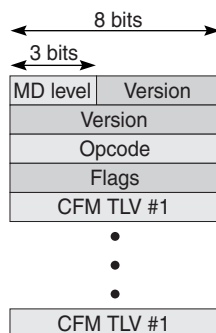
FCS

This is the frame check sequence field.

ETH-CFM OAMPDU

As shown in [Figure 11](#), each ETH-CFM OAMPDU message contains the following fields:

- MD level or MEG level: user-configured value, 0 to 7
- version: current version is 0
- opcodes: as defined in IEEE 802.1ag and Y.1731 standards, for messages such as:
 - Continuity Check Message (CCM)
 - Loopback Message (LBM)
 - Loopback Reply (LBR)
 - Linktrace Message (LTM)
 - Linktrace Reply (LTR)
- flags: as defined in IEEE 802.1ag and Y.1731 standards
- one or more TLVs, which include:
 - End TLV
 - Data TLV
 - Reply Ingress TLV
 - Reply Egress TLV
 - LTM egress identifier TLV
 - LTR egress identifier TLV
 - Test TLV

Figure 11: ETH-CFM OAMPDU Message

20847

CFM Frame Processing

Table 11 shows whether a CFM frame received by various MEP types is processed or not. Frames that are processed are extracted from the datapath for CFM processing; unprocessed frames are treated as user traffic and follow the user traffic rules.

Table 11: CFM Frame Processing

MEP Details				Received CFM Frame Treatment	
MEP Type	Direction	VC-Type	Port	Untagged	Tagged ⁽¹⁾
Spoke SDP	Down	Raw	Any	Processed	Not processed
		VLAN	Any	Not processed	Processed
SAP	Down	Any	Dot1q	Not processed ⁽²⁾	Processed
		Any	Null	Processed	Not processed
	Up	Any	Dot1q	Not processed	Processed
		Any	Null	Processed	Not processed

Notes:

1. Tagged frames are single-tagged frames.
2. Untagged frames received on a dot1q encapsulated port are processed by the Epipe configured to handle untagged frames. The SAP identifier on this Epipe uses VLAN ID 0, also referred to as SAP 0 (for example, 1/1/2:0).

Processing SAP 0 OAM Packets

Note the following points with respect to processing OAM packets on SAP 0:

- the 7705 SAR transmits untagged OAM frames on SAP 0
- the 7705 SAR does not process OAM frames tagged with VLAN ID 0 on a port configured with null encapsulation
- (for consistency with the 7710 SR), the 7705 SAR processes double-tagged OAM frames under the following configuration scenario: there is a SAP Up MEP on a dot1q encapsulated port, using SAP 0, and having VC-type VLAN
 In this case, the top VLAN tag is removed and the bottom VLAN tag is assumed to be SAP 0. If the bottom VLAN tag is not SAP 0, the VLAN ID is changed to 0. If the frame is an OAM frame, double-tagged is extracted from the SAP Up MEP and the reply is with a single-tagged frame with its VLAN ID set to 0.
- on a SAP Down MEP (dot1q), untagged frames are processed on SAP 0
- in general, except for the SAP 0 case above, double-tagged (or more) Ethernet OAM frames are not processed in the SAP
- in the unlikely case that a SAP Up MEP or a spoke SDP Down MEP on the 7705 SAR receives an untagged Ethernet OAM packet on a tagged VC (that is, the vc-type configuration for the SAP or spoke SDP is VLAN), then the frame is processed. The reply sent to the originator is a tagged packet on the VC.

MEG-ID and ICC-Based Format

Similar to an 802.1ag MA-ID, a Y.1731 MEG-ID uniquely identifies a group of MEs that are associated at the same MEG level in one administrative domain. The features of MEG-IDs are:

- each MEG-ID must be globally unique
- if the MEG may be required for path setup across interoperator boundaries, then the MEG-ID must be available to other network operators
- the MEG-ID should not change while the MEG remains in existence
- the MEG-ID should be able to identify the network operator that is responsible for the MEG

The 7705 SAR supports the ITU Carrier Code (ICC-based) MEG-ID format (TLV value 32). The generic and ICC-based MEG-ID formats are defined in the ITU-T Y.1731 standard. [Figure 12](#) shows the ICC-based MEG-ID format.

The MEG-ID value has exactly 13 characters and consists of two subfields, the ITU Carrier Code (ICC) followed by a Unique MEG-ID Code (UMC). The ITU Carrier Code consists of between 1 and 6 left-justified characters (alphabetic or leading alphabetic with trailing numeric). The UMC code immediately follows the ICC and consists of between 7 and 12 characters, with trailing NULLs (if necessary to complete the 13 characters).

The UMC is the responsibility of the organization to which the ICC has been assigned, provided that uniqueness is guaranteed.

Figure 12: ICC-based MEG-ID Format

	8	7	6	5	4	3	2	1
1	Reserved (01)							
2	MEG ID Format (32)							
3	MEG ID Format (13)							
4	0	MEG ID value [1]						
5	0	MEG ID value [2]						
⋮								
17	0	MEG ID value [12]						
18	0	MEG ID value [13]						
19	Unused (all ZEROs)							
20								
⋮								
⋮								
47								
48								

20848

ETH-CFM Functions and Tests

The following list of ETH-CFM functions applies to both dot1ag and Y.1731 Ethernet OAM:

- ETH-CFM — ETH-CFM can be enabled or disabled on a SAP or spoke SDP
- MD levels — eight MD levels can be assigned
- MD name — the following MD name formats are supported:
 - none (no MD name; used for specifying a Y.1731 functionality)
 - DNS name
 - MAC address and 2-octet integer
 - character string
- MAs — MAs for each MD level can be configured, modified, or deleted
 - each MA is defined by a unique combination of MD index, MD level, and MA index. This unique combination of values is called the MA identifier (MA-ID).
 - the following MA name formats are supported:
 - primary VLAN ID (VID)
 - character string
 - 2-octet integer
 - RFC 2685, Virtual Private Networks Identifier
 - icc-based (used for specifying a Y.1731 functionality)
 - when a VID is used as the MA name, CFM will not support VLAN translation because the unique MA-ID must match all the MEPs
 - the default format for an MA name is a 2-octet integer; integer value 0 means that the MA is not attached to a VID.
- MEPs — Up and Down MEPs on a SAP, and Down MEPs on a spoke SDP
 - MEPs can be configured, modified, or deleted for each MD level (both associations for the Up or Down MEP are with the same Bridge Port; as described in Section 19.2.1 of IEEE Standard 802.1ag-2007)
 - each MEP is uniquely identified by its MEP identifier and MA-ID combination
- MEP creation — MEP creation on a SAP is allowed only for Ethernet ports (with null or q-tag encapsulations)

ETH-CFM Ethernet OAM Tests

This section describes Ethernet OAM tests for ETH-CFM on the 7705 SAR, including:

- loopbacks
- linktrace
- throughput measurement
- continuity check
- remote defect indication
- alarm indication signal
- Ethernet (signal) test

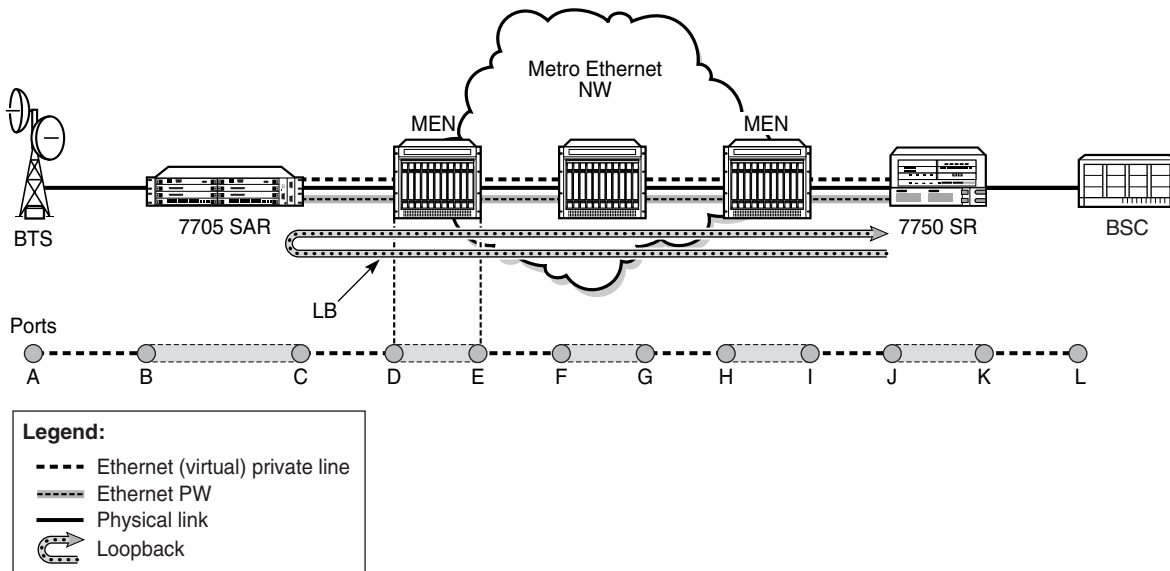
Loopback (LB)

The loopback function is supported by 802.1ag and Y.1731 on the 7705 SAR. A Loopback Message (LBM) is generated by a MEP to its peer MEP. Both dot1ag and dot3ah loopbacks are supported. The loopback function is similar to IP or MPLS ping in that it verifies Ethernet connectivity between the nodes on a per-request basis. That is, it is non-periodic and is only initiated by a user request.

In [Figure 13](#), the line labeled LB represents the dot1ag loopback message between the 7750 SR (source) and 7705 SAR (target). The 7750 SR-generated LBM is switched to the 7705 SAR, where the LBM message is processed. Once the 7705 SAR generates the Loopback Reply message (LBR), the LBR is switched over the PW to the 7750 SR.

The following loopback-related functions are supported:

- loopback message functionality on a MEP can be enabled or disabled
- MEP — supports generating loopback messages and responding to loopback messages with loopback reply messages
- displays the loopback test results on the originating MEP

Figure 13: Dot1ag Loopback Test

20480

Linktrace (LT)

The linktrace function is supported by 802.1ag and Y.1731 on the 7705 SAR. A Linktrace Message (LTM) is originated by a MEP and targeted to a peer MEP in the same MA and within the same MD level. Its function is similar to IP traceroute. The peer MEP responds with a Linktrace Reply (LTR) message after successful inspection of the LTM.

The following linktrace related functions are supported:

- enables/disables LT functions on an MEP
- MEP — supports generating LTMs and responding with LTR messages
- displays linktrace test results on the originating MEP

Throughput Measurement

Throughput measurement is performed by sending frames to the far end at an increasing rate (up to wire speed) and measuring the percentage of frames received back. In general, the rate is dependent on frame size; the larger the frame size, the lower the rate.

The Y.1731 specification recommends the use of unicast ETH-LB and ETH-Test frames to measure throughput.

In Release 4.0 of the 7705 SAR, LBM processing and LBR generation are enhanced and occur on the datapath, allowing the 7705 SAR to respond to loopback messages at wire speed and making in-service throughput tests possible. Thus, if the 7705 SAR receives LBMs at up to wire speed, it can generate up to an equal number of LBRs.

In order to process LBMs at wire speed, there must be either no TLVs or a single TLV (which is a Data TLV) in the LBM frame. The End TLV field (0) must be present and the frame can be padded with data after the End TLV field in order to increase the size of the frame. Note, however, that the MAC address cannot be a multicast MAC address; it must be the MEP MAC destination address (DA).

Datapath processing of LBMs is supported for the following MEPs:

- dot1ag
 - SAP Up MEP
 - SAP Down MEP
 - spoke SDP Down MEP
- Y.1731
 - SAP Up MEP
 - SAP Down MEP

For spoke SDP Down MEPs, fastpath (datapath) LBM processing requires that both interfaces—the LBM receiver and the LBR transmitter—reside on the same adapter card. For example, if the 7705 SAR must perform a reroute operation and needs to move the next-hop interface to another adapter card (that is, LBMs are received on one card and LBRs are transmitted on another), then the fastpath processing of LBMs is terminated and LBM processing continues via the CSM.

Continuity Check (CC)

The continuity check function is supported by 802.1ag and Y.1731 on the 7705 SAR. A Continuity Check Message (CCM) is a multicast frame that is generated by a MEP and sent to its remote MEPs in the same MA. The CCM does not require a reply message. To identify faults, the receiving MEP maintains a MEP database with the MAC addresses of the remote MEPs with which it expects to maintain connectivity checking. The MEP database can be provisioned manually. If there is no CCM from a monitored remote MEP in a preconfigured period, the local MEP raises an alarm.

The following CC capabilities are supported:

- enable and disable CC for a MEP
- automatically put local MEPs into the database when they are created

- manually configure and delete the MEP entries in the CC MEP monitoring database. Note that the only local provisioning required to identify a remote MEP is the remote MEP identifier (using the `remote-mepid mep-id` command).
- CCM transmit interval: 10ms, 100ms, 1s, 10s, 1m, 10m (default: 10s)
- transmit interval: 10ms, 100ms, 1s, 10s, 1m, 10m (default: 10s)
- CCM declares a fault when it:
 - stops hearing from one of the remote MEPs for a period of 3.5 times the CC interval
 - hears from a MEP with a lower MD level
 - hears from a MEP that is not in the same MA
 - hears from a MEP that is in the same MA but is not in the configured MEP list
 - hears from a MEP that is in the same MA with the same MEP ID as the receiving MEP
 - recognizes that the CC interval of the remote MEP does not match the local configured CC interval
 - recognizes that the remote MEP declares a fault

An alarm is raised and a trap is sent if the defect is greater than or equal to the configured low-priority-defect value.
- CC must be enabled in order for RDI information to be carried in the CCM OAMPDU

ETH-RDI

The Ethernet Remote Defect Indication function (ETH-RDI) is used by a MEP to communicate to its peer MEPs that a defect condition has been encountered. Defect conditions such as signal fail and AIS may result in the transmission of frames with ETH-RDI information. ETH-RDI is used only when ETH-CC transmission is enabled.

ETH-RDI has the following two applications:

- single-ended fault management — the receiving MEP detects an RDI defect condition, which gets correlated with other defect conditions in this MEP and may become a fault cause. The absence of received ETH-RDI information in a single MEP indicates the absence of defects in the entire MEG.
- contribution to far-end performance monitoring — the transmitting MEP reflects that there was a defect at the far end, which is used as an input to the performance monitoring process

A MEP that is in a defect condition transmits frames with ETH-RDI information. A MEP, upon receiving frames with ETH-RDI information, determines that its peer MEP has encountered a defect condition.

The specific configuration information required by a MEP to support the ETH-RDI function is as follows:

- MEG level — the MEG level at which the MEP exists
- ETH-RDI transmission period — application-dependent and is the same value as the ETH-CC transmission period
- priority — the priority of frames containing ETH-RDI information and is the same value as the ETH-CC priority

The PDU used to carry ETH-RDI information is the CCM.

ETH-AIS

The Ethernet Alarm Indication Signal function (ETH-AIS) is a Y.1731 CFM enhancement used to suppress alarms at the client (sub) layer following detection of defect conditions at the server (sub) layer.

Transmission of frames with ETH-AIS information can be enabled or disabled on a Y.1731 MEP.

Frames with ETH-AIS information can be issued at the client MEG level by a MEP, including a server MEP, upon detecting the following conditions:

- signal failure conditions in the case where ETH-CC is enabled
- AIS condition in the case where ETH-CC is disabled

For a point-to-point Ethernet connection at the client (sub) layer, a client layer MEP can determine that the server (sub) layer entity providing connectivity to its peer MEP has encountered a defect condition upon receiving a frame with ETH-AIS information. Alarm suppression is simplified by the fact that a MEP is expected to suppress only those defect conditions associated with its peer MEP.

Only a MEP, including a server MEP, is configured to issue frames with ETH-AIS information. Upon detecting a defect condition, the MEP can immediately start transmitting periodic frames with ETH-AIS information at a configured client MEG level. A MEP continues to transmit periodic frames with ETH-AIS information until the defect condition is removed. Upon receiving a frame with ETH-AIS information from its server (sub) layer, a client (sub) layer MEP detects the AIS condition and suppresses alarms associated with all its peer MEPs. Once the AIS condition is cleared, a MEP resumes alarm generation upon detecting defect conditions.

The following specific configuration information is required by a MEP to support ETH-AIS:

- client MEG level — the MEG level at which the most immediate client layer MEPs exist
- ETH-AIS transmission period — the transmission period of frames with ETH-AIS information
- priority — the priority of frames with ETH-AIS information

ETH-Test

The Ethernet Test (signal) function (ETH-Test) is a Y.1731 CFM enhancement used to perform one-way, on-demand, in-service diagnostics tests, which include verifying frame loss, bit errors, and so on.



Note: The out-of-service diagnostics test is not supported in the 7705 SAR, Release 4.0.

When configured to perform such tests, a MEP inserts frames with ETH-Test information such as frame size and transmission patterns.

When an in-service ETH-Test function is performed, data traffic is not disrupted and the frames with ETH-Test information are transmitted.

To support ETH-Test, a Y.1731 MEP requires the following configuration information:

- MEG level — the MEG level at which the MEP exists
- unicast MAC address — the unicast MAC address of the peer MEP for which ETH-Test is intended
- data — an optional element with which to configure data length and contents for the MEP. The contents can be a test pattern and an optional checksum.

Examples of test patterns include all 0s or all 1s. At the transmitting MEP, this configuration information is required for a test signal generator that is associated with the MEP. At the receiving MEP, this configuration is required for a test signal detector that is associated with the MEP.

- priority — the priority of frames with ETH-Test information

A MEP inserts frames with ETH-Test information towards a targeted peer MEP. The receiving MEP detects the frames with ETH-Test information and performs the requested measurements.

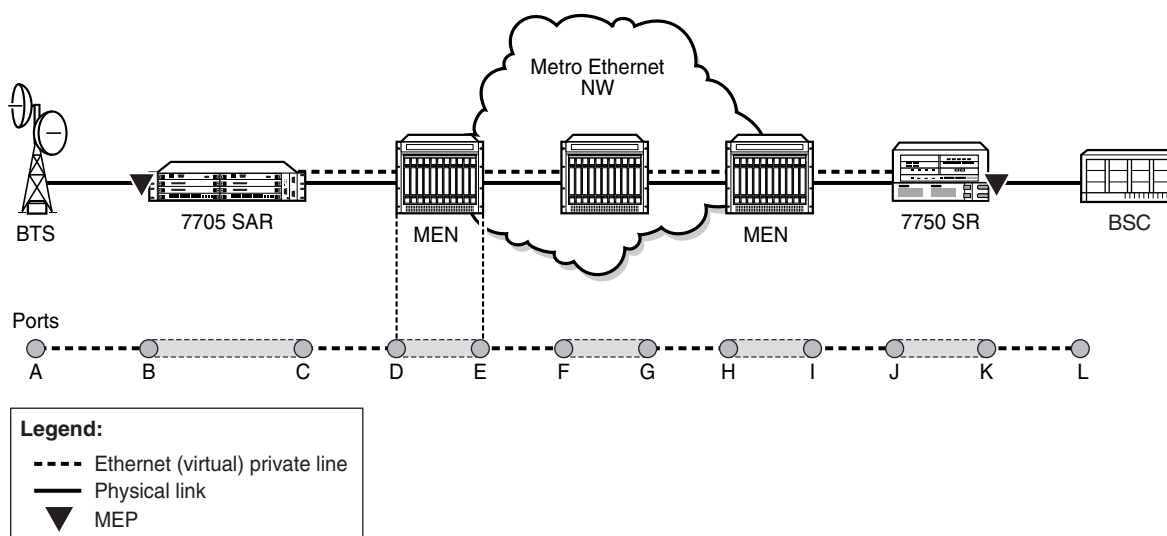
MEP Support (802.1ag and Y.1731)

The 7705 SAR supports Up and Down maintenance association endpoints (MEPs) on Ethernet SAPs for both 802.1ag and Y.1731. It also supports Down MEPs on Ethernet spoke SDPs for 802.1ag only.

802.1ag MEP Support on Ethernet SAPs

The 7705 SAR supports Up and Down MEPs on Ethernet SAPs. [Figure 14](#) shows that the 7705 SAR can terminate and respond to CFM messages received from connected devices, such as base stations, when port B is a Down MEP on a SAP. A CFM message coming from port A would be terminated on port B of the 7705 SAR. Conversely, port B on the 7705 SAR can generate and send a CFM message towards port A.

Figure 14: MEP on Ethernet Access

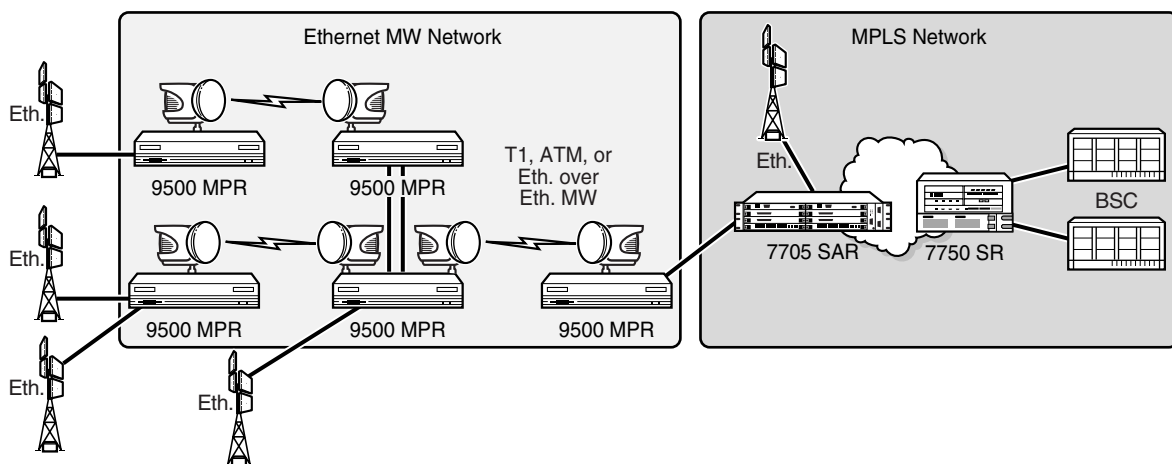


20474

[Figure 15](#) shows how a Down MEP on an Ethernet SAP might be used. In this example, an Ethernet network connects to an access Ethernet port on the 7705 SAR and there are multiple SAPs on that port (that is, multiple endpoints). Since CFM offers OAM capabilities on a per-service basis, which in this case means per SAP (or endpoint), each service can run CFM. Note that if BSC end devices were directly connected to the 7705 SAR (and a VLAN was not used to separate services from each other), EFM would offer capabilities similar to CFM for Ethernet OAM.

In the example shown in [Figure 15](#), separate dot1ag instances initiated on the 9500 MPR nodes can be used to ensure Ethernet layer connectivity on a per-base-station basis. All the traffic from these base stations is aggregated and switched to a single port on the 7705 SAR. Each base station is recognized through a different VLAN, where the VLANs are bound to different services. CFM with traffic in the Down MEP OAMPDU direction at the Ethernet SAP offers the flexibility to run OAM tests on a per-base-station basis.

Figure 15: Down MEP at Ethernet SAP



20475

802.1ag MEP Support on Ethernet Spoke SDPs

The 7705 SAR supports down maintenance association endpoints (MEPs) on Ethernet spoke SDP endpoints. [Figure 16](#) illustrates a Down MEP on an Ethernet spoke SDP.

CFM messages can be generated and switched across an Ethernet PW. CFM messages that are received and have an MD that matches the value configured on the 7705 SAR are extracted and processed. Any received CFM messages with an MD level that does not match the configured value are not terminated and are switched transparently to the Ethernet SAP.

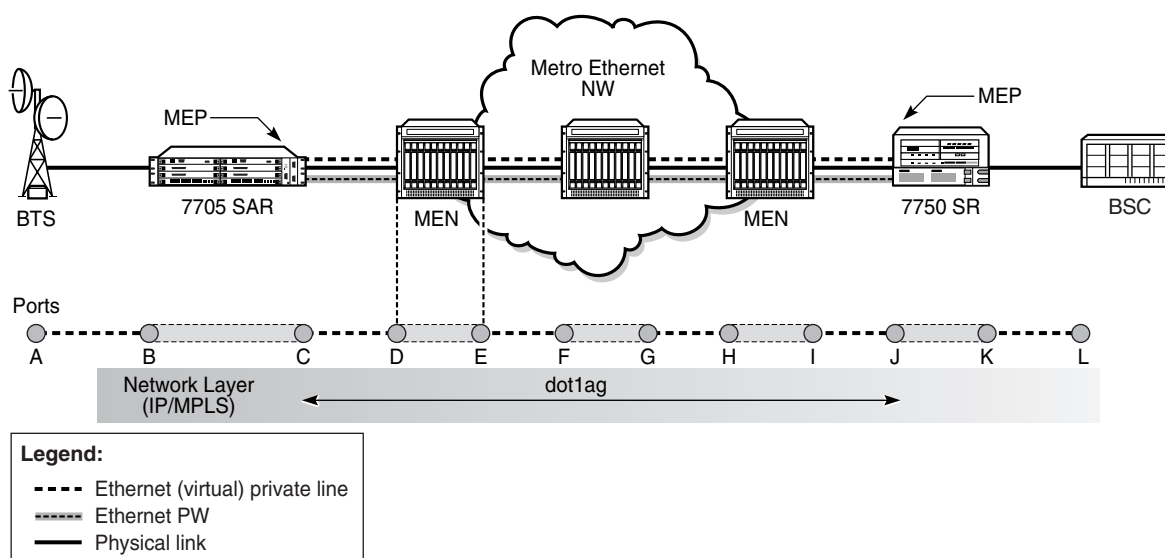
Down MEPs on Ethernet spoke SDPs on the 7705 SAR support the following:

- termination of the CFM messages destined for the MEP-ID of the 7705 SAR
- termination of CFM messages at the user-configured domain only
- discarding of OAMPDUs at a lower MD level than the configured one (an alarm message is raised)

- transparent pass-through of upper layer CFM messages
→ MD of the CFM messages that are higher than the one configured on the 7705 SAR

MIP functionality (that is, forwarding of CFM messages with the same MD level) is not supported in Release 4.0 of the 7705 SAR. Only Down MEP functionality is supported on Ethernet spoke SDPs (that is, termination of CFM messages that are ingress from the Ethernet PW, or generation of CFM packets that are destined for the 7750 SR spoke SDP MEP-ID).

Figure 16: Dot1ag Down MEPs on Spoke SDPs



20476

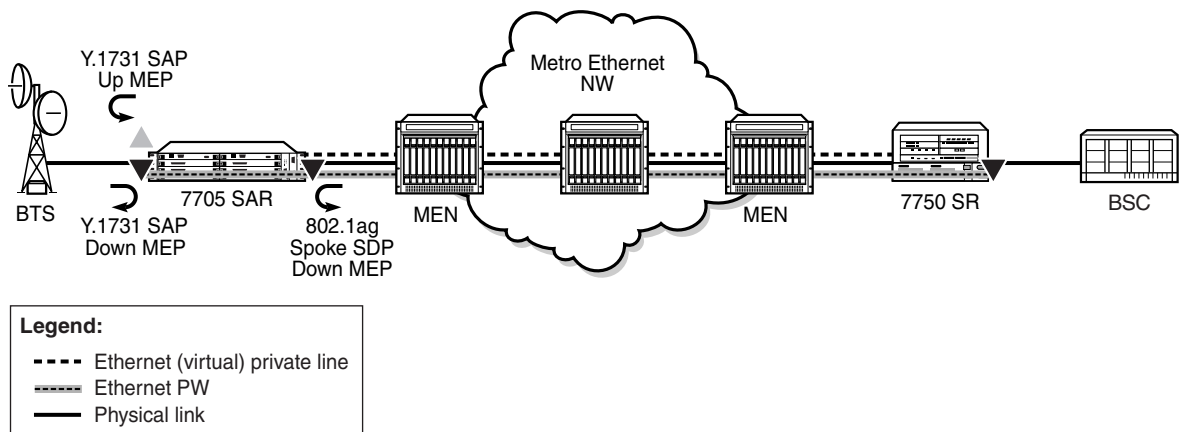
In [Figure 16](#), assuming that the MEP is enabled both on the SR and the 7705 SAR spoke SDP endpoints, the 7705 SAR can generate CFM messages and can terminate any received CFM messages that are destined for the 7705 SAR MEP-ID and have a matching configured domain. Any 7705 SAR-generated CFM packets would traverse the Ethernet PW and would be processed first by the SR node. The Ethernet PW running between the 7705 SAR and the SR generates a pipe-like connectivity; thus, no intermediate Ethernet node can process the CFM messages. All the CFM messages are transported over Ethernet PWs, and PW termination only takes place on SR and 7705 SAR endpoints.

Y.1731 MEP Support on Ethernet SAPs

As shown in Figure 17, the 7705 SAR supports Y.1731 Up and Down MEPs on Ethernet SAPs that are bound to an Ethernet PW service.

Figure 17 also shows an 802.1ag Down MEP on an Ethernet spoke SDP in order to illustrate that when performing CFM tests on the 7705 SAR, a Y.1731 Up MEP on an Ethernet SAP should be used instead of an 802.1ag Down MEP on an Ethernet spoke SDP. Using a Y.1731 SAP Up MEP means that CFM packets verify the switching fabric and SAP status before the packet is processed, because the SAP is on the access side of the 7705 SAR whereas a spoke SDP is on the network side. If a spoke SDP Down MEP is used, packets are terminated and extracted on the network side without being switched through the switching fabric.

Figure 17: Y.1731 MEP Support on the 7705 SAR



20849

Priority Mapping (802.1ag and Y.1731)

Operators often run OAM tests over a single, specific forwarding class (FC). For example, an operator might be mapping OAM traffic to FC2 (AF – Assured Forwarding) and, in order to examine the delay, jitter, or loss qualities of the OAM traffic, would need to run OAM tests using FC2. To provide operators with the ability to control which FC the OAM packets will follow, the `priority` command is included in several OAM test commands.

When the 7705 SAR generates an Ethernet OAM frame, it uses the priority as per the user's configuration of the `priority` keyword and then sends the frame through the datapath. Thus, the OAM frame follows the entire datapath and receives the same treatment as any other user frame before it is switched over the port.

For example, a CCM frame generated by a SAP Up MEP with a priority value of 7 will receive the following treatment.

- First, the CCM frame is classified as per the access ingress and QoS policy settings. For example, the CCM frame can be mapped to the BE forwarding class if the assigned QoS policy has its priority 7 mapped to BE.
- Then, the OAM packet is mapped to the associated queue (the queue hosting the BE forwarding class) and follows ingress scheduling like any other datapath frame.
- Next, the CCM frame is switched through the fabric and reclassified to the network egress queues, as per the assigned QoS policy classifiers.
- Finally, the CCM frame is scheduled again, as per the queue type and profile state of the queue.

This implementation replicates the user experience since the OAM packet follows the same path as the data packets.

Priority Mapping for SAP Up MEPs

For Up MEPs on a SAP, priority mapping operates as described in the following list, which indicates how the messages or replies generated on ingress have their FC and VLAN tag priority set.

The resulting frames (CCM, LMM, DMM, DM1, LMR, or DMR) are inserted in the access ingress datapath and are processed in the same way as any other frame. That is, they are classified based on the sap-ingress policy.

- Continuity Check messages (CCMs) generated on ingress are based on the setting of the `ccm-ltm-prio` command for the MEP (that is, the VLAN tag priority is set according to the `ccm-ltm-prio` command for the MEP).

- Loss Measurement messages (LMMs), two-way Delay Measurement messages (DMMs), and one-way Delay Measurement messages (DM1s) generated on ingress are based on the priority specified during the LMM, DMM, or DM1 test (that is, the VLAN tag priority is set according to the priority specified during the test).
- Loss Measurement replies (LMRs) and two-way Delay Measurement replies (DMRs) generated on ingress keep the VLAN tag priority of their corresponding LMM or DMM frame.

[Table 12](#) summarizes the FC and VLAN priority mappings for SAP Up and Down MEPs based on the frame type.

Table 12: FC and VLAN Priority Mappings for Up and Down MEPs as per Frame Type

MEP Type	Frame Type (Tx)	7705 SAR		SR-Type	
		FC	VLAN-priority	FC	VLAN-priority
SAP Up MEP	CCM	derived from vlan-prio after classification	ccm-ltm-prio	ccm-ltm-prio	same as incoming
	LMM, DMM, DM1	derived from vlan-prio after classification	user-specified	ccm-ltm-prio	same as incoming
	LMR, DMR	derived from vlan-prio after classification	preserve incoming query priority	derived from incoming vlan-prio after classification	same as incoming
SAP Down MEP	CCM	ccm-ltm-prio	ccm-ltm-prio	ccm-ltm-prio	ccm-ltm-prio
	LMM, DMM, DM1	user-specified	user-specified	user-specified	user-specified
	LMR, DMR	ccm-ltm-prio	incoming tag priority	derived from incoming vlan-prio after classification	same as incoming

Priority Mapping for SAP Down MEPs

For SAP Down MEPs, priority mapping operates as described in the following list, which indicates how the messages or replies generated on egress have their FC and VLAN tag priority set.

- CCMs generated on egress are based on `ccm-ltm-prio` of the MEP (that is, FC and VLAN tag priority are set according to the `ccm-ltm-prio` of the MEP).
 - LMM, DMM and DM1 generated on egress are based on the priority specified during the test (that is, FC and VLAN tag priority are set according to the priority specified during the test).
 - LMR and DMR generated on egress use the `ccm-ltm-prio` of the MEP as FC. The VLAN tag priority is not replaced (that is, the VLAN tag priority of LMM and DMM are kept).
-

Service Creation Overview

[Figure 18](#) shows a flowchart that provides an overview of the process to create a service. Service creation can be separated into two main functional areas — core services tasks and subscriber services tasks. Core services tasks are performed prior to subscriber services tasks.

Before starting the process shown in [Figure 18](#), ensure that the 7705 SAR system has been configured with an IP address and (for the 7705 SAR-8 or 7705 SAR-18) has the appropriate adapter cards installed and activated.

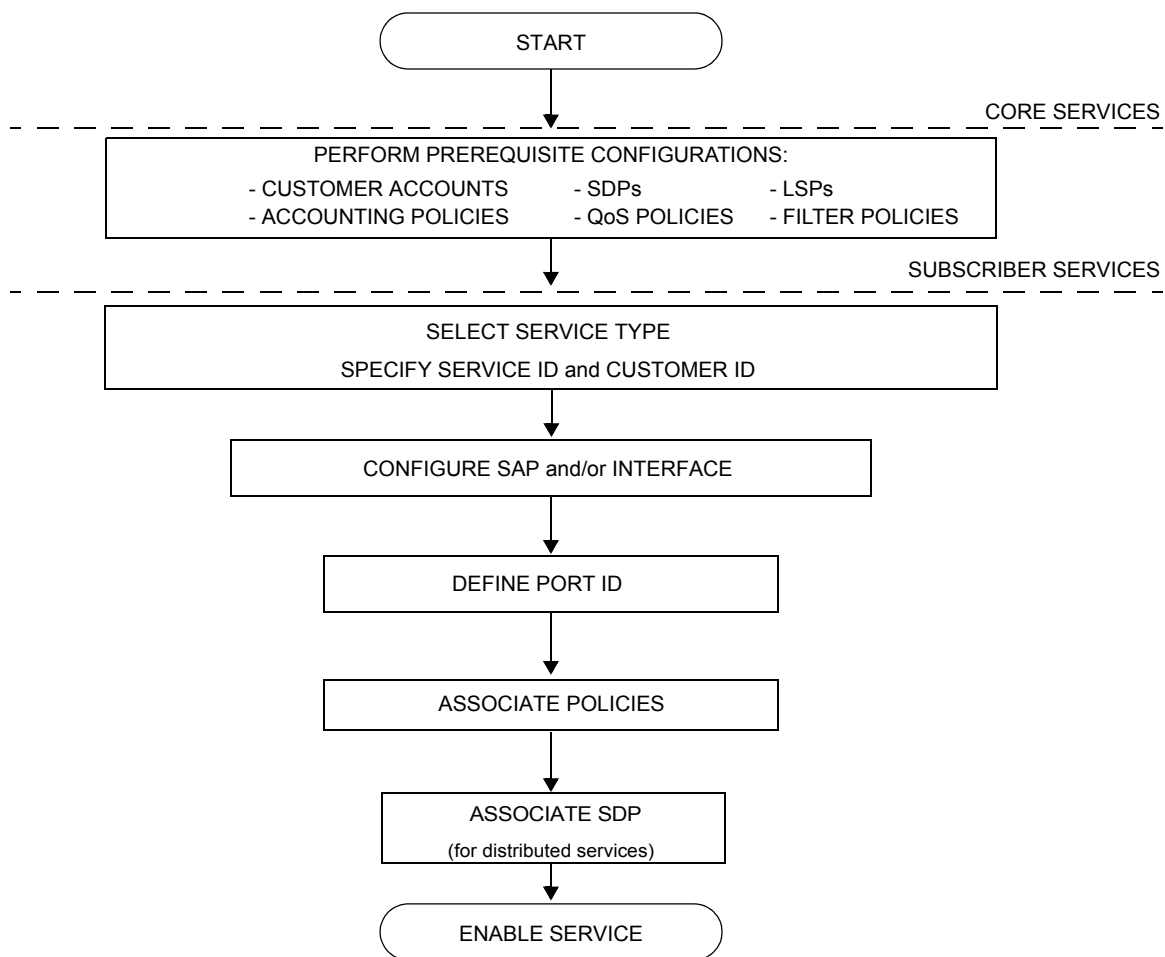
Core services tasks include the following items:

- create customer accounts
- create template QoS and accounting policies
- create LSPs
- create SDPs

Subscriber services tasks include the following items:

- create VLL (Apipe, Cpipe, Epipe, or Ipipe), IES, VPLS, or VPRN services
- configure SAPs
- bind SDPs
- create exclusive QoS policies
- optionally assign IP filter policies to Epipe SAPs, Ipipe SAPs, VPLS, VPRN, IES SAPs, and/or IES management SAPs (IPv4 filters can also be applied to VPLS SDPs (mesh and spoke))
- optionally assign MAC ingress filter policies to VPLS SAPs and VPLS SDPs (mesh and spoke)

Figure 18: Service Creation and Implementation Flowchart



Port and SAP CLI Identifiers

When typing text in the command line interface (CLI), *port-id* is often displayed to indicate that a port identifier may need to be typed in the command line. Similarly, to identify a SAP, the *port-id* is used, but additional information may need to be appended to indicate a logical sub-element of the port.

On the CLI, a *port-id* is defined using the format *slot/mda/port*, where *slot* identifies the IOM card slot (always 1), *mda* identifies the physical slot in the chassis for the adapter card, and *port* identifies the physical port on the adapter card.

The value that can be appended to a SAP has the format *[:][ID]* or *[.][ID]*. The colon or dot and following ID identify a sub-element of the port (if applicable), such as a TDM channel group for a Cpipe or a VPI/VCI value for an Apipe.

For example, a SAP associated with a TDM channel group on port 12 of an 16-port T1/E1 ASAP Adapter card in MDA slot 3 is identified as <1/3/12.3>, where ".3" is the appended value and identifies that for this SAP the channel group begins in timeslot 3.

Reference Sources

For information on standards and supported MIBs, refer to [Standards and Protocol Support](#).

Configuring Global Service Entities with CLI

This section provides information to create subscriber (customer) accounts and to configure service destination points (SDPs) using the command line interface.

Topics in this section include:

- [Service Model Entities on page 94](#)
- [Basic Configuration on page 95](#)
- [Common Configuration Tasks on page 97](#)
 - [Configuring Customer Accounts on page 97](#)
 - [Configuring SDPs on page 98](#)
- [ETH-CFM \(802.1ag and Y.1731\) Tasks on page 101](#)
 - [Configuring ETH-CFM Parameters \(802.1ag and Y.1731\) on page 101](#)
 - [Applying ETH-CFM Parameters on page 103](#)
- [Service Management Tasks on page 105](#)
 - [Modifying Customer Accounts on page 105](#)
 - [Deleting Customers on page 106](#)
 - [Modifying SDPs on page 106](#)
 - [Deleting SDPs on page 107](#)
 - [Deleting LSP Associations on page 107](#)

Service Model Entities

The Alcatel-Lucent service model uses (logical) service entities to construct a service. Each entity within the model has properties that describe it and influence its behavior. The service model has four main entities to configure a service. The entities are:

- Customers
 - [Configuring Customer Accounts](#)
 - Service Destination Points (SDPs)
 - [Configuring SDPs](#)
 - Service Types
 - [ATM VLL \(Apipe\) Services](#)
 - [Circuit Emulation VLL \(Cpipe\) Services](#)
 - [Ethernet VLL \(Epipe\) Services](#)
 - [IP Interworking VLL \(Ipipe\) Services](#)
 - [Internet Enhanced Service](#)
 - [VPLS](#)
 - [VPRN Services](#)
 - Service Access Points (SAPs)
 - [Configuring Apipe SAP Parameters](#)
 - [Configuring Cpipe SAP Parameters](#)
 - [Configuring Epipe SAP Parameters](#)
 - [Configuring Ipipe SAP Parameters](#)
 - [Configuring IES SAP Parameters](#)
 - [Configuring VPRN Interface SAP Parameters](#)
-

Basic Configuration

Before configuring a subscriber service, the QoS, logs, and MPLS LSPs (if applicable) must be configured. Refer to the following guides for more information:

- 7705 SAR OS Quality of Service Guide
- 7705 SAR OS Router Configuration Guide
- 7705 SAR OS System Management Guide
- 7705 SAR OS MPLS Guide

A basic service configuration must have the following items configured:

- a customer ID
- a service type
- a service ID
- a SAP identifying a port and encapsulation value
- an interface (where required) identifying an IP address, IP subnet, and broadcast address
- an associated SDP (for distributed services)

The following example shows an Epipe service configuration displaying the SDP and Epipe service entities. SDP ID 2 was created with the far-end node 10.10.10.104. Epipe ID 6000 was created for customer ID 6, which uses the SDP ID 2.

```
A:ALU-B>config>service# info detail
#-----
...
    sdp 2 mpls create
        description "MPLS-10.10.10.104"
        far-end 10.10.10.104
    ldp
    signaling tldp
    no vlan-vc-etype
    no path-mtu
    keep-alive
    shutdown
        hello-time 10
        hold-down-time 10
        max-drop-count 3
        timeout 5
        no message-length
    exit
    no shutdown
exit
...
```

```
...
    epipe 6000 customer 6 vpn 6000 create
    service-mtu 1514
    sap 1/1/2:0 create
    ingress
        filter ip 1
        qos 1
    exit
    egress
        qos 1
    exit
    no shutdown
exit
spoke-sdp 2:6111 create
    ingress
        no vc-label
    exit
    egress
        no vc-label
    exit
    no shutdown
exit
no shutdown
exit
...
#-----
A:ALU-B>config>service#
```

Common Configuration Tasks

This section provides a brief overview of the following common configuration tasks that must be performed to configure a customer account and an SDP:

- [Configuring Customer Accounts](#)
- [Configuring SDPs](#)

Configuring Customer Accounts

Use the `customer` command to configure customer information. Every customer account must have a customer ID. Optional parameters include:

- `description`
- `contact name`
- `telephone number`

If special characters are included in the customer description string, such as spaces, #, or ?, the entire string must be enclosed in double quotes.

Use the following CLI syntax to create and input customer information.

CLI Syntax:

```
config>service# customer customer-id create
                        contact contact-information
                        description description-string
                        phone phone-number
```

Example:

```
config>service# customer 5 create
config>service>cust# contact "Technical Support"
config>service>cust$ description "Alcatel-Lucent Customer"
config>service>cust# phone "650 555-5100"
config>service>cust# exit
```

The following example displays the customer account configuration output.

```
A:ALU-12>config>service# info
-----
..
    customer 5 create
        contact "Technical Support"
        description "Alcatel-Lucent Customer"
        phone "650 555-5100"
    exit
...
-----
A:ALU-12>config>service#
```

Configuring SDPs

Every service destination point (SDP) must have the following items configured:

- a locally unique SDP identification (ID) number
- the system IP address of the far-end router
- an SDP encapsulation type — MPLS, GRE, or IP

SDP Configuration Considerations

Consider the following SDP characteristics when creating and configuring an SDP.

- SDPs can be configured as MPLS, GRE, or IP.
- If an SDP configuration does not include the IP address of the associated far-end router, then VLL, VPLS, and VPRN services to the far-end router cannot be provided.
- A distributed service must be bound to an SDP.
By default, SDPs are not associated with services. Once an SDP is created, services can be associated with that SDP.
- An SDP can have more than one service bound to it. That is, an SDP is not specific or exclusive to any one service or any type of service.
- When configuring an SDP:
 - The far-end SDP IP address must be the system IP address of a 7705 SAR or an SR-series router.
 - For MPLS SDPs, LSPs must be configured before the LSP-to-SDP associations can be assigned. The LSP-to-SDP associations must be created explicitly.
 - Automatic ingress and egress labeling (targeted LDP) is enabled by default. Ingress and egress VC labels are signaled over a targeted LDP connection between two 7705 SAR routers.



Note: If signaling is disabled for an SDP, then ingress and egress vc-labels for the services using that SDP must be configured manually.

To configure a basic SDP, perform the following steps:

1. Specify an originating node.
2. Create an SDP ID.
3. Specify an encapsulation type.
4. Specify a far-end node.

Configuring an SDP

When configuring an SDP, consider the following points.

- If you do not specify an encapsulation type, the default is MPLS.
- When configuring a distributed service, you must identify an SDP ID and the far-end IP address. Use the `show>service>sdp` command to display a list of qualifying SDPs.
- When specifying MPLS SDP parameters, you can either specify an LSP or enable an LDP. There cannot be two methods of transport in a single SDP. If an LSP is specified, then RSVP is used for dynamic signaling within the LSP.
- LSPs are configured in the `config>router>mpls` context. See the 7705 SAR OS MPLS Guide for configuration and command information.

Use the following CLI syntax to create an SDP.

CLI Syntax:

```
config>service>sdp sdp-id [gre | mpls | ip] create
adv-mtu-override
description description-string
far-end ip-addr
keep-alive
hello-time seconds
hold-down-time seconds
max-drop-count count
message-length octets
timeout timeout
no shutdown

ldp                                     (for MPLS SDPs only)
lsp lsp-name [lsp-name]             (for MPLS SDPs only)
path-mtu octets
signaling {off|tldp}
no shutdown
```

Example:

```
config>service# sdp 2 gre create
config>service>sdp# description "GRE-10.10.10.104"
config>service>sdp# far-end "10.10.10.104"
config>service>sdp# no shutdown
config>service>sdp# exit
config>service# sdp 4 mpls create
config>service>sdp# description "MPLS-10.10.10.104"
config>service>sdp# far-end "10.10.10.104"
config>service>sdp# ldp
config>service>sdp# no shutdown
config>service>sdp# exit
config>service# sdp 8 mpls create
config>service>sdp# description "MPLS-10.10.10.104"
config>service>sdp# far-end "10.10.10.104"
```

```
config>service>sdp# lsp "to-104"
config>service>sdp# no shutdown
config>service>sdp# exit
config>service# sdp 104 mpls create
config>service>sdp# description "MPLS-10.10.10.94"
config>service>sdp# far-end "10.10.10.94"
config>service>sdp# ldp
config>service>sdp# no shutdown
config>service>sdp# exit
```

The following example displays the SDP sample configuration output.

```
A:ALU-12>config>service# info
-----
...
    sdp 2 create
        description "GRE-10.10.10.104"
        far-end 10.10.10.104
        keep-alive
        shutdown
    exit
    no shutdown
    sdp 4 create
        description "MPLS-10.10.10.104"
        far-end 10.10.10.104
        ldp
        keep-alive
        shutdown
    exit
    no shutdown
    exit
    sdp 8 mpls create
        description "MPLS-10.10.10.104"
        far-end 10.10.10.104
        lsp "to-104"
        keep-alive
        shutdown
    exit
    no shutdown
    exit
    sdp 104 mpls create
        description "MPLS-10.10.10.94"
        far-end 10.10.10.94
        ldp
        keep-alive
        shutdown
    exit
    no shutdown
    exit
...
-----
A:ALU-12>config>service#
```

ETH-CFM (802.1ag and Y.1731) Tasks

This section provides a brief overview of the following ETH-CFM tasks:

- [Configuring ETH-CFM Parameters \(802.1ag and Y.1731\)](#)
- [Applying ETH-CFM Parameters](#)

Configuring ETH-CFM Parameters (802.1ag and Y.1731)

Configuration commands for both the 802.1ag and the Y.1731 functions are entered in an `eth-cfm` context (either global or Epipe service). For information on Ethernet OAM commands for 802.1ag and Y.1731 OAM, refer to the “Ethernet OAM Capabilities” section in the 7705 SAR OS OAM and Diagnostics Guide.

An 802.1ag MEP and a Y.1731 MEP are similar in function. Configure a MEP to be a Y.1731 MEP by choosing the **format none** keywords in the `global domain` command, and the **format icc-based** keywords in the `global association` command.

802.1ag Configuration

The first set of commands occurs at the global level. The second set occurs at the Epipe service level.

```
*A:ALU-1>config>eth-cfm# info
-----
domain 1 name "kanata_MD" level 5
  association 1 format string name "kanata_MA"
    bridge-identifier 2
    exit
    ccm-interval 60
    remote-mepid 125
  exit
exit
-----

*A:ALU-1>config>service>epipe# info
-----
shutdown
sap 1/5/1 create
  eth-cfm
    mep 1 domain 1 association 1 direction down
    shutdown
  exit
exit
spoke-sdp 1:11 create
  eth-cfm
    mep 2 domain 1 association 1 direction down
    shutdown
  exit
```

```

        exit
    exit
-----

```



Note: RDI information is carried in the CCM OAMPDU. To be able to transmit and also receive RDI information, a MEP must have CCM enabled. See [Applying ETH-CFM Parameters](#).

Y.1731 Configuration

The following example displays a Y.1731 configuration. The first set of commands occurs at the global level. The second set occurs at the Epipe service level.

```

*A:ALU-1>config>eth-cfm# info
-----
    domain 1 format none level 1
        association 1 format icc-based name "1234567890123"
            bridge-identifier 100
            exit
            ccm-interval 1
        exit
    exit
-----

*A:ALU-1>config>service>epipe# info
-----
    shutdown
    sap 2/2/1:40 create
        eth-cfm
            mep 1 domain 1 association 1 direction up
                ais-enable
                    priority 2
                    interval 60
                exit
                eth-test-enable
                    test-pattern all-ones crc-enable
                exit
                no shutdown
            exit
        exit
    exit
    no shutdown
    ...
-----

```



Note: To be able to transmit and also receive AIS PDUs, a Y.1731 MEP must have `ais-enable` set. To be able to transmit and also receive ETH-Test PDUs, a Y.1731 MEP must have `eth-test-enable` set.

Applying ETH-CFM Parameters

Apply ETH-CFM parameters to the following entities, as shown in the CLI syntax examples below:

- Epipe SAP
- Epipe spoke SDP
- OAM tests (loopback, linktrace, Ethernet test, delay measurement, loss measurement)

The MAC address for a MEP on an Epipe cannot be changed. For a MEP on a SAP, the MAC address is the port MAC address. For a MEP on a spoke SDP, the MAC address is the system MAC address.

In Release 4.0, the 7705 SAR supports the following MEPs:

- 802.1ag
 - SAP Up MEP
 - SAP Down MEP
 - spoke SDP Down MEP
- Y.1731
 - SAP Up MEP
 - SAP Down MEP

CLI Syntax: `config>service>epipe>sap`
`eth-cfm`
`mep mep-id domain md-index association ma-index`
`[direction {up|down}]`
`ccm-enable`
`ais-enable`
`ccm-ltm-priority priority`
`dual-ended-loss-test-enable`
`eth-test-enable`
`low-priority-defect {allDef|macRemErrXcon|`
`remErrXcon|errXcon|xcon|noXcon}`
`one-way-delay-threshold seconds`
`[no] shutdown`

CLI Syntax: config>service>epipe>spoke-sdp
eth-cfm
mep *mep-id* domain *md-index* association *ma-index*
[direction {up|down}]
ccm-enable
ccm-ltm-priority *priority*
low-priority-defect {allDef|macRemErrXcon|
remErrXcon|errXcon|xcon|noXcon}
[no] shutdown

CLI Syntax: oam
eth-cfm linktrace *mac-address* mep *mep-id* domain *md-index* association *ma-index* [ttl *ttl-value*]
eth-cfm loopback *mac-address* mep *mep-id* domain *md-index* association *ma-index* [send-count *send-count*]
[size *data-size*] [priority *priority*]
eth-cfm eth-test *mac-address* mep *mep-id* domain *md-index* association *ma-index* [priority *priority*]
[data-length *data-length*]
eth-cfm one-way-delay-test *mac-address* mep *mep-id* domain *md-index* association *ma-index* [priority *priority*]
eth-cfm two-way-delay-test *mac-address* mep *mep-id* domain *md-index* association *ma-index* [priority *priority*]
eth-cfm single-ended-loss-test *mac-address* mep *mep-id* domain *md-index* association *ma-index* [priority *priority*] [interval {100ms|1s}] [send-count *send-count*]

Service Management Tasks

This section provides a brief overview of the following service management tasks:

- [Modifying Customer Accounts](#)
- [Deleting Customers](#)
- [Modifying SDPs](#)
- [Deleting SDPs](#)
- [Deleting LSP Associations](#)

Modifying Customer Accounts

Use the `show>service>customer` command to display a list of customer IDs.

To modify a customer account:

1. Access the specific account by specifying the customer ID.
2. Enter the parameter to modify (`description`, `contact`, `phone`) and then enter the new information.

CLI Syntax: `config>service# customer customer-id create`
`[no] contact contact-information`
`[no] description description-string`
`[no] phone phone-number`

Example: `config>service# customer 27 create`
`config>service>customer$ description "Western Division"`
`config>service>customer# contact "John Dough"`
`config>service>customer# no phone "(650) 237-5102"`

Deleting Customers

The `no` form of the `customer` command typically removes a customer ID and all associated information; however, all service references to the customer must be shut down and deleted before a customer account can be deleted.

CLI Syntax: `config>service# no customer customer-id`

Example:

```
config>service# epipe 5 customer 27 shutdown
config>service# epipe 9 customer 27 shutdown
config>service# no epipe 5
config>service# no epipe 9
config>service# no customer 27
```

Modifying SDPs

Use the `show>service>sdp` command to display a list of SDP IDs.

To modify an SDP:

1. Access the specific SDP by specifying the SDP ID.
2. Enter the parameter to modify, such as `description`, `far-end`, or `lsp`, and then enter the new information.



Note: Once the SDP is created, you cannot modify the SDP encapsulation type.

CLI Syntax: `config>service# sdp sdp-id`

Example:

```
config>service# sdp 79
config>service>sdp# description "Path-to-107"
config>service>sdp# shutdown
config>service>sdp# far-end "10.10.10.107"
config>service>sdp# path-mtu 1503
config>service>sdp# no shutdown
```

Deleting SDPs

The `no` form of the `sdp` command typically removes an SDP ID and all associated information; however, before an SDP can be deleted, the SDP must be shut down and removed (unbound) from all customer services where it is applied.

CLI Syntax: `config>service# no sdp 79`

Example:

```
config>service# epipe 5 spoke-sdp 79:5
config>service>epipe>spoke-sdp# shutdown
config>service>epipe>spoke-sdp# exit
config>service>epipe 5 no spoke-sdp 79:5
config>service>epipe# exit
config>service# no sdp 79
```

Deleting LSP Associations

The `no` form of the `lsp` command removes an LSP ID and all associated information; however, before an LSP can be deleted, it must be removed from all SDP associations.

CLI Syntax: `config>service# sdp sdp-id`
`[no] lsp lsp-name`

Example:

```
config>service# sdp 79
config>service>sdp# no lsp 123
config>service>sdp# exit all
```

Global Service Command Reference

Command Hierarchies

- [Global Service Configuration Commands](#)
 - [Customer Commands](#)
 - [SDP Commands](#)
 - [SAP Commands](#)
 - [ETH-CFM Commands](#)
- [Show Commands](#)

Global Service Configuration Commands

Customer Commands

```

config
  — service
    — customer customer-id [create]
    — no customer customer-id
      — customer contact-information
      — no customer
      — description description-string
      — no description
      — phone phone-number
      — [no] phone

```

SDP Commands

```

config
  — service
    — sdp sdp-id [gre | mpls | ip] [create]
    — no sdp sdp-id
      — [no] adv-mtu-override
      — description description-string
      — no description
      — far-end ip-address
      — no far-end
      — keep-alive
        — hello-time seconds
        — no hello-time
        — hold-down-time seconds
        — no hold-down-time
        — max-drop-count count
        — no max-drop-count
        — message-length octets
        — no message-length
        — [no] shutdown
        — timeout timeout
        — no timeout
      — [no] ldp
      — [no] lsp lsp-name
      — metric metric
      — no metric
      — path-mtu bytes
      — no path-mtu
      — signaling {off | tldp}
      — [no] shutdown
      — vlan-vc-etype 0x0600..0xffff
      — no vlan-vc-etype [x0600.0xffff]

```

SAP Commands

```

config
  — service
    — apipe
      — sap sap-id [create]
      — no sap sap-id
    — cpipe
      — sap sap-id [create]
      — no sap sap-id
    — epipe
      — sap sap-id [create]
      — no sap sap-id
    — ipipe
      — sap sap-id [create]
      — no sap sap-id
    — ies
      — interface ip-int-name [create]
        — sap sap-id [create]
        — no sap sap-id
    — vpri
      — interface ip-int-name [create]
        — sap sap-id [create]
        — no sap sap-id
    — vpls
      — sap sap-id [create]
      — no sap sap-id

```

ETH-CFM Commands

```

config
  — eth-cfm
    — domain md-index [format {dns | mac | none | string}] name md-name level level
    — domain md-index
    — no domain md-index
      — association ma-index [format {icc-based | integer | string | vid | vpn-id}] name ma-name
      — association ma-index
      — no association ma-index
        — [no] bridge-identifier bridge-id
          — vlan vlan-id
          — no vlan
        — ccm-interval {10ms | 100ms | 1 | 10 | 60 | 600}
        — no ccm-interval
        — [no] remote-mepid mep-id

```

Show Commands

```
show
  — service
    — customer customer-id
    — sdp [sdp-id | far-end ip-addr] [detail | keep-alive-history]
    — sdp-using sdp-id[:vc-id] | far-end ip-address]
    — service-using [epipe] [ies] [vprn] [vpls] [apipe] [cpipe] [sdp sdp-id] [customer customer-id]
```

Command Descriptions

- [Global Service Configuration Commands on page 114](#)
- [Show Commands on page 132](#)

Global Service Configuration Commands

- [Generic Commands on page 115](#)
- [Customer Commands on page 117](#)
- [SDP Commands on page 119](#)
- [SDP Keepalive Commands on page 124](#)
- [ETH-CFM Configuration Commands on page 128](#)

Generic Commands

description

Syntax	description <i>description-string</i> no description
Context	config>service>customer config>service>sdp
Description	This command creates a text description stored in the configuration file for a configuration context. The no form of this command removes the string from the context.
Default	No description is associated with the configuration context.
Parameters	<i>description-string</i> — the description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.

shutdown

Syntax	[no] shutdown
Context	config>service>sdp config>service>sdp>keep-alive
Description	The shutdown command administratively disables an entity. The operational state of the entity is disabled as well as the operational state of any entities contained within. When disabled, an entity does not change, reset, or remove any configuration settings or statistics. Many objects must be shut down before they may be deleted. Many entities must be explicitly enabled using the no shutdown command. The no form of this command places the entity into an administratively enabled state. Services are created in the administratively down state (shutdown). When a no shutdown command is entered, the service becomes administratively up and then tries to enter the operationally up state. Default administrative states for services and service entities are described in the following Special Cases.
Special Cases	Service Admin State — bindings to an SDP within the service will be put into the out-of-service state when the service is shut down. While the service is shut down, all customer packets are dropped and counted as discards for billing and debugging purposes.

SDP (global) — when an SDP is shut down at the global service level, all bindings to that SDP are put into the out-of-service state and the SDP itself is put into the administratively and operationally down states. Packets that would normally be transmitted using this SDP binding will be discarded and counted as dropped packets.

SDP (service level) — shutting down an SDP within a service only affects traffic on that service from entering or being received from the SDP. The SDP itself may still be operationally up for other services.

SDP Keepalives — enables SDP connectivity monitoring keepalive messages for the SDP ID. Default state is disabled (shutdown), in which case the operational state of the SDP-ID is not affected by the keepalive message state.

Customer Commands

customer

Syntax	customer <i>customer-id</i> [create] no customer <i>customer-id</i>
Context	config>service
Description	<p>This command creates a customer ID and customer context used to associate information with a particular customer. Services can later be associated with this customer at the service level.</p> <p>Each <i>customer-id</i> must be unique and the create keyword must follow each new customer <i>customer-id</i> entry.</p> <p>To edit a customer's parameters, enter the existing customer <i>customer-id</i> without the create keyword.</p> <p>Default customer 1 always exists on the system and cannot be deleted.</p> <p>The no form of this command removes a <i>customer-id</i> and all associated information. Before removing a <i>customer-id</i>, all references to that customer in all services must be deleted or changed to a different customer ID.</p>
Parameters	<i>customer-id</i> — specifies the ID number to be associated with the customer, expressed as an integer
Values	1 to 2147483647

contact

Syntax	contact <i>contact-information</i> no contact
Context	config>service>customer
Description	<p>This command allows you to configure contact information for a customer. Include any customer-related contact information such as a technician's name or account contract name.</p> <p>The no form of this command removes the contact information from the customer ID.</p>
Default	No contact information is associated with the <i>customer-id</i> .
Parameters	<p><i>contact-information</i> — the customer contact information entered as an ASCII character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p>

phone

Syntax	[no] phone <i>phone-number</i>
Context	config>service>customer
Description	<p>This command adds telephone number information for a customer ID.</p> <p>The no form of this command removes the phone number value from the customer ID.</p>
Default	No telephone number information is associated with a customer.
Parameters	<i>phone-number</i> — the customer phone number entered as an ASCII string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.

SDP Commands

sdp

Syntax	sdp <i>sdp-id</i> [gre mpls ip] [create] no sdp <i>sdp-id</i>
Context	config>service
Description	<p>This command creates or edits an SDP. SDPs must be explicitly configured.</p> <p>An SDP is a (logical) service entity that is created on the local router. An SDP identifies the endpoint of a logical, unidirectional service tunnel. Traffic enters the tunnel at the SDP on the local router and exits the tunnel at the remote router. Thus, it is not necessary to specifically define far-end SAPs.</p> <p>The 7705 SAR supports generic routing encapsulation (GRE) tunnels, multiprotocol label switching (MPLS) tunnels, and IP tunnels.</p> <p>For MPLS, a 7705 SAR supports both signaled and non-signaled label switched paths (LSPs) through the network. Non-signaled paths are defined at each hop through the network. Signaled LSPs are established in LDP-DU (downstream unsolicited) mode.</p> <p>SDPs are created and then bound to services. Many services may be bound to a single SDP. The operational and administrative state of the SDP controls the state of the SDP binding to the service.</p> <p>If <i>sdp-id</i> does not exist, a new SDP is created. SDPs are created in the admin down state (shutdown). Once all relevant parameters are defined, the no shutdown command must be executed before the SDP can be used.</p> <p>If <i>sdp-id</i> exists, the current CLI context is changed to that SDP for editing and modification. If editing an existing SDP, the gre, mpls, or ip keyword is not specified. If a keyword is specified for an existing <i>sdp-id</i>, an error is generated and the context of the CLI is not changed to the specified <i>sdp-id</i>.</p> <p>The no form of this command deletes the specified SDP. Before an SDP can be deleted, it must be administratively down (shutdown) and not bound to any services. If the specified SDP is bound to a service, the no sdp command fails, generating an error message specifying the first bound service found during the deletion process. If the specified <i>sdp-id</i> does not exist, an error is generated.</p>
Default	none
Parameters	<p><i>sdp-id</i> — the SDP identifier</p> <p>Values 1 to 17407</p> <p>gre — specifies that the SDP will use GRE encapsulation tunnels. Only one GRE SDP is supported to a given destination 7705 SAR or 7710/7750 SR.</p> <p>mpls — specifies that the SDP will use MPLS encapsulation and one or more LSP tunnels to reach the far-end 7705 SAR or 7710/7750 SR. Multiple MPLS SDPs are supported to a given destination service router. Multiple MPLS SDPs to a single destination service router are helpful when they use divergent paths.</p>

ip — specifies that the SDP will use IP encapsulation tunnels. Only one IP SDP is supported to a given destination 7705 SAR or 7710/7750 SR because the SDP is tied to the system address of the destination LER.

adv-mtu-override

Syntax	[no] adv-mtu-override
Context	config>service>sdp
Description	<p>This command overrides the advertised VC-type MTU. When enabled, the 7705 SAR signals a VC MTU equal to the service MTU that includes the Layer 2 header. Under normal operations it will advertise the service MTU minus the Layer 2 header. In the receive direction, it will accept either one.</p> <p>The no form of this command disables the VC-type MTU override.</p>
Default	no adv-mtu-override

far-end

Syntax	far-end <i>ip-address</i> no far-end
Context	config>service>sdp
Description	<p>This command configures the system IP address of the far-end destination 7705 SAR, 7710 SR, 7750 SR, or other router ID platform for the SDP that is the termination point for a service.</p> <p>The far-end IP address must be explicitly configured. The destination IP address must be a 7705 SAR, 7710 SR, 7750 SR, or other router ID platform system IP address.</p> <p>If the SDP uses GRE or IP for the destination encapsulation, the local 7705 SAR might not know that the <i>ip-address</i> is actually a system IP interface address on the far-end service router.</p> <p>If the SDP uses MPLS encapsulation, the far-end <i>ip-address</i> is used to check LSP names when added to the SDP. If the “to IP address” defined within the LSP configuration does not exactly match the SDP far-end <i>ip-address</i>, the LSP will not be added to the SDP and an error message will be generated.</p> <p>An SDP cannot be administratively enabled until a far-end <i>ip-address</i> is defined. The SDP is operational when it is administratively enabled (no shutdown).</p> <p>The no form of this command removes the currently configured destination IP address for the SDP. The <i>ip-address</i> parameter is not specified and will generate an error message if used in the no far-end command. The SDP must be administratively disabled using the config>service>sdp>shutdown command before the no far-end command can be executed. Removing the far-end IP address will cause all <i>lsp-name</i> associations with the SDP to be removed.</p>
Default	none

Parameters	<i>ip-address</i> — the system address of the far-end 7705 SAR for the SDP
Values	a.b.c.d

ldp

Syntax	[no] ldp
Context	config>service>sdp
Description	<p>This command enables LDP-signaled LSPs on MPLS-encapsulated SDPs.</p> <p>In MPLS SDP configurations, either one LSP can be specified or LDP can be enabled. The SDP ldp and lsp commands are mutually exclusive. If an LSP is specified on an MPLS SDP, then LDP cannot be enabled on the SDP. To enable LDP on the SDP when an LSP is already specified, the LSP must be removed from the configuration using the no lsp lsp-name command.</p> <p>Alternatively, if LDP is already enabled on an MPLS SDP, then an LSP cannot be specified on the SDP. To specify an LSP on the SDP, LDP must be disabled. The LSP must have already been created in the config>router>mpls context with a valid far-end IP address.</p>
Default	no ldp (disabled)

lsp

Syntax	[no] lsp lsp-name
Context	config>service>sdp
Description	<p>This command creates an association between an LSP and an MPLS SDP. This command is implemented only on MPLS-type encapsulated SDPs.</p> <p>In MPLS SDP configurations, either one LSP can be specified or LDP can be enabled. The SDP ldp and lsp commands are mutually exclusive. If an LSP is specified on an MPLS SDP, then LDP cannot be enabled on the SDP. To enable LDP on the SDP when an LSP is already specified, the LSP must be removed from the configuration using the no lsp lsp-name command.</p> <p>Alternatively, if LDP is already enabled on an MPLS SDP, then an LSP cannot be specified on the SDP. To specify an LSP on the SDP, LDP must be disabled. The LSP must have already been created in the config>router>mpls context with a valid far-end IP address. Refer to the 7705 SAR OS MPLS Guide for CLI syntax and command usage.</p> <p>If no LSP is associated with an MPLS SDP, the SDP cannot enter the operationally up state. The SDP can be administratively enabled (no shutdown) with no LSP associations. The <i>lsp-name</i> may be shut down, causing the association with the SDP to be operationally down (the LSP will not be used by the SDP).</p> <p>LSP SDPs also require that the TLDP signaling be specified and that the SDP keepalive parameter be enabled and not timed out.</p>

The **no** form of this command deletes an LSP association from an SDP. If the *lsp-name* does not exist as an association or as a configured LSP, no error is returned. An *lsp-name* must be removed from all SDP associations before the *lsp-name* can be deleted from the system. The SDP must be administratively disabled (**shutdown**) before the last *lsp-name* association with the SDP is deleted.

Default No LSP names are defined.

Parameters *lsp-name* — the name of the LSP to associate with the SDP. An LSP name is case-sensitive and is limited to 32 ASCII 7-bit printable characters with no spaces. If an exact match of *lsp-name* does not already exist as a defined LSP, an error message is generated. If the *lsp-name* does exist and the LSP **to** IP address matches the SDP **far-end** IP address, the association is created.

metric

Syntax **metric** *metric*
no metric

Context config>service>sdp

Description This command specifies the metric to be used within the tunnel table manager for decision-making purposes. When multiple SDPs going to the same destination exist, this value is used as a tie-breaker by tunnel table manager users to select the route with the lower value.

Parameters *metric* — specifies the SDP metric

Values 1 to 17407

path-mtu

Syntax **path-mtu** *bytes*
no path-mtu

Context config>service>sdp

Description This command configures the Maximum Transmission Unit (MTU) in bytes that the SDP can transmit to the far-end router without packet dropping or IP fragmentation overriding the default SDP-type path MTU.

The default SDP-type **path-mtu** can be overridden on a per-SDP basis.

Dynamic maintenance protocols on the SDP may override this setting.

If the physical **mtu** on an egress interface indicates that the next hop on an SDP path cannot support the current **path-mtu**, the operational **path-mtu** on that SDP will be modified to a value that can be transmitted without fragmentation.

The **no** form of this command removes any **path-mtu** defined on the SDP and the SDP will use the system default for the SDP type.

Default	The default path-mtu defined on the system for the type of SDP is used.
Parameters	<i>bytes</i> — specifies the number of bytes in the path MTU
Values	576 to 9194

signaling

Syntax	signaling {off tldp}
Context	config>service>sdp
Description	<p>This command specifies the signaling protocol used to obtain the ingress and egress labels in frames transmitted and received on the SDP. When signaling is off, then labels are manually configured when the SDP is bound to a service. The signaling value can only be changed while the administrative status of the SDP is down.</p> <p>The no form of this command is not applicable. To modify the signaling configuration, the SDP must be administratively shut down and then the signaling parameter can be modified and re-enabled.</p>
Default	tldp
Parameters	<p>off — ingress and egress signal auto-labeling is not enabled. If this parameter is selected, then each service using the specified SDP must manually configure VPN labels. This configuration is independent of the SDP's transport type, MPLS (LDP).</p> <p>tldp — ingress and egress signaling auto-labeling is enabled</p>

vlan-vc-etype

Syntax	vlan-vc-etype 0x0600..0xffff no vlan-vc-etype [0x0600..0xffff]
Context	config>service>sdp
Description	This command configures the VLAN VC EtherType. The no form of this command returns the value to the default. The etype value populates the EtherType field in the Ethernet frame. It is used to indicate which protocol is being transported in the Ethernet frame. The default value indicates that the payload is an IEEE 802.1q-tagged frame.
Default	no vlan-vc-etype (0x8100)
Parameters	<i>0x0600..0xffff</i> — specifies a valid VLAN etype identifier

SDP Keepalive Commands

keep-alive

Syntax	keep-alive
Context	config>service>sdp
Description	This command is the context for configuring SDP connectivity monitoring keepalive messages for the SDP-ID.

SDP-ID keepalive messages use SDP Echo Request and Reply messages to monitor SDP connectivity. The operating state of the SDP is affected by the keepalive state on the SDP-ID. SDP Echo Request messages are only sent when the SDP-ID is completely configured and administratively up. If the SDP-ID is administratively down, keepalives for that SDP-ID are disabled. SDP Echo Requests, when sent for keepalive messages, are always sent with the *originator-sdp-id*. All SDP-ID keepalive SDP Echo Replies are sent using generic IP OAM encapsulation.

When a keepalive response is received that indicates an error condition, the SDP ID will immediately be brought operationally down. Once a response is received that indicates the error has cleared and the **hold-down-time** interval has expired, the SDP ID will be eligible to be put into the operationally up state. If no other condition prevents the operational change, the SDP ID will enter the operational state.

A set of event counters track the number of keepalive requests sent, the size of the message sent, non-error replies received and error replies received. A keepalive state value is kept, indicating the last response event. A keepalive state timestamp value is kept, indicating the time of the last event. With each keepalive event change, a log message is generated, indicating the event type and the timestamp value.

[Table 13](#) describes keepalive interpretation of SDP Echo Reply response conditions and the effect on the SDP ID operational status.

Table 13: SDP Echo Reply Response Conditions

Result of Request	Stored Response State	Operational State
keepalive request timeout without reply	Request Timeout	Down
keepalive request not sent due to non-existent <i>orig-sdp-id</i> ⁽¹⁾	Orig-SDP Non-Existent	Down
keepalive request not sent due to administratively down <i>orig-sdp-id</i>	Orig-SDP Admin-Down	Down
keepalive reply received, invalid origination-id	Far End: Originator-ID Invalid	Down

Table 13: SDP Echo Reply Response Conditions (Continued)

Result of Request	Stored Response State	Operational State
keepalive reply received, invalid responder-id	Far End: Responder-ID Error	Down
keepalive reply received, No Error	Success	Up (if no other condition prevents)

1. This condition should not occur.

hello-time

Syntax	hello-time <i>seconds</i> no hello-time				
Context	config>service>sdp>keep-alive				
Description	This command configures the time period between SDP keepalive messages on the SDP-ID for the SDP connectivity monitoring messages. The no form of this command reverts the hello-time <i>seconds</i> value to the default setting.				
Parameters	<i>seconds</i> — the time period in seconds between SDP keepalive messages, expressed as a decimal integer <table> <tr> <td>Default</td><td>10</td></tr> <tr> <td>Values</td><td>1 to 3600</td></tr> </table>	Default	10	Values	1 to 3600
Default	10				
Values	1 to 3600				

hold-down-time

Syntax	hold-down-time <i>seconds</i> no hold-down-time
Context	config>service>sdp>keep-alive
Description	This command configures the minimum time period the SDP will remain in the operationally down state in response to SDP keepalive monitoring. This parameter can be used to prevent the SDP operational state from “flapping” by rapidly transitioning between the operationally up and operationally down states based on keepalive messages. When an SDP keepalive response is received that indicates an error condition or the max-drop-count keepalive messages receive no reply, the <i>sdp-id</i> will immediately be brought operationally down. If a keepalive response is received that indicates the error has cleared, the <i>sdp-id</i> will be eligible to be put into the operationally up state only after the hold-down-time interval has expired.

The **no** form of this command reverts the **hold-down-time** *seconds* value to the default setting.

Parameters	<i>seconds</i> — the time in seconds, expressed as a decimal integer, the <i>sdp-id</i> will remain in the operationally down state after an SDP keepalive error before it is eligible to enter the operationally up state. A value of 0 indicates that no hold-down-time will be enforced for <i>sdp-id</i> .
Default	10
Values	0 to 3600

max-drop-count

Syntax	max-drop-count <i>count</i> no max-drop-count
Context	config>service>sdp>keep-alive
Description	<p>This command configures the number of consecutive SDP keepalive failed request attempts or remote replies that can be missed after which the SDP is operationally downed.</p> <p>If the max-drop-count consecutive keepalive request messages cannot be sent or no replies are received, the SDP-ID will be brought operationally down by the keepalive SDP monitoring.</p> <p>The no form of this command reverts the max-drop-count <i>count</i> value to the default settings.</p>
Parameters	<p><i>count</i> — the number of consecutive SDP keepalive requests that can fail to be sent or replies missed before the SDP is brought down, expressed as a decimal integer</p> <p>Default 3</p> <p>Values 1 to 5</p>

message-length

Syntax	message-length <i>octets</i> no message-length
Context	config>service>sdp>keep-alive
Description	<p>This command configures the size of SDP monitoring keepalive request messages transmitted on the SDP.</p> <p>The no form of this command reverts the message-length <i>octets</i> value to the default setting.</p>
Parameters	<p><i>octets</i> — the size of keepalive request messages in octets, expressed as a decimal integer. The size keyword overrides the default keepalive message size.</p> <p>The message length should be equal to the SDP operating path MTU as configured in the path-mtu command.</p>

If the default size is overridden, the actual size used will be the smaller of the operational SDP-ID path MTU and the size specified.

Default 0

Values 72 to 1500

timeout

Syntax **timeout** *timeout*
no timeout

Context config>service>sdp>keep-alive

Description This command configures the time interval that the SDP waits before tearing down the session.

Parameters *timeout* — the timeout in seconds, expressed as a decimal integer

Default 5

Values 1 to 10

ETH-CFM Configuration Commands

eth-cfm

Syntax	eth-cfm
Context	config
Description	This command enables the context to configure Connectivity Fault Management (CFM) parameters for 802.1ag and Y.1731 standards.

domain

Syntax	domain <i>md-index</i> [format { dns mac none string }] [name <i>md-name</i>] level <i>level</i> domain <i>md-index</i> no domain <i>md-index</i>												
Context	config>eth-cfm												
Description	<p>This command configures CFM domain parameters.</p> <p>The dns, mac, and string keywords apply to dot1ag. The none keyword applies to Y.1731. Using the none keyword means that the association command must use the icc-based format. A MEP associated with domain format none and association format icc-based is a Y.1731 MEP; otherwise, the MEP is a dot1ag MEP.</p> <p>The no form of the command removes the MD index parameters from the configuration.</p>												
Parameters	<p><i>md-index</i> — specifies the Maintenance Domain (MD) index value</p> <p>Values 1 to 4294967295</p> <p>format {dns mac none string} — specifies a value that represents the type (format) of the <i>md-name</i></p> <p>Values</p> <table><tr><td>dns:</td><td>specifies the DNS name format</td></tr><tr><td>mac:</td><td>X:X:X:X:X-X-u</td></tr><tr><td></td><td>X: [0 to FF] hex</td></tr><tr><td></td><td>u: [0 to 65535] decimal</td></tr><tr><td>none:</td><td>no name specified (the domain represents a Y.1731 MEG, not a dot1ag domain)</td></tr><tr><td>string:</td><td>specifies an ASCII string</td></tr></table> <p>Default string</p>	dns:	specifies the DNS name format	mac:	X:X:X:X:X-X-u		X: [0 to FF] hex		u: [0 to 65535] decimal	none:	no name specified (the domain represents a Y.1731 MEG, not a dot1ag domain)	string:	specifies an ASCII string
dns:	specifies the DNS name format												
mac:	X:X:X:X:X-X-u												
	X: [0 to FF] hex												
	u: [0 to 65535] decimal												
none:	no name specified (the domain represents a Y.1731 MEG, not a dot1ag domain)												
string:	specifies an ASCII string												

md-name — specifies a generic Maintenance Domain (MD) name

Values 1 to 43 characters

level — specifies the integer identifying the maintenance domain level (MD level). Higher numbers correspond to higher-level maintenance domains (those with the greatest physical reach) with the highest values for customers' CFM packets. Lower numbers correspond to lower-level maintenance domains (those with more limited physical reach) with the lowest values for single bridges or physical links.

Values 0 to 7

association

Syntax	association <i>ma-index</i> [format { icc-based integer string vid vpn-id }] name <i>ma-name</i> association <i>ma-index</i> no association <i>ma-index</i>
Context	config>eth-cfm>domain
Description	<p>This command configures the Maintenance Association (MA) for the domain.</p> <p>The integer, string, vid, and vpn-id keywords apply to dot1ag MAs. The icc-based keyword applies to Y.1731 MEGs, and is only available when the domain format is none. A MEP associated with domain format none and association format icc-based is a Y.1731 MEP; otherwise the MEP is a dot1ag MEP.</p>
Parameters	<p><i>ma-index</i> — specifies the MA index value</p> <p>Values 1 to 4294967295</p> <p>format {icc-based integer string vid vpn-id} — specifies a value that represents the type (format) of the <i>ma-name</i></p> <p>Values</p> <ul style="list-style-type: none"> icc-based: raw ASCII, exactly 13 characters (the association is a Y.1731 MEG, not a dot1ag MA) integer: 0 to 65535 (integer value 0 means the MA is not attached to a VID) string: raw ASCII vid: 0 to 4094 vpn-id: RFC 2685, Virtual Private Networks Identifier XXX:XXXX where X is a value between 00 and FF (for example 00164D:AABBCCDD) <p>Default integer</p> <p><i>ma-name</i> — specifies the part of the maintenance association identifier that is unique within the maintenance domain name</p> <p>Values 1 to 45 characters</p>

bridge-identifier

Syntax	[no] bridge-identifier <i>bridge-id</i>
Context	config>eth-cfm>domain>association
Description	This command configures the service ID for the domain association. The <i>bridge-id</i> should be configured to match the <i>service-id</i> of the service where MEPs for this association will be created. For example, for an Epipe with <i>service-id</i> 2, set the <i>bridge-id</i> to 2. Note that there is no verification that the service with a matching <i>service-id</i> exists.
Parameters	<i>bridge-id</i> — specifies the bridge ID for the domain association
Values	1 to 2147483647

vlan

Syntax	vlan <i>vlan-id</i> no vlan
Context	config>eth-cfm>domain>association>bridge-identifier
Description	This command configures the bridge-identifier primary VLAN ID. Note that it is informational only, and no verification is done to ensure that MEPs on this association are on the configured VLAN.
Parameters	<i>vlan-id</i> — specifies a VLAN ID monitored by MA
Values	0 to 4094

ccm-interval

Syntax	ccm-interval {10ms 100ms 1 10 60 600} no ccm-interval
Context	config>eth-cfm>domain>association
Description	This command configures the CCM transmission interval for all MEPs in the association, in milliseconds and seconds. The no form of the command reverts to the default value.
Default	10 s

remote-mepid

Syntax	[no] remote-mepid <i>mep-id</i>
Context	config>eth-cfm>domain>association
Description	This command configures the remote maintenance association endpoint MEP identifier.
Parameters	<i>mep-id</i> — maintenance association endpoint identifier of a remote MEP whose information from the MEP database is to be returned
Values	1 to 8191

Show Commands

customer

Syntax	customer <i>customer-id</i>
Context	show>service
Description	This command displays service customer information.
Parameters	<i>customer-id</i> — displays only information for the specified customer ID Default all customer IDs display Values 1 to 2147483647
Output	The following output is an example of customer information, and Table 14 describes the fields.

Sample Output

```
*A:ALU-12# show service customer
=====
Customers
=====
Customer-ID : 1
Contact : Manager
Description : Default customer
Phone : (123) 555-1212

Customer-ID : 2
Contact : Tech Support
Description : ABC Networks
Phone : (234) 555-1212

Customer-ID : 3
Contact : Fred
Description : ABC Networks
Phone : (345) 555-1212

Customer-ID : 6
Contact : Ethel
Description : Epipe Customer
Phone : (456) 555-1212

Customer-ID : 7
Contact : Lucy
Description : VPLS Customer
Phone : (567) 555-1212

Customer-ID : 8
Contact : Customer Service
Description : IES Customer
Phone : (678) 555-1212
```

```

Customer-ID : 274
Contact : Mssrs. Beaucoup
Description : ABC Company
Phone : 650 123-4567

Customer-ID : 94043
Contact : Test Engineer on Duty
Description : TEST Customer
Phone : (789) 555-1212
-----
Total Customers : 8
-----
*A:ALU-12#
*A:ALU-12# show service customer 274
=====
Customer 274
=====
Customer-ID : 274
Contact : Mssrs. Beaucoup
Description : ABC Company
Phone : 650 123-4567
-----
Total Customers : 1
-----
*A:ALU-12#

```

Table 14: Show Customer Command Output Fields

Label	Description
Customer-ID	Displays the unique customer identification number
Contact	Displays the name of the primary contact person
Description	Displays generic information about the customer
Phone	Displays the telephone or pager number used to reach the primary contact person
Total Customers	Displays the total number of customers configured

sdp

Syntax	sdp [<i>sdp-id</i> far-end <i>ip-address</i>] [detail keep-alive-history]
Context	show>service
Description	This command displays SDP information. If no optional parameters are specified, a summary SDP output for all SDPs is displayed.
Parameters	<p><i>sdp-id</i> — the SDP ID for which to display information</p> <p>Default all SDPs</p> <p>Values 1 to 17407</p> <p><i>ip-address</i> — displays only SDPs matching with the specified far-end IP address</p> <p>Default SDPs with any far-end IP address</p> <p>detail — displays detailed SDP information</p> <p>keep-alive-history — displays the last fifty SDP keepalive events for the SDP</p>
Output	The following output is an example of service SDP information, and Table 15 describes the fields.

Sample Output

```
*A:ALU-12# show service sdp

=====
Services: Service Destination Points
=====
SdpId      Adm MTU    Opr MTU    IP address      Adm  Opr        Deliver Signal
-----
10         0         0         10.10.10.24     Up   Down       LDP    TLDP
20         0         0         10.10.10.24     Up   Down       MPLS   TLDP
30        4462      1514      10.20.1.21      Up   Up         GRE    TLDP
-----
Number of SDPs : 3
-----
*A:ALU-12#

*A:ALU-12# show service sdp 10

=====
Service Destination Point (Sdp Id : 10)
=====
SdpId      Adm MTU    Opr MTU    IP address      Adm  Opr        Deliver Signal
-----
10         0         0         10.10.10.24     Up   Down       LDP    TLDP
=====
*A:ALU-12#

*A:ALU-12# show service sdp 8 detail
=====
Service Destination Point (Sdp Id : 8) Details
```

```

=====
Sdp Id 8  -(10.10.10.104)
=====
Description          : MPLS-10.10.10.104
SDP Id               : 8                      SDP-Source       : manual
Admin Path MTU       : 0                      Oper Path MTU      : 1550
Far End              : 10.10.10.104          Delivery          : MPLS
Admin State          : Up                    Oper State         : Down
Signaling            : TLDP                 Metric            : 0
Last Status Change   : 02/01/2007 09:11:39  Adv. MTU Over.    : No
Last Mgmt Change     : 02/01/2007 09:11:46  VLAN VC Etype     : 0x8100
Flags                : SignalingSessDown TransportTunnDown

KeepAlive Information :
Admin State          : Disabled              Oper State         : Disabled
Hello Time           : 10                   Hello Msg Len      : 0
Hello Timeout        : 5                   Unmatched Replies  : 0
Max Drop Count       : 3                   Hold Down Time     : 10
Tx Hello Msgs        : 0                   Rx Hello Msgs      : 0

Associated LSP LIST :
Lsp Name             : to-104
Admin State          : Up                    Oper State         : Down
Time Since Last Tran*: 01d07h36m
=====
* indicates that the corresponding row element may have been truncated.
*A:ALU-12#

*A:ALU-12>show>service# sdp 5001 keep-alive-history

=====
Service Destination Point (Sdp Id : 5001)
=====
Time of Probe Report   RTT(ms)  Size   Status
-----
2010/11/30 11:27:32    1011    72   Response Received
2010/11/30 11:27:22    1001    72   Response Received
2010/11/30 11:27:12    1001    72   Response Received
2010/11/30 11:27:02    1001    72   Response Received
2010/11/30 11:26:58    1002    72   Response Received
=====
*A:ALU-12>show>service#

```

Table 15: Show Service SDP Output Fields

Label	Description
SDP Id	Identifies the SDP
Description	Identifies the SDP by the text description stored its configuration file
SDP Source	Specifies the SDP source type
Adm MTU Adm Path MTU	Specifies the desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router

Table 15: Show Service SDP Output Fields (Continued)

Label	Description
Opr MTU Opr Path MTU	Specifies the actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router
Far End	Specifies the IP address of the remote end of the GRE or MPLS tunnel defined by this SDP
Adm Admin State	Specifies the desired state of the SDP
Opr Oper State	Specifies the operating state of the SDP
Deliver Delivery	Specifies the type of delivery used by the SDP: MPLS, GRE, or IP
Flags	Specifies all the conditions that affect the operating status of this SDP
Signal Signaling	Specifies the signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on the SDP
Metric	Specifies the value used as a tie-breaker by the tunnel table manager to select a route
Last Status Change	Specifies the time of the most recent operating status change to this SDP
Last Mgmt Change	Specifies the time of the most recent management-initiated change to this SDP
Adv. MTU Over	Specifies the state of the advertised VC-type MTU override command
VLAN VC Etype	Specifies the VLAN VC EtherType for the SDP
Number of SDPs	Specifies the total number of SDPs displayed according to the criteria specified
Keepalive Information:	
Hello Time	Specifies how often the SDP Echo Request messages are transmitted on this SDP
Hello Msg Len	Specifies the length of the SDP Echo Request messages transmitted on this SDP
Hello Timeout	Specifies the number of seconds to wait for an SDP echo response message before declaring a timeout
Unmatched Replies	Specifies the number of SDP unmatched message replies timer expired

Table 15: Show Service SDP Output Fields (Continued)

Label	Description
Max Drop Count	Specifies the maximum number of consecutive SDP Echo Request messages that can be unacknowledged before the keepalive protocol reports a fault
Hold Down Time	Specifies the amount of time to wait before the keepalive operating status is eligible to enter the alive state
TX Hello Msgs	Specifies the number of SDP echo request messages transmitted since the keepalive was administratively enabled or the counter was cleared
Rx Hello Msgs	Specifies the number of SDP echo request messages received since the keepalive was administratively enabled or the counter was cleared
Collect Stats.	Specifies that the collection of accounting and statistical data for the SDP is enabled or disabled
Associated LSP LIST:	
Note: If the SDP type is GRE, the following message displays: SDP Delivery Mechanism is not MPLS	
Lsp Name	For MPLS: identifies the name of the static LSP
Time since Last Trans*	For MPLS: specifies the time that the associated static LSP has been in service
Time of Probe Report	Indicates the date and time of the report
RTT (ms)	Indicates round-trip time (RTT), in milliseconds.
Size	Indicates the size of the packet, in bytes
Status	Indicates the status of the response

sdp-using

- Syntax** **sdp-using** [*sdp-id[:vc-id]* | **far-end** *ip-address*]
- Context** show>service
- Description** This command displays services using SDP or far-end address options.
- Parameters** *sdp-id* — displays only services bound to the specified SDP ID
- Values** 1 to 17407
- vc-id* — the virtual circuit identifier
- Values** 1 to 4294967295
- ip-address* — displays only services matching with the specified far-end IP address
- Default** services with any far-end IP address
- Output** The following output is an example of service SDP-using information, and [Table 16](#) describes the fields.

Sample Output

```
*A:ALU-1# show service sdp-using 300
=====
Service Destination Point (Sdp Id : 300)
=====
```

SvcId	SdpId	Type	Far End	Opr State	I.Label	E.Label
1	300:1	Spok	10.0.0.13	Up	131071	131071
2	300:2	Spok	10.0.0.13	Up	131070	131070
100	300:100	Spok	10.0.0.13	Up	131069	131069
101	300:101	Spok	10.0.0.13	Up	131068	131068
102	300:102	Spok	10.0.0.13	Up	131067	131067

```
-----
Number of SDPs : 7
-----
=====
*A:ALU-1#
```

Table 16: Show Service SDP-Using Output Fields

Label	Description
SvcId	Identifies the service
SdpId	Identifies the SDP
Type	Indicates the type of SDP (mesh or spoke)
Far End	Displays the far-end address of the SDP
Opr State	Displays the operational state of the service

Table 16: Show Service SDP-Using Output Fields (Continued)

Label	Description
I. Label	Displays the ingress label used by the far-end device to send packets to this device in this service by this SDP
E. Label	Displays the egress label used by this device to send packets to the far-end device in this service by this SDP

service-using

Syntax	service-using [epipe] [ies] [vpls] [vprn] [apipe] [ipipe] [cpipe] [sdp sdp-id] [customer customer-id]
Context	show>service
Description	<p>This command displays the services matching certain usage properties.</p> <p>If no optional parameters are specified, all services defined on the system are displayed.</p>
Parameters	<p>epipe — displays matching Epipe services</p> <p>ies — displays matching IES services</p> <p>vpls — displays matching VPLS services</p> <p>vprn — displays matching VPRN services</p> <p>apipe — displays matching Apipe services</p> <p>cpipe — displays matching Cpipe services</p> <p>sdp-id — displays only services bound to the specified SDP ID</p> <p>Default services bound to any SDP ID</p> <p>Values 1 to 17407</p> <p>customer-id — displays services only associated with the specified customer ID</p> <p>Default services associated with a customer</p> <p>Values 1 to 2147483647</p>

Output The following outputs are examples of service-using information, and [Table 17](#) describes the fields.

Sample Output all services used in system

```
*A:ALU-12# show service service-using
```

```
=====
```

Services

```
=====
```

ServiceId	Type	Adm	Opr	CustomerId	Last Mgmt Change
1	Cpipe	Down	Down	1	10/10/2007 04:11:09
2	Apipe	Down	Down	1	10/10/2007 05:20:22
103	Epipe	Up	Up	104	10/10/2007 03:35:01
104	Epipe	Up	Up	104	10/10/2007 03:35:01
105	Epipe	Up	Up	104	10/10/2007 03:35:01
303	Cpipe	Up	Up	104	10/10/2007 03:35:01
304	Cpipe	Up	Up	104	10/10/2007 03:35:03
305	Cpipe	Up	Up	104	10/10/2007 03:35:06
701	Apipe	Up	Down	1	10/10/2007 03:35:10
702	Apipe	Up	Down	1	10/10/2007 03:35:10
703	Apipe	Up	Down	1	10/10/2007 03:35:10
704	Apipe	Up	Down	1	10/10/2007 03:35:10
806	Apipe	Up	Down	1	10/10/2007 03:35:10
807	Apipe	Up	Down	1	10/10/2007 03:35:11
808	Apipe	Up	Down	1	10/10/2007 03:35:11
903	Cpipe	Up	Up	1	10/10/2007 03:35:08
904	Cpipe	Up	Up	1	10/10/2007 03:35:08
5000	VPLS	Down	Down	1	10/26/2010 20:13:12
5001	VPLS	Down	Down	1	10/26/2010 20:13:12

```
=====
```

Matching Services : 19

Sample Output services used by customer

```
*A:ALU-12# show service service-using customer 1
```

```
=====
```

Services Customer 1

```
=====
```

ServiceId	Type	Adm	Opr	CustomerId	Last Mgmt Change
1	Cpipe	Down	Down	1	10/10/2007 04:11:09
2	Apipe	Down	Down	1	10/10/2007 05:20:22
701	Apipe	Up	Down	1	10/10/2007 03:35:10
702	Apipe	Up	Down	1	10/10/2007 03:35:10
703	Apipe	Up	Down	1	10/10/2007 03:35:10
704	Apipe	Up	Down	1	10/10/2007 03:35:10
806	Apipe	Up	Down	1	10/10/2007 03:35:10
807	Apipe	Up	Down	1	10/10/2007 03:35:11
808	Apipe	Up	Down	1	10/10/2007 03:35:11
903	Cpipe	Up	Up	1	10/10/2007 03:35:08
904	Cpipe	Up	Up	1	10/10/2007 03:35:08
5000	VPLS	Down	Down	1	10/26/2010 20:13:12
5001	VPLS	Down	Down	1	10/26/2010 20:13:12

```
=====
```

Matching Services : 13

```
*A:ALU-12#
```

Sample Output services by service type (epipe)

```

*A:ALU-12# show service service-using epipe
=====
Services [epipe]
=====
ServiceId      Type      Adm      Opr      CustomerId      Last Mgmt Change
-----
103            Epipe     Up       Up       104             10/10/2007 03:35:01
104            Epipe     Up       Up       104             10/10/2007 03:35:01
105            Epipe     Up       Up       104             10/10/2007 03:35:01
-----
Matching Services : 3

*A:ALU-12#

```

Table 17: Show Service service-using Output Fields

Label	Description
Service Id	Identifies the service
Type	Specifies the service type configured for the service ID
Adm	Displays the desired state of the service
Opr	Displays the operating state of the service
CustomerId	Displays the ID of the customer who owns this service
Last Mgmt Change	Displays the date and time of the most recent management-initiated change to this service

In This Chapter

This chapter provides information about Virtual Leased Line (VLL) services and implementation notes.

Topics in this chapter include:

- [ATM VLL \(Apipe\) Services on page 145](#)
 - [ATM VLL for End-to-End ATM Service on page 145](#)
 - [ATM SAP-to-SAP Service on page 146](#)
 - [ATM Traffic Management Support on page 147](#)
 - [Control Word on page 147](#)
- [Circuit Emulation VLL \(Cpipe\) Services on page 148](#)
 - [Cpipe Service Overview on page 148](#)
- [Ethernet VLL \(Epipe\) Services on page 166](#)
 - [Epipe Service Overview on page 166](#)
- [IP Interworking VLL \(Ipipe\) Services on page 175](#)
 - [Ipipe Service Overview on page 175](#)
- [Pseudowire Switching on page 180](#)
 - [Pseudowire Switching with Pseudowire Redundancy on page 182](#)
 - [Pseudowire Switching Behavior on page 183](#)
 - [Pseudowire Switching TLV on page 186](#)

- [VLL Service Considerations on page 187](#)
 - [Service Support on page 187](#)
 - [SDPs on page 188](#)
 - [SAP Encapsulations and Pseudowire Types on page 188](#)
 - [QoS Policies on page 192](#)
 - [IP Filter Policies on page 192](#)
 - [MTU Settings on page 193](#)
 - [Pseudowire Control Word on page 197](#)
 - [Pseudowire Redundancy on page 197](#)
 - [Active/Standby Mode for Pseudowire Redundancy \(Standby Signaling\) on page 202](#)
- [Configuring a VLL Service with CLI on page 205](#)
- [VLL Services Command Reference on page 235](#)

ATM VLL (Apipe) Services

This section provides information about the Apipe service. Topics in this section include:

- [ATM VLL for End-to-End ATM Service](#)
- [ATM SAP-to-SAP Service](#)
- [ATM Traffic Management Support](#)
- [Control Word](#)

Apipe configuration information is found under the following topics:

- [Common Configuration Tasks](#)
- [Configuring VLL Components](#)
 - [Creating an Apipe Service](#)
- [Service Management Tasks](#)

ATM VLL for End-to-End ATM Service

ATM VLLs (Apipe) provide a point-to-point ATM service between users connected to 7705 SAR nodes or other SR routers over an IP/MPLS network (see [Figure 19](#)). User ATM traffic is connected to a 7705 SAR either directly or through an ATM access network. In both cases, an ATM PVC—for example, a virtual channel (VC) or a virtual path (VP)—is configured on the 7705 SAR. VPI/VCI translation is supported in the ATM VLL.

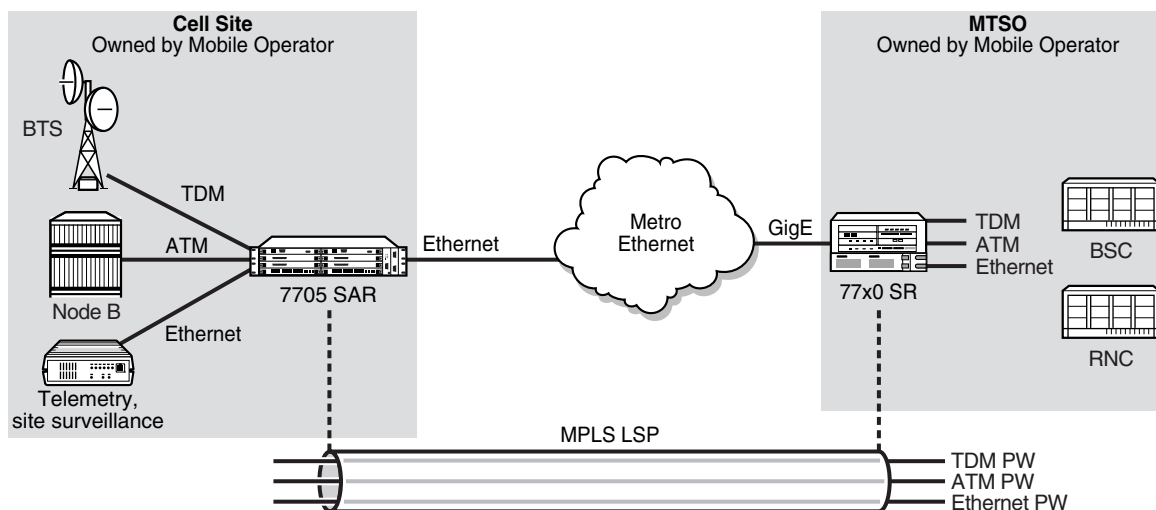
The 7705 SAR receives standard UNI/NNI cells on the ATM service access point (SAP), which are then encapsulated into a pseudowire packet using N-to-1 cell mode encapsulation in accordance with RFC 4717.

The ATM pseudowire (PW) is initiated using targeted LDP signaling as specified in RFC 4447, *Pseudowire Setup and Maintenance using LDP*; alternatively, it can be configured manually. The 7705 SAR supports MPLS, GRE, and IP as the tunneling technologies for transporting ATM PWs.

In addition to supporting N-to-1 cell mode encapsulation, ATM VLL service supports cell concatenation, control word (CW), SAP-to-SAP (local service), and SAP-to-SDP binding (distributed service). See [SAP Encapsulations and Pseudowire Types](#) for more information on N-to-1 cell mode encapsulation.

ATM VLL optimizes the ATM cell from a 53-byte cell to a 52-byte packet by removing the header error control (HEC) byte at the near end. The far end regenerates the HEC before switching ATM traffic to the attached circuit.

Figure 19: ATM VLL for End-to-End ATM Service



19482

ATM SAP-to-SAP Service

ATM VLLs can be configured with both endpoints (SAPs) on the same 7705 SAR. This is referred to as ATM SAP-to-SAP or local ATM service. ATM SAP-to-SAP emulates local ATM switching between two ATM endpoints on the 7705 SAR. Both ingress and egress traffic is legacy ATM traffic.

An ATM SAP-to-SAP connection is set up in the 7705 SAR and a pseudowire is configured between the two endpoints. One endpoint of the SAP connection can be an IMA group, while the other endpoint can be an unbundled port.



Note: ATM SAP-to-SAP connections are supported between any T1/E1 ASAP port that is in access mode with ATM/IMA encapsulation and another port with the same encapsulation configuration. One endpoint of a SAP connection can be an IMA group, while the other endpoint can be on a single ATM port.

ATM SAP-to-SAP connections are also supported between any two OC3/STM1 ports and between any T1/E1 ASAP port and OC3/STM1 port, as long as both SAPs support ATM.

ATM Traffic Management Support

The 7705 SAR supports the ATM Forum Traffic Management Specification Version 4.1.

Network Ingress Classification

Classification is based on the EXP value of the pseudowire label and EXP-to-FC mapping is determined by the network ingress QoS policy.

The ingress MPLS packets are mapped to forwarding classes based on EXP bits that are part of the headers in the MPLS packets. The EXP bits are used to ensure an end-to-end QoS application. For PW services, there are two labels: one for the MPLS tunnel and one for the pseudowire itself. Mapping is done according to the outer tunnel EXP bit settings. This ensures that if the EXP bit settings are altered along the path by the intermediate LSR nodes, the newly requested FC selection is carried out properly.

Ingress GRE and IP packets are mapped to forwarding classes based on DSCP bit settings of the IP header.

ATM Access Egress Queuing and Shaping

The 7705 SAR provides a per-SAP queuing architecture on the 16-port T1/E1 ASAP Adapter card, 32-port T1/E1 ASAP Adapter card, 4-port DS3/E3 Adapter card, and 4-port OC3/STM1 Clear Channel Adapter card. After the ATM pseudowire is terminated at the access egress point, all the ATM cells are mapped to default queue 1, and queuing is performed on a per-SAP basis.

Access ingress and access egress traffic management features are identical for SAP-to-SAP and SAP-to-SDP applications. For more information on ATM access egress queuing and scheduling, refer to the 7705 SAR OS Quality of Service Guide.

Control Word

ATM VLL supports an optional control word (CW). Refer to [Pseudowire Control Word](#) for more information.

Circuit Emulation VLL (Cpipe) Services

This section provides information about the Cpipe service.

Topics in this section include:

- [Cpipe Service Overview](#)
 - [TDM SAP-to-SAP Service](#)
 - [Cpipe Service Modes](#)
 - [TDM PW Encapsulation](#)
 - [Circuit Emulation Parameters and Options](#)
 - [Error Situations](#)

Cpipe configuration information is found under the following topics:

- [Common Configuration Tasks](#)
- [Configuring VLL Components](#)
 - [Creating a Cpipe Service](#)
- [Service Management Tasks](#)

Cpipe Service Overview

Cpipe service is the Alcatel-Lucent implementation of TDM PW VLL as defined in the IETF PWE3 working group.

The 7705 SAR can support TDM circuit applications that are able to transport delay-sensitive TDM traffic over a packet network. For example, in the case of cell site aggregation, Cpipe services provide transport service for 2G connectivity between the base transceiver station and the base station controller, and for 3G backhaul applications (for example, EVDO traffic from T1/E1 ports with MLPPP). Cpipe services over MPLS or GRE tunnels are supported.

The 2G traffic is transported encapsulated in a TDM VLL over the packet switched network (PSN). The entire T1/E1 frame or part of a frame ($n \times 64$ kb/s) is carried as a TDM VLL over the PSN. At the far end, the transport layer frame structure is regenerated when structured circuit emulation is used, or simply forwarded as part of the payload when unstructured circuit emulation is used. The 3G UMTS R99 traffic uses ATM/IMA as the transport protocol. The IMA sessions are terminated at the site by the 7705 SAR and the 3G ATM traffic is transported across the PSN through the use of ATM VLLs (PWE3).

TDM SAP-to-SAP Service

TDM VLLs can be configured with both endpoints (SAPs) on the same 7705 SAR. This is referred to as TDM SAP-to-SAP or local TDM service. TDM SAP-to-SAP emulates a TDM multiplexing and switching function on the 7705 SAR.

A TDM SAP-to-SAP connection is set up in the 7705 SAR and a pseudowire is configured between the two endpoints.



Note: TDM SAP-to-SAP connections are supported between any T1/E1 port or channel that is configured for access mode and circuit emulation service and another port or channel with the same configuration (endpoint type, bit rate [number of DS0s in a channel group], payload size, CAS enabled/disabled, and RTP enabled/disabled).

Cpipe Service Modes

Cpipe services support unstructured circuit emulation mode (SAToP) as per RFC 4553 and structured circuit emulation mode (CESoPSN) for DS1, E1 and $n \times 64$ kb/s circuits as per RFC 5086.

Unstructured Mode (SAToP)

Structure-agnostic TDM over Packet (SAToP) is an unstructured circuit emulation mode used for the transport of unstructured TDM or structured TDM (where the structure is ignored).



Note: The word “agnostic” is used in RFC 4553, but it is not used in the literal sense. The meaning of agnostic in this case is “unaware or independent”; therefore, structure-agnostic is used to mean structure-unaware or structure-independent.

As a structure-unaware or structure-independent service, SAToP service does not align to any framing; the framing mode for the port is set to unframed. For structured TDM, SAToP disregards the bit sequence and TDM structure in order to transport the entire signal over a PSN as a pseudowire.

Structured Mode (CESoPSN)

Structure-aware circuit emulation is used for the transport of structured TDM, taking at least some level of the structure into account. By selecting only the necessary $n \times 64$ kb/s timeslots to transport, bandwidth utilization is reduced or optimized (compared to a full DS1 or E1). Full DS1s or E1s can be transported by selecting all the timeslots in the DS1 or E1 circuit. Framing bits (DS1) or FAS (E1) are terminated at the near end and reproduced at the far end.

The 7705 SAR supports CESoPSN with and without CAS for DS1 and E1.

When CESoPSN with CAS is selected, the ABCD bits are coded into the T1 or E1 multiframe packets, transported within the TDM PW, and reconstructed in the T1 or E1 multiframe at the far end for each timeslot.

Channel Associated Signaling (CAS) includes four signaling bits (A, B, C, and D) in the messages sent over a voice trunk. These messages provide information such as the dialed digits and the call state (whether on-hook or off-hook).

The mechanism for E1 CAS is described in ITU-T G.732. When configured for E1 CAS, timeslot 17 carries the signaling information for the timeslots used for voice trunking. Each channel requires four signaling bits, so grouping 16 E1 frames into a multiframe allows the signaling bits for all 30 channels to be trunked.

As shown in [Figure 20](#), timeslot 1 of all frames within the E1 multiframe is reserved for alignment, alarm indication, and CRC. For Frame 0, timeslot 17 is reserved for multiframe alignment bits. For the remaining 15 frames, timeslot 17 contains ABCD bits for two channels.



Note: For E1 CAS, timeslots are numbered 1 to 32 on the 7705 SAR.

For T1 CAS, the signaling bits are transferred using Robbed Bit Signaling (RBS), where the least significant bit in the channel is used periodically to transport these bits instead of voice data. T1 CAS is supported when ESF or SF framing is configured. ESF framing uses a 24-frame multiframe and transfers all four signaling bits (ABCD). SF framing uses a 12-frame multiframe and transfers only the AB bits. The signaling bits are carried in the least significant bit of the following frames:

- A bit in frame 6
- B bit in frame 12
- C bit in frame 18
- D bit in frame 24

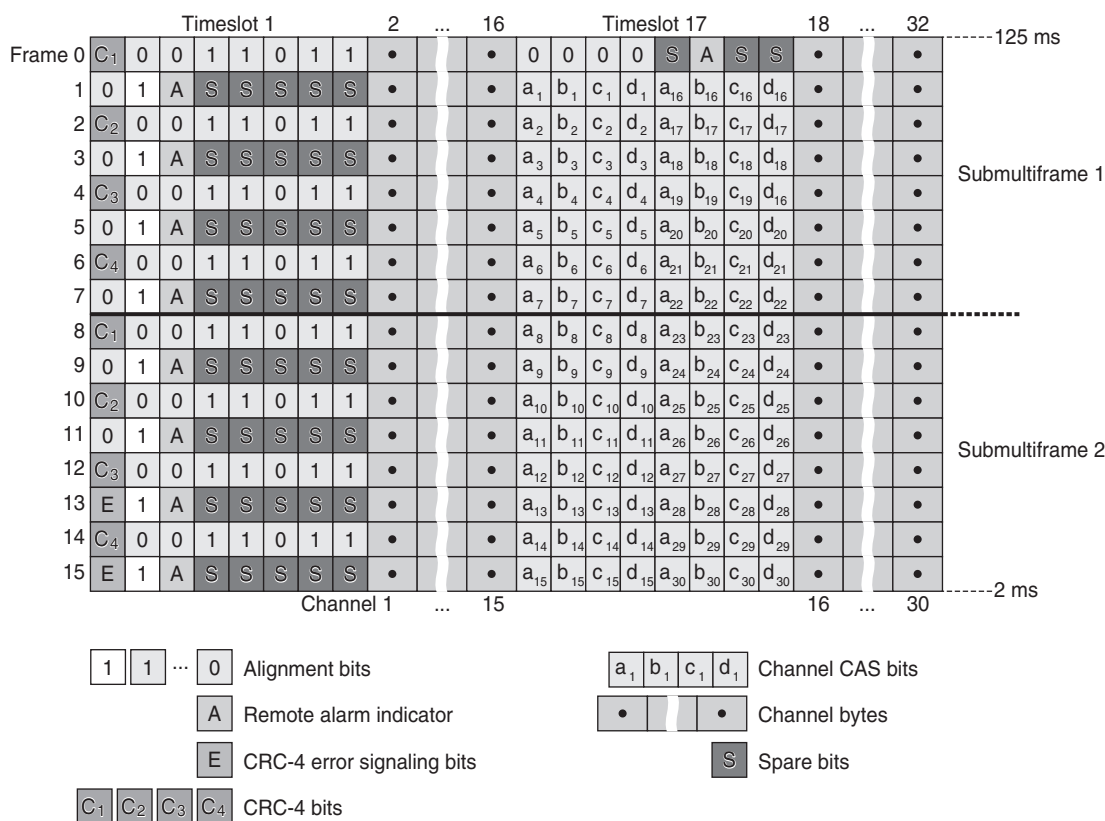


Note: On the 7705 SAR, CAS/RBS is enabled at the port level, rather than at the 64 kb/s channel level. This means that control signals and voice and data signals are all carried in the same channels. However, T1 and E1 links with a mix of voice and data channels cannot be transported directly across a 7705 SAR/SR network. For a workaround, please contact your Alcatel-Lucent technical service representative.

This limitation does not apply to 12-port Serial Data Interface card and 6-port E&M Adapter card traffic transported over MPLS because the signaling is transported in individual pseudowires. (The 12-port Serial Data Interface card and 6-port E&M Adapter card are not supported on the 7705 SAR-18.)

Table 18 shows the structure of a T1 ESF multiframe that uses RBS. The structure of a T1 SF multiframe is based on 12 frames and only the A and B bits are available.

Figure 20: E1 Framing for CAS Support in an E1 Multiframe



19966

Table 18: T1 Framing for CAS (RBS) Support in a T1 ESF Multiframe

Frame Number	F Bit				Bit Numbers in Each Channel Timeslot		Signaling Channel Designation ⁽⁴⁾
	Bit Number within Multiframe	Assignments					
		FAS ⁽¹⁾	DL ⁽²⁾	CRC ⁽³⁾	For Character Signal ⁽⁴⁾	For Signaling ⁽⁴⁾	
1	1	—	m	—	1-8	—	A
2	194	—	—	e1	1-8	—	
3	387	—	m	—	1-8	—	
4	580	0	—	—	1-8	—	
5	773	—	m	—	1-8	—	
6	966	—	—	e2	1-7	8	
7	1159	—	m	—	1-8	—	
8	1352	0	—	—	1-8	—	
9	1545	—	m	—	1-8	—	B
10	1738	—	—	e3	1-8	—	
11	1931	—	m	—	1-8	—	
12	2124	1	—	—	1-7	8	
13	2317	—	m	—	1-8	—	
14	2510	—	—	e4	1-8	—	
15	2703	—	m	—	1-8	—	
16	2896	0	—	—	1-8	—	
17	3089	—	m	—	1-8	—	C
18	3282	—	—	e5	1-7	8	
19	3475	—	m	—	1-8	—	
20	3668	1	—	—	1-8	—	
21	3861	—	m	—	1-8	—	
22	4054	—	—	e6	1-8	—	
23	4247	—	m	—	1-8	—	
24	4440	1	—	—	1-7	8	

Notes:

1. FAS = frame alignment signal (....001011....)
2. DL = 4 kb/s data link (m represents message bits)
3. CRC = CRC-6 block check field (e1 to e6 represent check bits)
4. Only applicable for CAS

TDM PW Encapsulation

TDM circuits are MPLS-encapsulated as per RFC 4553 (SAToP) and RFC 5086 (CESoPSN) (see [Figure 21](#) and [Figure 22](#)).

Figure 21: SAToP MPLS Encapsulation

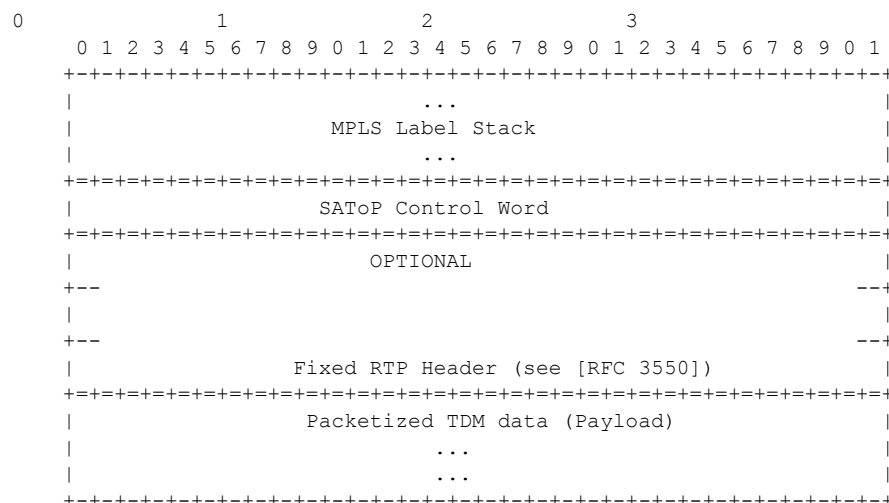
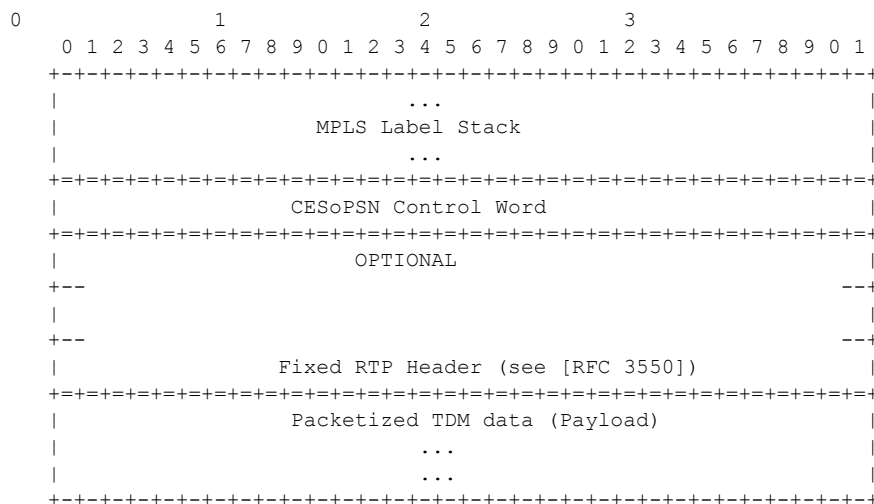


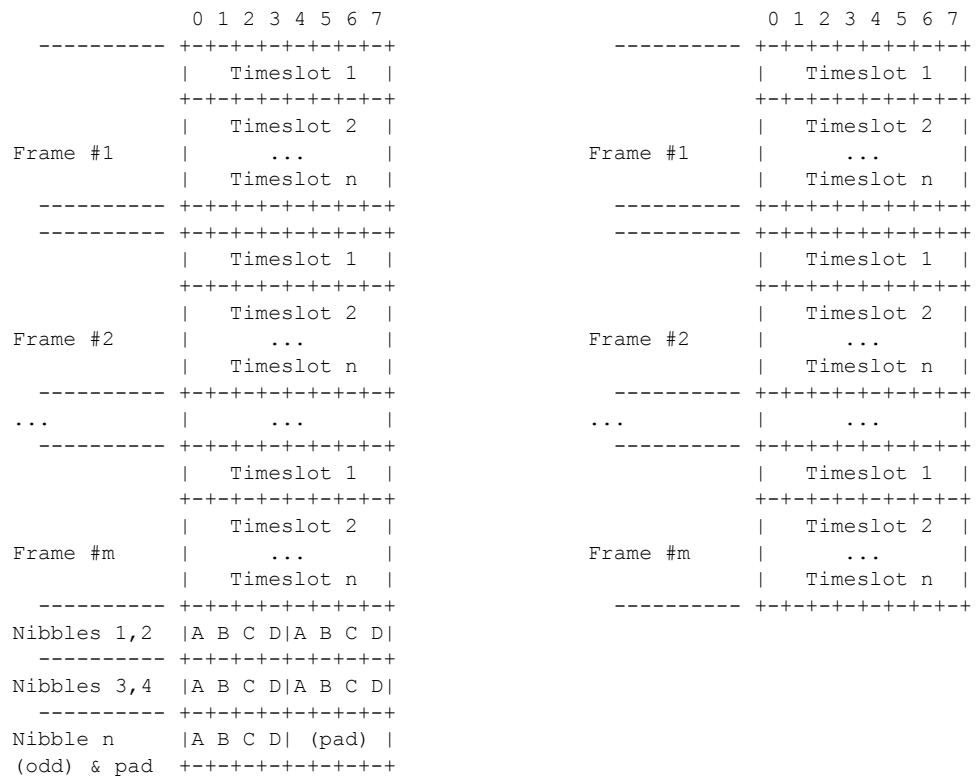
Figure 22: CESoPSN MPLS Encapsulation



For GRE tunnels, the same encapsulations shown in [Figure 22](#) are used, but GRE tunnel headers are used instead of MPLS tunnel headers.

Figure 23 shows the format of the CESoPSN TDM payload (with and without CAS) for packets carrying trunk-specific $n \times 64$ kb/s service.

Figure 23: CESoPSN Packet Payload Format for Trunk-Specific $n \times 64$ kb/s (With and Without CAS Transport)



(a) Packet with CAS

(b) Packet without CAS

For CESoPSN without CAS, select the packet size so that an integer number of frames are transported. That is, if n timeslots per frame are to be encapsulated in a TDM PW, then the packet size must be a multiple of n (where n is not equal to 1). For example, if $n = 4$ timeslots, then the packet size can be 8, 12, 16 and so on.

For CESoPSN with CAS, the packet size is an integer number of frames, where the number of frames is 24 for T1 or 16 for E1, and is not user-configurable. The extra bytes for ABCD (CAS) signaling bits are not included when setting the packet size.



Note: The extra bytes for CAS signaling bits must be included when setting the service-mtu size. See [Structured T1/E1 CES with CAS](#) for more information.

Circuit Emulation Parameters and Options

All ports on a 16-port T1/E1 ASAP Adapter card, 32-port T1/E1 ASAP Adapter card, and 2-port OC3/STM1 Channelized Adapter card can be configured independently to support TDM circuit emulation across the packet network. Structure-aware mode (CESoPSN) is supported for $n \times 64$ kb/s channel groups in DS1 and E1 circuits. Unstructured mode (SAToP) is supported for full DS1 and E1 circuits. The following parameters and options are described in this section:

- [Unstructured](#)
- [Structured DS1/E1 CES without CAS](#)
- [Structured T1/E1 CES with CAS](#)
- [Packet Payload Size](#)
- [Jitter Buffer](#)
- [RTP Header](#)
- [Control Word](#)

Unstructured

Unstructured CES is configured by choosing `satop-t1` or `satop-e1` as the `vc-type` when creating a Cpipe service. For DS1 and E1 unstructured circuit emulation, the framing parameter of the port must be set to `ds1-unframed` and `e1-unframed` (respectively) because SAToP service ignores the underlying framing. Additionally, channel group 1 must contain all 24 or 32 timeslots, which is configured automatically when channel group 1 is created.

For DS1 and E1 circuit emulation, the payload packet size is configurable and must be an integer value between 64 and 1514 octets and must be a multiple of 32. The payload packet size affects the packet efficiency and packetization delay. [Table 19](#) shows the default values for packet size and packetization delay. See [Packet Payload Size](#) for more information.



Note: When using SAToP to transport DS1 traffic, the framing bit (bit 193) in the DS1 overhead is included and packed in the payload and sent over the PSN. If the underlying framing is ESF, then the Facility Data Link (FDL) channel is transported over the Cpipe as part of the SAToP service. No matter the case, the framing parameter of the port must be set to unframed.

Table 19: Unstructured Payload Defaults

Circuit	Payload Size (Octets)	Packetization Delay (ms)
DS1	192	1.00
E1	256	1.00

Structured DS1/E1 CES without CAS

Structured CES without CAS is configured by choosing `cesopsn` as the `vc-type` when creating a Cpipe service. For $n \times 64$ kb/s structured circuit emulation operation, the framing parameter of the port must be set to a framed setting (such as ESF for DS1). Each channel group contains n DS0s (timeslots), where n is between 1 and 24 timeslots for DS1 and between 1 and 31 timeslots for E1.

The packet payload size is configurable (in octets) and must be an integer multiple of the number of timeslots in the channel group. The minimum payload packet size is 2 octets (based on two frames per packet and one timeslot per frame). See [Table 20](#) for default and minimum payload size values. The maximum payload packet size is 1514 octets.

Each DS1 or E1 frame contributes a number of octets to the packet payload. That number is equal to the number of timeslots configured in the channel group. Thus, a channel group with four timeslots contributes 4 octets to the payload. The timeslots do not need to be contiguous.

Note that a smaller packet size results in a lower packetization delay; however, it increases the packet overhead (when expressed as a percentage of the traffic).

Calculation of Payload Size

The payload size (S), in octets, can be calculated using the following formula:

$$S = N \times F$$

where:

N = the number of octets (timeslots) collected per received frame (DS1 or E1)

F = the number of received frames (DS1 or E1) that are accumulated in each CESoPSN packet

For example, assume the packet collects 16 frames (F) and the channel group contains 4 octets (timeslots) (N). Then the packet payload size (S) is:

$$\begin{aligned} S &= 4 \text{ octets/frame} \times 16 \text{ frames} \\ &= 64 \text{ octets} \end{aligned}$$

Calculation of Packetization Delay

Packetization delay is the time needed to collect the payload for a CESoPSN packet. DS1 and E1 frames arrive at a rate of 8000 frames per second. Therefore, the received frame arrival period is 125 μ s.

In the previous example, 16 frames were accumulated in the CESoPSN packet. In this case, the packetization delay (D) can be calculated as follows:

$$D = 125 \mu\text{s}/\text{frame} \times 16 \text{ frames} \\ = 2.000 \text{ ms}$$

Table 20 shows the default and minimum values for frames per packet, payload size, and packetization delay as they apply to the number of timeslots (N) that contribute to the packet payload. The default values are set by the operating system as follows:

- for $N = 1$, the default is 64 frames/packet
- for $2 \leq N \leq 4$, the default is 32 frames/packet
- for $5 \leq N \leq 15$, the default is 16 frames/packet
- for $N \geq 16$, the default is 8 frames/packet

Table 20: Default and Minimum Payload Size for CESoPSN without CAS

Number of Timeslots (N)	Default Values			Minimum Values		
	Frames per Packet (F)	Payload Size (Octets) (S)	Packetization Delay (ms) (D)	Frames per Packet (F)	Payload Size (Octets) (S)	Packetization Delay (ms) (D)
1	64	64	8.000	2	2	0.250
2	32	64	4.000	2	4	0.250
3	32	96	4.000	2	6	0.250
4	32	128	4.000	2	8	0.250
5	16	80	2.000	2	10	0.250
6	16	96	2.000	2	12	0.250
7	16	112	2.000	2	14	0.250
8	16	128	2.000	2	16	0.250
9	16	144	2.000	2	18	0.250
10	16	160	2.000	2	20	0.250
11	16	176	2.000	2	22	0.250

Table 20: Default and Minimum Payload Size for CESoPSN without CAS (Continued)

Number of Timeslots (N)	Default Values			Minimum Values		
	Frames per Packet (F)	Payload Size (Octets) (S)	Packetization Delay (ms) (D)	Frames per Packet (F)	Payload Size (Octets) (S)	Packetization Delay (ms) (D)
12	16	192	2.000	2	24	0.250
13	16	208	2.000	2	26	0.250
14	16	224	2.000	2	28	0.250
15	16	240	2.000	2	30	0.250
16	8	128	1.000	2	32	0.250
17	8	136	1.000	2	34	0.250
18	8	144	1.000	2	36	0.250
19	8	152	1.000	2	38	0.250
20	8	160	1.000	2	40	0.250
21	8	168	1.000	2	42	0.250
22	8	176	1.000	2	44	0.250
23	8	184	1.000	2	46	0.250
24	8	192	1.000	2	48	0.250
25	8	200	1.000	2	50	0.250
26	8	208	1.000	2	52	0.250
27	8	216	1.000	2	54	0.250
28	8	224	1.000	2	56	0.250
29	8	232	1.000	2	58	0.250
30	8	240	1.000	2	60	0.250
31	8	248	1.000	2	62	0.250

Structured T1/E1 CES with CAS

Structured circuit emulation with CAS is supported for T1 and E1 circuits.

Structured CES with CAS service is configured by choosing `cesopsn-cas` as the `vc-type` when creating a Cpipe service. The DS1 or E1 service on the port associated with the Cpipe SAP should be configured to support CAS (via the `signal-mode {cas}` command) before configuring the Cpipe service to support DS1 or E1 with CAS. Refer to the 7705 SAR OS Interface Configuration Guide for information on configuring signal mode.

For $n \times 64$ kb/s structured circuit emulation with CAS, the implementation is almost identical to that of CES without CAS. When CAS operation is enabled, timeslot 16 cannot be included in the channel group on E1 carriers. The CAS option is enabled or disabled at the port level; therefore, it applies to all channel groups on that E1 port.

The packet size is based on 16 frames per packet for E1 when CAS is enabled and is not user-configurable. For example, if the number of timeslots is 4, then the payload size is 64 octets. This 16-frame fixed configuration is logical because an E1 multiframe contains 16 frames; therefore, proper bit positioning for the A, B, C, and D CAS signaling bits can be ensured at each end of the pseudowire. [Table 21](#) shows the payload sizes based on the number of timeslots.

For CAS, the signaling portion adds $(n/2)$ bytes (n is an even integer) or $((n+1)/2)$ bytes (n is odd) to the packet, where n is the number of timeslots in the channel group. Note that you do not include the additional signaling bytes in the configuration setting of the TDM payload size. However, the operating system includes the additional bytes in the total packet payload, and the total payload must be accounted for when setting the service-mtu size. Continuing the example above, since $n = 4$, the total payload is 64 octets plus $(4/2 = 2)$ CAS octets, or 66 octets. Refer to [Figure 23](#) to see the structure of the CES with CAS payload.

CES fragmentation is not supported.



Note: If you configure the service-mtu size to be smaller than the total payload size (payload plus CAS bytes), then the Cpipe will not become operational. This must be considered if you change the service-mtu from its default value.

Table 21: Payload Size for T1 and E1 CESoPSN with CAS

Number of Timeslots	T1			E1		
	Number of Frames per Packet	Payload Size (Octets)	Packetization Delay (ms)	Number of Frames per Packet	Payload Size (Octets)	Packetization Delay (ms)
1	24	24	3.00	16	16	2.00
2	24	48	3.00	16	32	2.00
3	24	72	3.00	16	48	2.00
4	24	96	3.00	16	64	2.00
5	24	120	3.00	16	80	2.00
6	24	144	3.00	16	96	2.00
7	24	168	3.00	16	112	2.00
8	24	192	3.00	16	128	2.00
9	24	216	3.00	16	144	2.00
10	24	240	3.00	16	160	2.00
11	24	264	3.00	16	176	2.00
12	24	288	3.00	16	192	2.00
13	24	312	3.00	16	208	2.00
14	24	336	3.00	16	224	2.00
15	24	360	3.00	16	240	2.00
16	24	384	3.00	16	256	2.00
17	24	408	3.00	16	272	2.00
18	24	432	3.00	16	288	2.00
19	24	456	3.00	16	304	2.00
20	24	480	3.00	16	320	2.00
21	24	504	3.00	16	336	2.00
22	24	528	3.00	16	352	2.00
23	24	552	3.00	16	368	2.00

Table 21: Payload Size for T1 and E1 CESoPSN with CAS (Continued)

Number of Timeslots	T1			E1		
	Number of Frames per Packet	Payload Size (Octets)	Packetization Delay (ms)	Number of Frames per Packet	Payload Size (Octets)	Packetization Delay (ms)
24	24	576	3.00	16	384	2.00
25	NA	NA	NA	16	400	2.00
26	NA	NA	NA	16	416	2.00
27	NA	NA	NA	16	432	2.00
28	NA	NA	NA	16	448	2.00
29	NA	NA	NA	16	464	2.00
30	NA	NA	NA	16	480	2.00

Packet Payload Size

The packet payload size defines the number of octets contained in the payload of a TDM PW packet when the packet is transmitted. Each DS0 (timeslot) in a DS1 or E1 frame contributes 1 octet to the payload, and the total number of octets contributed per frame depends on the number of timeslots in the channel group (for example, 10 timeslots contribute 10 octets per frame).

Jitter Buffer

A circuit emulation service uses a jitter buffer to ensure that received packets are tolerant to packet delay variation (PDV). The selection of jitter buffer size must take into account the size of the TDM-encapsulated packets (payload size). A properly configured jitter buffer provides continuous play-out, thereby avoiding discards due to overruns and underruns (packets arriving too early or too late). The maximum receive jitter buffer size is configurable for each SAP configured for circuit emulation. The range of values is from 1 to 250 ms in increments of 1 ms.

Configuration/design Considerations

Determining the best configuration value for the jitter buffer may require some adjustments to account for the requirements of your network, which can change PDV as nodes are added or removed.

The buffer size must be set to at least 3 times the packetization delay and no greater than 32 times the packetization delay. Use a buffer size (in ms) that is equal to or greater than the peak-to-peak packet delay variation (PDV) expected in the network used by circuit emulation service. For example, for a PDV of ± 5 ms, configure the jitter buffer to be at least 10 ms.



Note: The jitter buffer setting and payload size (packetization delay) interact such that it may be necessary for the operating system to adjust the jitter buffer setting in order to ensure no loss of packets. Thus, the configured jitter buffer value may not be the value used by the system. Use the `show>service>id service_id>all` command to show the effective PDVT (packet delay variation tolerance).

The following values are the default jitter buffer times for structured circuits, where N is the number of timeslots:

- for $N = 1$, the default is 32 ms
- for $2 \leq N \leq 4$, the default is 16 ms
- for $5 \leq N \leq 15$, the default is 8 ms
- for $N \geq 16$, the default is 5 ms

Jitter buffer overrun and underrun counters are available for statistics and can raise an alarm (optional) while the circuit is operational. For overruns, excess packets are discarded and counted. For underruns, an all-ones pattern is sent for unstructured circuits and an all-ones or a user-defined pattern is sent for structured circuits (based on configuration).

The circuit status and statistics can be displayed using the `show` command.

RTP Header

For all circuit emulation channels, the RTP in the header is optional (as per RFC 5086). When enabled for absolute mode operation, an RTP header is inserted in the MPLS frame upon transmit. Absolute mode is defined in RFC 5086 and means that the ingress PE will set timestamps using the clock recovered from the incoming TDM circuit. When an MPLS frame is received, the RTP header is ignored. The RTP header mode is for TDM PW interoperability purposes only and should be enabled when the other device requires an RTP header.

Control Word

The structure of the control word is mandatory for SAToP and CESoPSN and is shown in [Figure 24](#). [Table 22](#) describes the bit fields. Refer to [Pseudowire Control Word](#) for more information.

Figure 24: Control Word Bit Structure

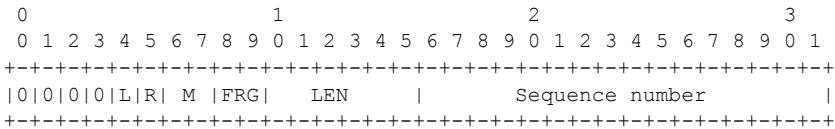


Table 22: Control Word Bit Descriptions

Bit(s)	Description
Bits 0 to 3	The use of bits 0 to 3 is described in RFC 4385. These bits are set to 0 unless they are being used to indicate the start of an Associated Channel Header (ACH) for the purposes of VCCV.
L (Local TDM Failure)	The L bit is set to 1 if an abnormal condition of the attachment circuit such as LOS, LOF, or AIS has been detected and the TDM data carried in the payload is invalid. The L bit is cleared (set back to 0) when fault is rectified.
R (Remote Loss of Frames indication)	The R bit is set to 1 if the local CE-bound interworking function (IWF) is in the packet loss state and cleared (reset to 0) after the local CE-bound IWF is no longer in the packet loss state.

Table 22: Control Word Bit Descriptions (Continued)

Bit(s)	Description
M (Modifier)	<p>The M bits are a 2-bit modifier field. For SAToP, M is set to 00 as per RFC 4553. For CESoPSN, M is set according to RFC 5086, summarized as follows:</p> <ul style="list-style-type: none"> When L bit = 0, and <ul style="list-style-type: none"> M = 00 – Normal conditions M = 01 – Reserved for future use M = 10 – RDI condition for the attachment circuit (AC) M = 11 – Reserved for CESoPSN When L bit = 1, and <ul style="list-style-type: none"> M = 00 – TDM data is invalid M = 01 – Reserved for future use M = 10 – Reserved for future use M = 11 – Reserved for future use
FRG	The FRG bits in the CESoPSN control word are set to 00.
LEN	The LEN bits (bits 10 to 15) carry the length of the CESoPSN packet (defined as the size of the CESoPSN header plus the payload size) if it is less than 64 bytes, and set to 0 otherwise.
Sequence number	The sequence number is used to provide the common PW sequencing function as well as detection of lost packets.

Error Situations

The CE-bound interworking function (IWF) uses the sequence numbers in the control word to detect lost and incorrectly ordered packets. Incorrectly ordered packets that cannot be reordered are discarded.

For unstructured CES, the payload of received packets with the L bit set is replaced with an all-ones pattern. For structured CES, the payload of received packets with the L bit set is replaced with an all-ones or a user-configurable bit pattern. This is configured using the `idle-payload-fill` command. For structured CES with CAS, the signaling bits are replaced with an all-ones or a user-configurable bit pattern. This is configured using the `idle-signal-fill` command. Refer to the 7705 SAR OS Interface Configuration Guide for more information.

All circuit emulation services can have a status of up, loss of packets (LOP) or admin down, and any jitter buffer overruns or underruns are logged.

Ethernet VLL (Epipe) Services

This section provides information about the Epipe service.

Topics in this section include:

- [Epipe Service Overview](#)
 - [Ethernet Access Egress Queuing and Scheduling](#)
 - [Ethernet SAP-to-SAP](#)
 - [Ethernet OAM](#)
 - [Control Word](#)
 - [MTU](#)
 - [Raw and Tagged Modes](#)
 - [IP Filters](#)

Epipe configuration information is found under the following topics:

- [Common Configuration Tasks](#)
- [Configuring VLL Components](#)
 - [Creating an Epipe Service](#)
- [Service Management Tasks](#)

Epipe Service Overview

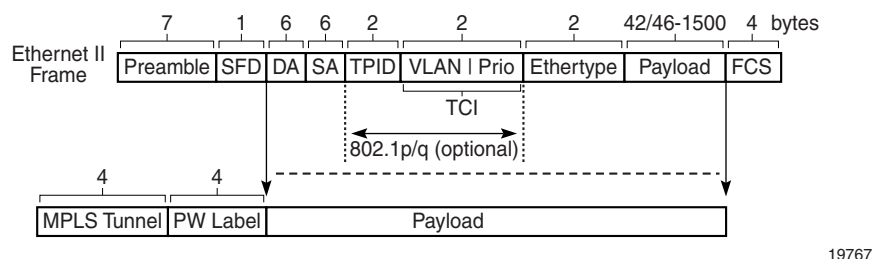
An Ethernet pseudowire (PW) is used to carry Ethernet/802.3 protocol data units (PDUs) over an MPLS or IP network, allowing service providers to offer emulated Ethernet services over existing MPLS or IP networks. For the 7705 SAR, Ethernet emulation is a point-to-point service.

The 7705 SAR uses Ethernet VLLs to carry Ethernet traffic from various sources at a site, including traffic such as e911 locators, power supply probes, and HSPA-dedicated interfaces. Native Ethernet bridging is not supported.

An MPLS Epipe service is the Alcatel-Lucent implementation of an Ethernet VLL based on the IETF RFC 4448, *Encapsulation Methods for Transport of Ethernet over MPLS Networks*.

Figure 25 shows a typical Ethernet VLL frame together with its MPLS tunnel encapsulation:

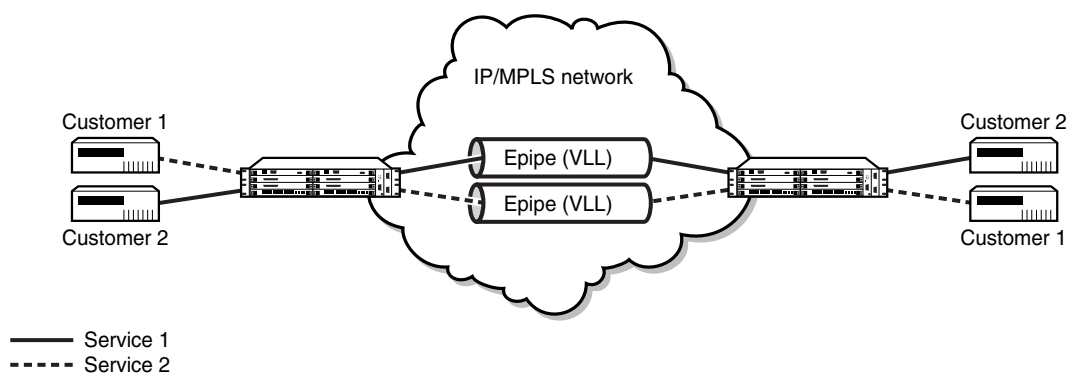
Figure 25: Ethernet VLL Frame with MPLS Encapsulation



An Epipe service is a Layer 2 point-to-point service where the customer data is encapsulated and transported across a service provider's MPLS or IP network. An Epipe service is completely transparent to the subscriber's data and protocols. Like other PW VLL services, Epipe service behaves like a non-learning Ethernet bridge. A distributed Epipe service consists of a SAP and an SDP pair, where one SDP is on same router as the SAP, and the second SDP is on the far-end router.

Each SAP configuration includes a specific port on which service traffic enters the 7705 SAR from the customer side (also called the access side). Each port is configured with an encapsulation type (SAP encapsulation). Thus, a whole Ethernet port can be bound to a single service (that is, the whole Ethernet port is configured as a SAP), or if a port is configured for IEEE 802.1Q encapsulation (referred to as dot1q), then a unique encapsulation value (ID) must be specified.

Figure 26: Epipe Service



Ethernet Access Egress Queuing and Scheduling

Ethernet access egress queuing and scheduling is very similar to the Ethernet access ingress behavior. Once the Ethernet pseudowire is terminated, traffic is mapped to up to eight different forwarding classes per SAP. Mapping traffic to different forwarding classes is performed based on the EXP bit settings of the received Ethernet pseudowire.

For more information on Ethernet access egress queuing and scheduling, refer to the 7705 SAR OS Quality of Service Guide.

Ethernet SAP-to-SAP

Ethernet VLLs can be configured with both endpoints (SAPs) on the same 7705 SAR. This is referred to as Ethernet SAP-to-SAP or local Ethernet service. Ethernet SAP-to-SAP provides local Ethernet switching between two Ethernet endpoints on the 7705 SAR.

An Ethernet SAP-to-SAP connection is set up on the 7705 SAR and a pseudowire is configured between the two endpoints.

When the port encapsulation is null, there is no change to the VLAN tags on the ingress and egress frame headers, if VLAN tags are present.

When the port encapsulation is dot1q, the VLAN tag is removed from the ingress frame header and a new VLAN tag is inserted into the egress frame header. No VLAN tag is inserted into the egress frame header if the SAP has a VLAN ID of 0.

Ethernet OAM

Ethernet VLL service supports Ethernet OAM functions for ETH-CFM according to the 802.1ag and Y.1731 standards, for Y.1731 Performance Management, and for EFM OAM according to the 802.3ah standard. For more information, see [ETH-CFM \(802.1ag and Y.1731\)](#), and refer to the “Ethernet OAM” section in the 7705 SAR OS Interface Configuration Guide, and the “Ethernet OAM Capabilities” section in the 7705 SAR OS OAM and Diagnostics Guide.

Ethernet ports in access or network mode also support CFM loopback message (LBM) frames for Layer 1 and Layer 2 OAM tests on unlabeled ports. For more information, refer to the “Ethernet OAM” section in the 7705 SAR OS Interface Configuration Guide.

Control Word

Ethernet VLL supports an optional control word (CW). Refer to [Pseudowire Control Word](#) for more information.

MTU

The largest maximum transmission unit (MTU) supported on an Ethernet port is 2102 bytes for null encapsulated ports and 2106 bytes for dot1q encapsulated ports. The default MTU for a Gigabit Ethernet port is 1572 bytes; whereas, the default MTU for a 10/100 Ethernet port is 1514 or 1518 bytes, depending on the encapsulation type setting (null or dot1q).

Network-facing Ethernet ports must support a larger MTU than access-facing Ethernet ports in order to account for the pseudowire headers that are added to the access Ethernet frames.

The following list gives the worst-case MTU sizes for Ethernet VLLs over Ethernet port(s) under various configurations, where the worst case is the largest MTU size required in order to carry the payload:

- Access, null mode: 1514 bytes (1500 bytes payload)
- Access, dot1q mode: 1518 bytes (1500 bytes payload)
- Network, null mode: 1572 bytes (1514 bytes payload)
- Network, dot1q mode: 1572 bytes (1518 bytes payload)



Note: Since it is not practical to split a Layer 2 Ethernet frame into smaller frames, the access port (SAP) MTU must be smaller than the service and network port MTU. If the access port MTU is larger than the tunnel MTU, the Ethernet VLL does not come into service and remains in the inoperative state. See [MTU Settings](#) for information on MTU for VLL service.

Raw and Tagged Modes

An Ethernet PW operates in one of two modes: raw or tagged. Raw and tagged modes relate to the way the router handles VLAN tags embedded in the header of an Ethernet frame. Both modes are supported by the 7705 SAR.

Raw and tagged modes are configured using the `vc-type {ether|vlan}` parameter under the `spoke-sdp` command. To configure raw mode, choose the `ether` option; to configure tagged mode, choose `vlan`.

VLAN tags can provide service-affecting information about a frame. Service-affecting means that information in the tag affects the forwarding decisions that are made to route the packet. The port connected to the attachment circuit (AC) can be configured for `null` or `dot1q` operation. When the port is configured for `null`, the 7705 SAR treats any attached tag received at the SAP (from the AC) as not service affecting; when configured for `dot1q`, received tags are service affecting.

Raw Mode

In raw mode, VLAN tags are not service affecting (that is, the port is set to `null` and the tags do not affect frame forwarding decisions) and are forwarded over the Epipe as part of the payload.

If a service-affecting tag arrives from the ingress AC (that is, the port is set to `dot1q` and a tag is received), the tag is removed (popped) from the payload before the Ethernet frame gets switched over the PSN via the Epipe.

In raw mode, all traffic from the ingress port gets switched to the same endpoint. However, if the MTU (or configured size) of the tunnel is exceeded then service is affected because the frame is dropped.

In raw mode, when the 7705 SAR detects a failure on the Ethernet ingress port or the port is administratively disabled, the 7705 SAR sends a PW status notification message to the remote router.

Tagged Mode

In tagged mode, every frame sent on the Ethernet PW has a service-affecting VLAN tag. If the frame received by the 7705 SAR from the attachment circuit (AC) does not have a service-affecting VLAN tag, then the 7705 SAR inserts (pushes) a VLAN tag into the frame header before sending the frame to the SDP and the PW. If the frame received from the AC has a service-affecting VLAN tag, the tag is replaced.

In tagged mode, when the 7705 SAR detects a failure on the Ethernet physical port or the port is administratively disabled, the 7705 SAR sends a PW status notification message for all PWs associated with the port.

VLAN Translation

VLAN ID translation is supported, as appropriate. [Table 25](#) (see [Tagging Rules](#)) shows the VLAN ID translation operation for the various packet types. The payload part of the packet is shown in parentheses.

The operations to add, strip (remove), or forward the VLAN headers are performed based on the encapsulation type at the ingress of the attachment circuit (the SAP), in the network, and at the egress circuit.

Tagging Rules

[Table 23](#) and [Table 24](#) show the general tagging rules for combinations of interface port type (null or dot1q) and Epipe type (Ethernet or VLAN) for SAP ingress and SAP egress directions.

An attachment circuit (ingress or egress) can be configured for one of the following encapsulation types:

- null
- dot1q
- QinQ



Note: The QinQ mode is not supported in Release 4.0 of the 7705 SAR.

Table 23: Ingress SAP Tagging Rules

Ingress SAP Type ⁽¹⁾	VC Type (Epipe)	
	Raw (Ethernet)	Tagged (VLAN)
Null	No operation	Push (VC tag)
Dot1q	Pop (outer tag)	Pop (outer tag) Push (VC tag) ⁽²⁾

Notes:

1. Ingress SAP type is configured at the port level.
2. If the VC tag is not set, then the original tag is preserved.

Table 24: Egress SAP Tagging Rules

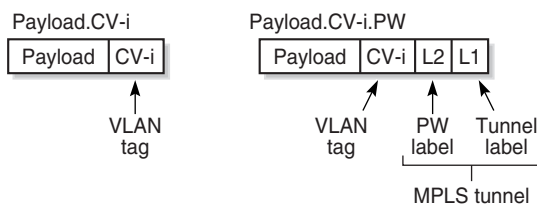
Egress SAP Type ⁽¹⁾	VC Type (Epipe)	
	Raw (Ethernet)	Tagged (VLAN)
Null	No operation	Pop (VC tag)
Dot1q	Push (SAP tag) ⁽²⁾	Pop (VC tag) Push (SAP tag) ⁽³⁾

Notes:

1. Ingress SAP type is configured at the port level.
2. If the SAP tag is 0, then no VLAN tag is pushed.
3. If the SAP tag is 0, then only the pop operation is performed.

Table 25 shows the VLAN ID translation operation (from ingress to egress) for the various packet types. In Table 25, the following abbreviations are used to simplify the operations shown in each cell, and the text in the cell represents the packet format.

- The packet payload at the service level is shown in parenthesis. It includes any SAP headers.
- CV represents the Customer VLAN tag, where CV-i and CV-x represent the ingress VLAN tag, and CV-e represents egress VLAN tag.
- PV represents the Provider VLAN tag, where PV can be either the customer-configured VLAN tag (that is, CV-x) or a provider-configured VLAN tag (that is, configured using the `spoke-sdp>vlan-vc-tag` CLI command)
- PW represents the MPLS label, which consists of a PW label and a tunnel label.
- Dots in packet formats represent the places in an Ethernet frame where labels or tags are added to a packet. Figure 27 shows two examples using the more familiar representation of a packet format, where the packet starts on the right-hand side.

Figure 27: Ethernet Frame Representations

19786



Note: When the SAP type is dot1q, the SAP VLAN tag always affects the ingress traffic, regardless of the Ethernet VLL type (raw or tagged). Similarly, when the SAP type is dot1q, untagged frames are dropped at the SAP ingress. That is, only the frames with an outer VLAN tag that matches the SAP VLAN tag are forwarded. The exception to this occurs when the VLAN tag = 0. When a SAP is configured with VLAN ID = 0, any untagged packets received are processed.

Table 25: Ethernet VLL Encapsulation Translation

Ingress / Attachment Circuit (Ethernet)	MPLS Network		Egress / Attachment Circuit (Ethernet)	
	Packet Format	VC Type	Encap	Packet Format
Null (untagged Ethernet)				
Payload	(Payload).PW	Raw	Null	Payload
	(Payload).PV.PW	Tag	Dot1q	Payload.CV-e
Payload.CV-i	(Payload.CV-i).PW	Raw	Null	Payload.CV-i
	(Payload.CV-i).PV.PW	Tag	Dot1q	Payload.CV-i.CV-e
Payload.CV-i.CV-x	(Payload.CV-i.CV-x).PW	Raw	Null	Payload.CV-i.CV-x
	(Payload.CV-i.CV-x).PV.PW	Tag	Dot1q	Payload.CV-i.CV-x.CV-e
Dot1q				
Payload	(Payload).PW	Raw	Null	Payload
	(Payload).PV.PW	Tag	Dot1q	Payload.CV-e
Payload.CV-i	(Payload).PW	Raw	Null	Payload
	(Payload).PV.PW	Tag	Dot1q	Payload.CV-e
Payload.CV-i.CV-x	(Payload.CV-i).PW	Raw	Null	Payload.CV-i
	(Payload.CV-i).PV.PW	Tag	Dot1q	Payload.CV-i.CV-e

IP Filters

IP filters are applied to Epipe SAPs in the ingress direction, as described below. For a full list of entities to which IP filters can be applied, see [IP Filter Policies](#).

Ethernet pseudowires are generally used to transparently switch traffic across an MPLS network to the far end. However, in some cases, the traffic that is switched over the network, consuming valuable bandwidth, is just discarded at the other end of the pseudowire. As well, with the 7705 SAR expanding into areas such as vertical markets, and with local area networks being connected to the 7705 SAR Ethernet ports, an increasing amount of traffic must stay local and not pass through the MPLS network to the far end. By using IP filters at the access ingress, operators can determine what traffic is passed through the pseudowire and therefore use the network links more efficiently.

IP filters can also be used for security purposes, by allowing access only to designated services (for example, allowing e-mail and FTP services while disallowing Telnet services) at the origin of the traffic.

IP filter policies specify either a forward or a drop action for packets, based on information specified in the match criteria. You can create up to 16 IP unique filter policies per adapter card and up to 96 IP filters per node. Within each filter policy, you can create up to 64 matching entries.

The same IP filter policy can be assigned to any entity (network interfaces, IP pseudowires, Ethernet pseudowires, IES, and VPRN services), all of which can be configured on the same adapter card. For example, a filter policy defined as filter-5 can be assigned to multiple Epipe SAPs and, simultaneously, to network interfaces on the same adapter card.

A filter policy assigned to an entity on one adapter card can also be assigned to any entity on another adapter card. For example, a filter policy defined as filter-2 can be assigned to an Epipe on an Ethernet Adapter card and to a network interface on another Ethernet Adapter card.

Up to 16 unique filter policies are supported per adapter card, and assigning the same filter policy to different entities on a card counts as using one filter policy.

Configuration of filter policies is similar for network interfaces, IES management SAPs, Ethernet and IP pseudowire SAPs, VPRN SAPs, and IES SAPs. This guide describes the assignment of filter policies to SAPs. Refer to the 7705 SAR OS Router Configuration Guide, “Filter Policies”, for information on configuring filter policies and assigning them to network interfaces.

IP Interworking VLL (Ipipe) Services

This section provides information about the Ipipe service.

Topics in this section include:

- [Ipipe Service Overview](#)
 - [IP Interworking VLL Datapath](#)
 - [Control Word](#)
 - [IP Filters](#)

Ipipe configuration information is found under the following topics:

- [Common Configuration Tasks](#)
- [Configuring VLL Components](#)
 - [Creating an Ipipe Service](#)
- [Service Management Tasks](#)

Ipipe Service Overview

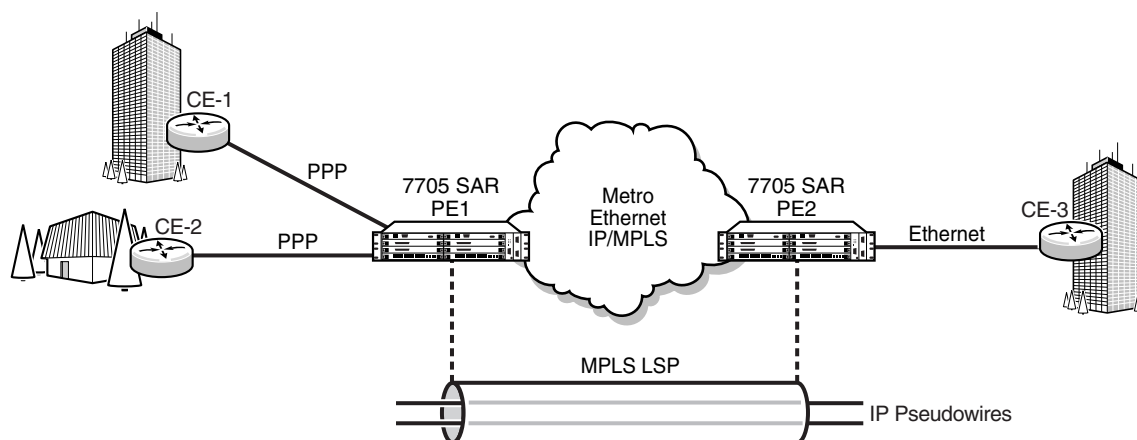
An Ipipe pseudowire (IP PW) enables service interworking between different link layer technologies and network interworking between connections with the same link layer technologies. IP PWs provide an efficient means to connect Layer 3 IP traffic to the IP/MPLS network, even without access to VLANs.

An Ipipe is a point-to-point Layer 2 service where the customer data is encapsulated and transported across an MPLS or IP network. An Ipipe service transparently forwards all packets received on one SAP to the other SAP. No native IP routing of customer packets occurs.

IP interworking allows connections to be created with any combination of PPP, MLPPP, and Ethernet SAPs, but the payload must always be IP. Ipipes can be used to transport IP payloads more efficiently than Epipes because an Ipipe service does not need to forward the Ethernet header information.

[Figure 28](#) provides an example of IP connectivity between a host attached to a point-to-point access circuit (PPP) with routed PDU IPv4 encapsulation and a host attached to an Ethernet interface. Both hosts are on the same LAN segment.

Figure 28: IP Pseudowires Between SAR Nodes



20146

A PPP interface makes use of RFC 1332, *The PPP Internet Protocol Control Protocol (IPCP)*, PPP IPCP encapsulation of an IPv4 packet. The PW uses the IP Layer 2 transport pseudowire encapsulation type.

IP Interworking VLL Datapath

In order to be able to forward IP packets between CE 1 and CE 3 in [Figure 28](#), PE 2 is manually configured with both CE 1 and CE 3 IP addresses. These are host addresses and are entered in the /32 format. PE 2 maintains an ARP cache context for each IP interworking VLL and responds to ARP request messages received on the Ethernet SAP. PE 2 responds with the Ethernet SAP configured MAC address as a proxy for any ARP request for the CE 1 IP address. PE 2 silently discards any ARP request messages received on the Ethernet SAP for addresses other than CE 1. Likewise, PE 2 silently discards any ARP request messages with source IP addresses other than CE 3. In all cases, PE 2 keeps track of the association of IP to MAC addresses for ARP requests it receives over the Ethernet SAP. All entries are subject to aging.

In order to forward unicast frames destined for CE 3, PE 2 needs to know the MAC address of CE 3. If there is no entry in the ARP cache, PE 2 sends an ARP request message for the CE 3 MAC address over the Ethernet SAP.

IP broadcast and IP multicast packets are sent on the Ethernet SAP using the broadcast or direct-mapped multicast MAC address.

In order to forward unicast frames destined for CE 1, PE 2 validates the MAC destination address of the received Ethernet frame. It should match that of the Ethernet SAP. PE 2 then removes the Ethernet header and encapsulates the IP packet directly into a pseudowire with or without the optional control word. PE 1 removes the pseudowire encapsulation and forwards the IP packet over the SAP using PPP encapsulation.

When a packet reaches the access egress and the configured SAP is over a VLAN, the node pushes (inserts) the appropriate VLAN tag into the Ethernet frame header before forwarding the Ethernet frame out of the port. Ethernet frames at the access egress can also be marked with appropriate dot1 priority bits if the dot1 priority QoS profile is assigned to the forwarding class configuration.

Ethernet frames mapped to an Ipipe service can have a maximum of two VLAN tags. Frames with more than two VLAN tags are dropped at the Ipipe access ingress SAP.

At access ingress, PE 1 performs proxy PPP negotiation and provides the IP address of the remote CE 3 device to CE 1 during IPCP negotiation using the IP-Address option.

A PE does not flush the ARP cache unless the SAP goes administratively or operationally down. The PE with the Ethernet SAP sends unsolicited ARP requests to refresh the ARP cache according to the refresh interval. ARP requests are staggered at an increasing rate if no reply is received to the first unsolicited ARP request. The refresh interval is configurable using the `mac-refresh` CLI command.

Control Word

IP interworking VLL supports an optional control word (CW). Refer to [Pseudowire Control Word](#) for more information.

IP Filters

IP filters are applied to Ipipe SAPs in the ingress direction, as described below. For a full list of entities to which IP filters can be applied, see [IP Filter Policies](#).

IP pseudowires are generally used to transparently switch traffic across an MPLS network to the far end. However, in some cases, the traffic that is switched over the network, consuming valuable bandwidth, is just discarded at the other end of the pseudowire. As well, with the 7705 SAR expanding into areas such as vertical markets, and with local area networks being connected to the 7705 SAR Ethernet ports, an increasing amount of traffic must stay local and not pass through the MPLS network to the far end. By using IP filters at the access ingress, operators can determine what traffic is passed through the pseudowire and therefore use the network links more efficiently.

Another use for IP filters is in cases where a customer router is connected to an access port on the 7705 SAR with ppp/mlppp encapsulation. The service provider may want to filter incoming traffic from the customer at the boundaries of the network.

IP filters can also be used for security purposes, by allowing access only to designated services (for example, allowing e-mail and FTP services while disallowing Telnet services) at the origin of the traffic.

IP filter policies specify either a forward or a drop action for packets, based on information specified in the match criteria. You can create up to 16 IP unique filter policies per adapter card and up to 96 IP filters per node. Within each filter policy, you can create up to 64 matching entries.

The same IP filter policy can be assigned to any entity (network interfaces, IP pseudowires, Ethernet pseudowires, IES, and VPRN services), all of which can be configured on the same adapter card. For example, a filter policy defined as filter-5 can be assigned to multiple Ipipe SAPs and, simultaneously, to network interfaces on the same adapter card.

A filter policy assigned to an entity on one adapter card can also be assigned to any entity on another adapter card. For example, a filter policy defined as filter-2 can be assigned to an Ipipe on an Ethernet Adapter card and to a network interface on another Ethernet Adapter card.

Up to 16 unique filter policies are supported per adapter card, and assigning the same filter policy to different entities on a card counts as using one filter policy.

Configuration of filter policies is similar for network interfaces, IES management SAPs, Ethernet and IP pseudowire SAPs, VPRN SAPs, and IES SAPs. This guide describes the assignment of filter policies to SAPs. Refer to the 7705 SAR OS Router Configuration Guide, “Filter Policies”, for information on configuring filter policies and assigning them to network interfaces.

Pseudowire Switching

The pseudowire switching feature provides the user with the ability to create a VLL service by cross-connecting two spoke SDPs.

Services with one SAP and one spoke SDP are created normally on the PE; however, when a pseudowire originates at customer equipment and not the 7705 SAR, the target destination of the SDP is the 7705 SAR pseudowire switching node instead of the remote PE. In such cases, the user must configure a VLL service on the pseudowire switching node (the 7705 SAR, in this case) using the two SDPs and no SAP. This creates a VLL service that travels over two different types of tunnels. The first pseudowire segment connects the Node B to the 7705 SAR, and the second segment connects the 7705 SAR to a 7750 SR node. [Figure 29](#) shows an example of a VLL pseudowire switching service.

For the 7750 SR node, there is no implementation change required. The pseudowire segment is treated as a 7705 SAR-initiated dynamic ATM pseudowire. The 7705 SAR signals for the ATM pseudowire and negotiates all required parameters, including the pseudowire label, control word, and VCCV type.

The pseudowire switching node acts in a passive role with respect to signaling of the pseudowires. The node waits until one or both of the PEs send the label mapping message before relaying it to the other PE. This is because it needs to pass the interface parameters of each PE to the other. For example, the 7705 SAR assumes the pseudowire payload from the Node B, then signals for the ATM pseudowire to the far end and negotiates all required parameters, including the pseudowire label, control word, and VCCV type.

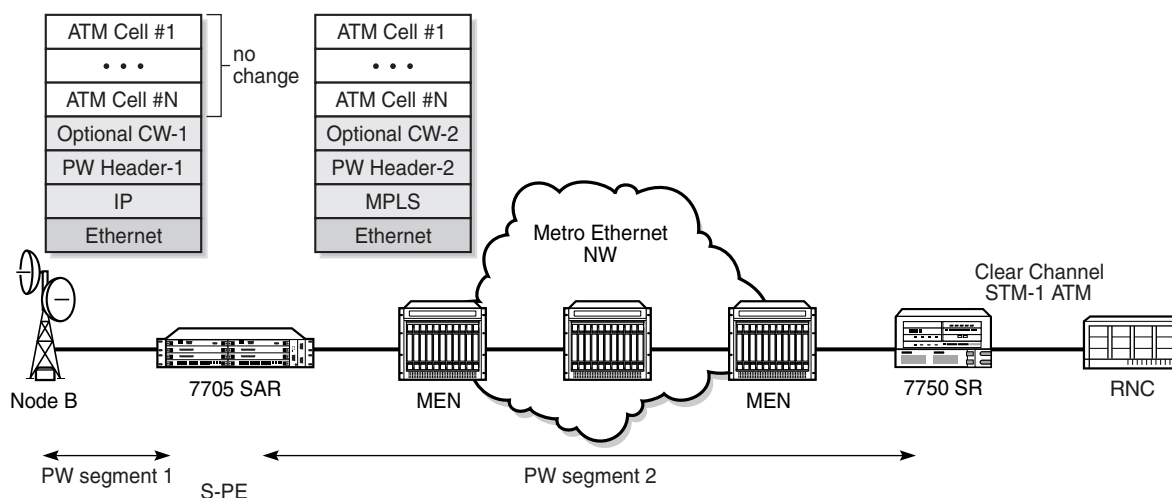
The switching pseudowire inserts a pseudowire switching point TLV indicating the system address in the label mapping message. This TLV is useful because it allows for troubleshooting of the path of the pseudowire, especially if multiple pseudowire switching points exist between the two PEs. The TLV also helps in loop detection of TLDP signaling messages, where a switching point receives a label mapping message that it already relayed. The switching point TLV is inserted in pseudowire status notification messages when they are sent end-to-end or from a pseudowire switching node towards a destination PE. See [Pseudowire Switching TLV](#) for more information.

Pseudowire OAM is supported for dynamic switching pseudowires and allows the 7705 SAR pseudowire switching node to relay end-to-end pseudowire status notification messages between the two PEs. The 7705 SAR can generate a pseudowire status and send it to one, or both, of the PEs by including its system address in the pseudowire switching point TLV. This allows a 7705 SAR PE to identify the origin of the pseudowire status notification message.

The pseudowire segment between the 7705 SAR and the 7750 SR supports OAM tools as well as BFD; however, since Node Bs are not dual-homed, OAM tools operating on this pseudowire segment can only provide informative messages. The 7705 SAR responds to Node B-initiated ping packets if the destination IP address is the system IP or interface IP address of the 7705 SAR. If the IP packet does not contain a SAR destination IP address, the 7705 SAR does not respond, and instead, forwards the packet.

Figure 29 shows an example of static-simplex to dynamic-simplex pseudowire switching. This service consists of a SAP and a spoke SDP. However, the target destination of the SDP is not the remote PE but the pseudowire switching node. In addition, the user configures a VLL service on the pseudowire switching node using the two SDPs.

Figure 29: Simplex to Simplex Pseudowire Switching



20772

Configuration examples can be found in [Configuring PW Switching](#).

Table 26 shows the pseudowire switching options supported in Release 4.0 of the 7705 SAR.

Table 26: Supported Pseudowire Switching Options

Pseudowire Segment 1		Pseudowire Segment 2		Epipe	Ipipe	Apipe	Cpipe -ces	Cpipe -satop
Tunnel	Pseudowire	Tunnel	Pseudowire					
RSVP-TE, LDP, Static MPLS, IP, or GRE/IP	Static	RSVP-TE, LDP, Static MPLS, IP, or GRE/IP	TLDP (with or without pseudowire redundancy)	✓	✓	✓	✓	✓
RSVP-TE, LDP, Static MPLS, IP, or GRE/IP	TLDP	RSVP-TE, LDP, Static MPLS, IP, or GRE/IP	TLDP	✓	✓	✓	✓	✓
IP	Static ⁽¹⁾	MPLS- Static	Static ⁽¹⁾	✓	✓	✓	✓	✓

Note:

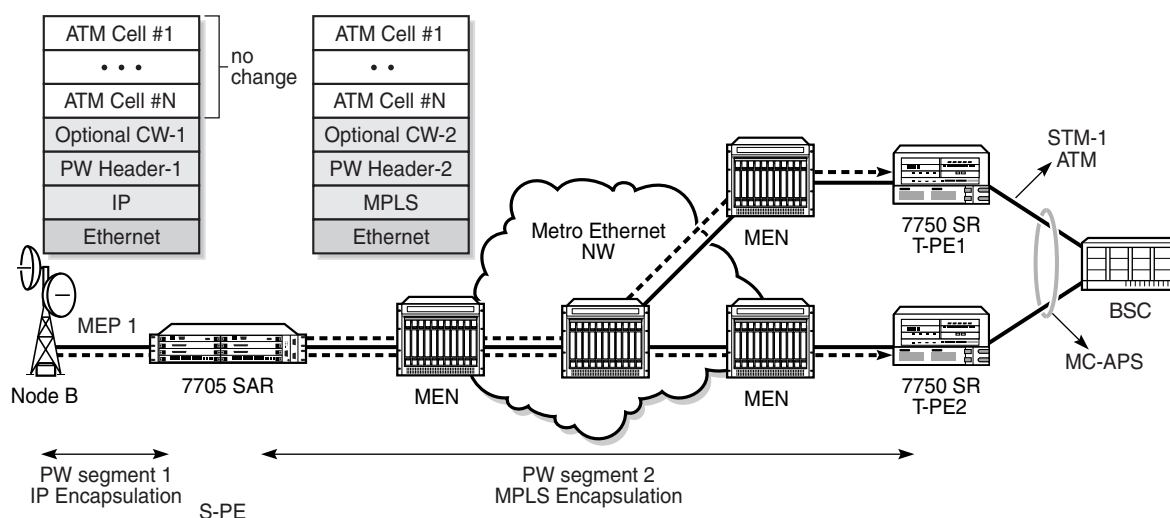
1. A static- to-static pseudowire switching service will fail if there is more than one S-PE node between the T-PE nodes.

The 7705 SAR supports use of an optional control word on both pseudowire segments. Use of a control word is negotiated by the 7705 SAR and 7750 SR during the signaling phase. The 7705 SAR and 7750 SR negotiate during the signaling phase even if a control word is not used. If a control word is used, the 7705 SAR generates it and configures it with all 0s.

When the 7705 SAR appends or strips the control word to support VCCV ping type 1, the TTL value of the switched pseudowire is reset to 255. If the control word is present on the ingress pseudowire packet and it is not removed because it is on an end-to-end service, the 7705 SAR reduces the pseudowire TTL by 1 at the time of pseudowire switching.

Pseudowire Switching with Pseudowire Redundancy

Pseudowire switching with pseudowire redundancy supports one redundant pseudowire with up to four redundant spoke SDPs. Figure 30 shows an example of a network with simplex to redundant pseudowire switching.

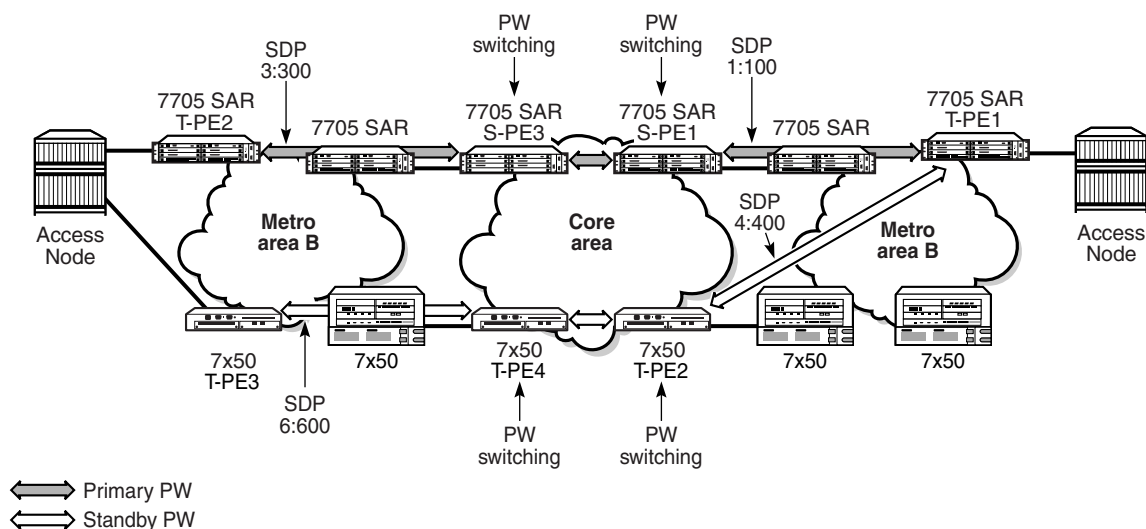
Figure 30: Simplex to Redundant Pseudowire Switching

20773

To enable pseudowire redundancy, the first pseudowire segment must be a static pseudowire (that is, TLDP disabled). The second pseudowire segment can then be configured with up to four redundant spoke SDPs. See [Pseudowire Redundancy](#) for instructions on configuring redundancy. Pseudowire switching with pseudowire redundancy also supports standby signaling. See [Active/Standby Mode for Pseudowire Redundancy \(Standby Signaling\)](#) for more information.

Pseudowire Switching Behavior

In the network in [Figure 31](#), T-PE nodes act as masters and pseudowire switching nodes (S-PE nodes) act as slaves for the purpose of pseudowire signaling. Switching nodes need to pass the SAP interface parameters of each PE to the other PE. T-PE1 sends a label mapping message for the Layer 2 FEC to the peer pseudowire switching node; for example, S-PE1. It includes the SAP interface parameters, such as MTU, in the label mapping message. S-PE1 checks the FEC against the local information, and if a match exists, it appends the optional pseudowire switching point TLV to the FEC TLV in which it records its system address. T-PE1 then relays the label mapping message to S-PE2. S-PE2 performs a similar operation and forwards a label mapping message to T-PE2.

Figure 31: Pseudowire Switching Network

20905

The same procedures are followed for the label mapping message in the reverse direction; for example, from T-PE2 to T-PE1. S-PE1 and S-PE2 will affect the spoke SDP cross-connect only when both directions of the pseudowire have been signaled and matched.

Pseudowire status notification messages can be generated by the T-PE nodes and/or the S-PE nodes. Pseudowire status notification messages received by a switching node are processed and then passed on to the next hop. An S-PE node appends the optional pseudowire switching TLV, with its system address added to it, to the FEC in the pseudowire status notification message only if it originated the message or the message was received with the TLV in it. If the S-PE node is not the originator or if there is no TLV with the system address in the message, this means that the message was originated by a T-PE node. In this case, the S-PE processes and passes the message without changes except for the VC ID value in the FEC TLV.

The merging of the received TLDP status notification message and the local status for the spoke SDPs from the service manager at a 7705 SAR PE complies with the following rules.

- When the local status for both spokes is up, the S-PE passes any received SAP or SDP-binding generated status notification message unchanged. For example, the status notification TLV is unchanged but the VC-ID in the FEC TLV is set to the value of the pseudowire segment to the next hop.

- When the local operational status for any of the spokes is down, the S-PE always sends SDP-binding down status bits regardless if the received status bits from the remote node indicated SAP up or down or SDP-binding up or down.

When one segment of the pseudowire cross-connect at the S-PE is static while the other is signaled using TLDP, the S-PE operates much like a T-PE from a signaling perspective and as an S-PE from a data plane perspective. The S-PE signals a label mapping message as soon as the local configuration is complete. The control word C-bit field in the pseudowire FEC is set to the value configured on the static spoke SDP.

When the label mapping for the egress direction is also received from the TLDP peer, and the information in the FEC matches that of the local configuration, the static-to-dynamic cross-connect is established.

In a static-to-dynamic pseudowire switching service, it is possible for the end nodes of the static pseudowire segment to be misconfigured. In this case, an S-PE or T-PE node may receive packets with the wrong encapsulation. If this happens, an invalid payload might be forwarded over the pseudowire or the SAP respectively.

Furthermore, if the S-PE or T-PE node is expecting the control word in the packet encapsulation, and the received packet arrives with no control word but the first nibble below the label stack is 0x0001, the packet may be mistaken for a VCCV OAM packet and may be forwarded to the CSM. In that case, the CSM will perform a check of the IP header fields. If any of the fields fail the check, the VCCV packet will be discarded.

Pseudowire Switching With IP Tunnels

You cannot enable TLDP dynamic pseudowire establishment on pseudowire switching segments using IP tunnels if the second pseudowire segment is configured for pseudowire redundancy. The pseudowire label, control word, VCCV type, and so on, must be configured manually.

On the first pseudowire segment, ATM pseudowires are natively transported over IP using GRE encapsulation with the IP type set to 0x8847, or IP encapsulation. The destination IP address of pseudowire packets received from the Node B must be set to the system IP or interface IP address of the 7705 SAR. Similarly, the destination IP address of pseudowire packets received from the 7750 SR must be set to the system IP or interface IP address of the Node B. Node B management traffic is transported over the same Ethernet link between the 7705 SAR and the Node B. The 7705 SAR forwards the management IP traffic to its destination based on longest prefix match.

On the second pseudowire segment, ATM pseudowires are transported over MPLS tunnels. The MPLS tunnels can also be used to transport additional cell site traffic, such as BTS traffic using TDM pseudowires, or LTE base station traffic using IP or Ethernet pseudowires.

Pseudowire Switching TLV

Figure 32 shows the format of the pseudowire switching TLV and Table 27 describes the fields.

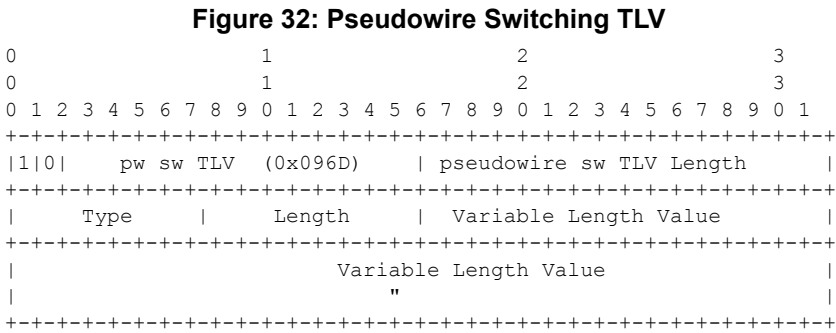


Table 27: Pseudowire Switching TLV Field Descriptions

Field	Description
PW sw TLV Length	Specifies the total length of all the following pseudowire switching point TLV fields in octets
Type	Encodes how the Value field is to be interpreted
Length	Specifies the length of the Value field in octets
Value	Octet string of Length octets that encodes information to be interpreted as specified by the Type field

The following list describes details specific to pseudowire switching point sub-TLVs:

- pseudowire ID of last pseudowire segment traversed
- pseudowire switching point description string - an optional description string of text up to 80 characters long
- IP address of pseudowire switching point - an optional sub-TLV containing the IP V4 address of the pseudowire switching point
- MH VCCV capability indication

VLL Service Considerations

This section describes the general 7705 SAR service features and any special capabilities or considerations as they relate to VLL services.

Topics in this section include:

- [Service Support](#)
- [SDPs](#)
- [SAP Encapsulations and Pseudowire Types](#)
- [QoS Policies](#)
- [IP Filter Policies](#)
- [MTU Settings](#)
- [Pseudowire Control Word](#)
- [Pseudowire Redundancy](#)
- [Active/Standby Mode for Pseudowire Redundancy \(Standby Signaling\)](#)

Service Support

On a 7705 SAR-8 and 7705 SAR-18, ATM VLL service is supported on any port on the 4-port OC3/STM1 Clear Channel Adapter card when the port is configured for ATM and on any T1/E1 port on the 16-port T1/E1 ASAP Adapter card, 32-port T1/E1 ASAP Adapter card, 4-port DS3/E3 Adapter card, and 2-port OC3/STM1 Channelized Adapter card when the port is configured for ATM or IMA. On the 7705 SAR-F, ATM VLL service is supported on any T1/E1 ASAP port.

Ethernet VLL service is supported on the 7705 SAR-8 on any port on the 8-port Ethernet Adapter card version 1 and version 2 and on the 7705 SAR-18 on any port on the 8-port Ethernet Adapter card version 2.

Ethernet VLL service is supported on the 7705 SAR-F on any Ethernet port. Ethernet ports on the 7705 SAR-F are functionally equivalent to Ethernet ports on an 8-port Ethernet Adapter card version 2.

TDM VLL service is supported on any T1/E1 port on the 16-port T1/E1 ASAP Adapter card, 32-port T1/E1 ASAP Adapter card, and 2-port OC3/STM1 Channelized Adapter card, on any serial port on the 12-port Serial Data Interface card, and on any voice port on the 6-port E&M Adapter card, when the port is configured for circuit emulation encapsulation.



Note: The 6-port E&M Adapter card and 12-port Serial Data Interface card are not supported on the 7705 SAR-18 in Release 4.0.

TDM VLL service is supported on the 7705 SAR-F on any T1/E1 ASAP port.

IP interworking VLL service is supported on the 7705 SAR-8 on any Ethernet port on the 8-port Ethernet Adapter card version 1 and version 2, on the 7705 SAR-18 on any Ethernet port on the 8-port Ethernet Adapter card version 2, and on PPP/MLPPP connections on the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card.

IP interworking VLL service is supported on the 7705 SAR-F on any 10/100 Base-T Ethernet or Gigabit Ethernet SFP port and on PPP/MLPPP connections on any T1/E1 ASAP port.



Note: MPLS and VLL service over MPLS are not supported on access ports.

SDPs

The most basic SDPs must have the following characteristics:

- a locally unique SDP identification (ID) number and a VC-ID
- the system IP address of the far-end 7705 SAR routers
- an SDP encapsulation type — GRE, IP, or MPLS

SDP Statistics for VLL Services

The 7705 SAR supports local CLI-based and SNMP-based statistics collection for each VC used in the SDPs. This allows for traffic management of tunnel usage by the different services and, with aggregation, the total tunnel usage.

SAP Encapsulations and Pseudowire Types

The section describes encapsulations and PW types for the following VLL services:

- Apipe
- Cpipe
- Epipe
- Ipipe

Apipe

ATM VLLs can be configured with both endpoints (SAPs) on the same router or with the two endpoints on different routers. In the latter case, Pseudowire Emulation Edge-to-Edge (PWE3) signaling can be used to establish a pseudowire between the devices, allowing ATM traffic to be tunneled through an MPLS or IP network.

As an alternative to signaled pseudowires, manual configuration of pseudowires is also supported.

The Apipe service supports both VP and VC connections, which are identified by specifying the `vc-type` when provisioning the Apipe. The N-to-1 VCC cell transport mode is supported (see [ATM PWE3 N-to-1 Cell Mode Encapsulation](#)). The value of N is always 1.

The supported PW service types are 0x0009 (for ATM N-to-1 VCC cell mode) and 0x000A (for ATM N-to-1 VPC cell mode), as defined in RFC 4446.

Cpipe

Cpipe service supports CESoPSN and SAToP encapsulation over MPLS or GRE tunnels to connect to the far-end circuit. Cpipes support SAP-to-SAP and SAP-to-spoke SDP binding with a default service MTU of 1514 bytes.

The supported PW service types are 0x0011 (SAToP E1), 0x0012 (SAToP T1), 0x0015 (CESoPSN basic mode), and 0x0017 (CESoPSN TDM with CAS).

Epipe

Epipe service is designed to carry Ethernet frame payloads, so it can provide connectivity between any two SAPs on different nodes that pass Ethernet frames. The following SAP encapsulations are supported on the 7705 SAR Epipe service:

- Ethernet null
- Ethernet dot1q

While different encapsulation types can be used at either end, encapsulation mismatching can occur if the encapsulation behavior is not understood by connecting devices and if those devices are unable to send and receive the expected traffic. For example, if the encapsulation type on one side of the Epipe is dot1q and the other is null, tagged traffic received on the null SAP will be double-tagged when it is transmitted out of the dot1q SAP.

The supported PW service types are 0x0004 (Ethernet tagged mode), and 0x0005 (Ethernet raw).

Ipipe

Ipipe service supports Ethernet null, Ethernet dot1q, IPCP, and PPP/MLPPP SAP encapsulation over IP or MPLS. Ipipes support SAP-to-spoke SDP binding with a default service MTU of 1500 bytes.

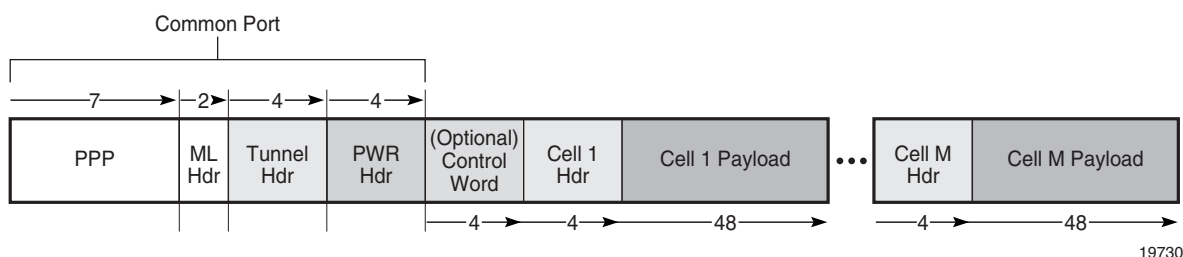
Ipipe service supports 0x000B (IP Layer2 Transport) PW service type.

ATM PWE3 N-to-1 Cell Mode Encapsulation

ATM PWE3 signaling over a PSN uses N-to-1 cell mode encapsulation (as per RFC 4717). For Release 4.0, N is not user-configurable and N = 1 is the only value supported. [Figure 33](#) shows the structure of an N-to-1 cell mode frame.

In N-to-1 mode, OAM cells are transported through the VLL in the same way as any other cell.

Figure 33: N-to-1 Cell Mode Encapsulation



VPI/VCI Translation

To simplify provisioning, the same VPI and VCI can be used at different sites. Before traffic from various sites can be switched to a Radio Network Controller (RNC), VPI and VCI translation must occur in order to uniquely identify the site and the far-end equipment.

The endpoints of a PWE3 N-to-1 cell mode ATM VLL can be:

- ATM VCs—VPI/VCI translation is supported (the VPI/VCI at each endpoint does not need to be the same)

In this case, when the VPI and VCI used at the endpoints are different, both the VPI and the VCI can be modified at the endpoint (VPI and/or VCI can only be changed by the far-end PE node, before the cells are switched to the ATM interface).

- ATM VPs—VPI translation is supported (the VPI at each endpoint need not be the same, but the original VCI will be maintained)

In this case, when the VPI and VCI used at the endpoints are different, only the VPI can be modified at the endpoint (VPI can only be changed by the far-end PE node, before the cells are switched to the ATM interface).

Control Word

An optional control word (CW) is supported for ATM VLLs. Refer to [Pseudowire Control Word](#) for more information.

Cell Concatenation

Cell concatenation (or packing) into a pseudowire packet payload at the VC and VP levels is supported. Cells are packed on ingress to the VLL and unpacked on egress.

Cell concatenation is supported only for N-to-1 cell mode, where $N = 1$.

The number of cells in the payload of a single VLL packet is user-configurable, which ensures proper transport of traffic sensitive to delay and jitter. (For example, for voice traffic in 3G/WCDMA, delay is a crucial factor and the time spent for concatenation should be minimized. The payload is extremely delay-sensitive and should be transported with only a small amount of bandwidth optimization.) In all cases, the number of cells in a VLL packet must be less than the MTU size, where the MTU maximum is 1514 bytes and the maximum N-to-1 mode payload is 29 cells (52 ATM bytes per cell (no HEC byte)).

While cells are being packed, the concatenation process may be terminated by any one of the following conditions. Each condition has a configurable attribute associated with it:

- reaching a maximum number of cells per packet
- expiring of a timer
- changing of the cell loss priority (CLP) bit

If none of the conditions are met, the packet is sent when the MTU is reached. The CLP bits are untouched, even if VPI/VCI translation occurs at egress.



Note: Configuring the attributes that provide the best compromise between minimizing delay (low number of cells concatenated) and maximizing bandwidth (high number of cells concatenated) requires careful planning.

QoS Policies

When applied to 7705 SAR Apipe, Cpipe, Epipe, and Ipipe services, service ingress QoS policies only create the unicast queues defined in the policy.

With Apipe, Cpipe, Epipe, and Ipipe services, egress QoS policies function as with other services where the class-based queues are created as defined in the policy.

Both Layer 2 and Layer 3 criteria can be used in the QoS policies for traffic classification in a Cpipe, Epipe, or Ipipe service. QoS policies on Apipes cannot perform any classification.

IP Filter Policies

The 7705 SAR supports IPv4 and IPv6 filter policies on the following entities:

- IPv4 ingress
 - network interfaces
 - Ethernet SAPs on all services
 - ATM SAPs on a 4-port OC3/STM1 Clear Channel Adapter card in conjunction with bridged llc-snap ATM SAP to VPLS
 - ATM SAPs on a 16- or 32-port T1/E1 ASAP Adapter card in conjunction with routed VC-Mux ATM SAP to IES
 - spoke SDPs on VPLS
 - mesh SDPs on VPLS
- IPv4 egress
 - Ethernet SAPs on VPLS
- IPv6 ingress
 - Ethernet interfaces (IPv6 interfaces)
 - Ethernet SAPs on IES

Configuration of IP filter policies for Epipes, Ipipes, VPRN, VPLS, and IES SAPs is similar to configuration of IP filters for network interfaces and IES management SAPs. Refer to the 7705 SAR OS Router Configuration Guide, “Filter Policies”, for information on configuring IP filters.

MTU Settings

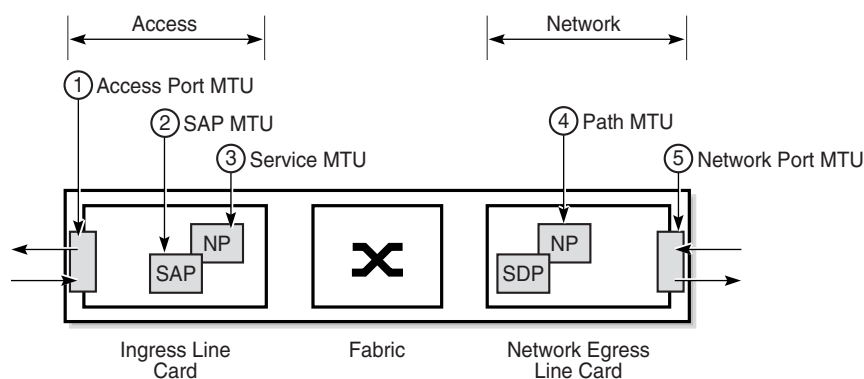
There are several MTU values that must be set properly for a VLL service (Apipe, Cpipe, Epipe, or Ipipe) to work from end to end. [Figure 34](#) locates the MTU point for each value. [Table 28](#) describes the MTU points. The MTU points are:

- access port MTU
- SAP MTU
- service MTU
- path MTU
- network port MTU

In order for a VLL service to be declared “up” without any MTU-related error messages, the following rule must be true:

$$\text{SAP MTU} \geq \text{Service MTU} \leq \text{Path MTU}$$

Figure 34: MTU Points on the 7705 SAR



19688

Table 28: MTU Points and Descriptions

Key	MTU Point	Description
1	Access port MTU	<p>The access port MTU value is a configurable value that accounts for the L2 header and the payload. The default access port MTU value for the following Fast Ethernet port SAP encapsulations is:</p> <ul style="list-style-type: none"> • Null: 1514 bytes (payload = 1500 bytes, L2 header = 14 bytes) • dot1q: 1518 bytes (payload = 1500 bytes, L2 header = 18 bytes)
2	SAP MTU	<p>The SAP MTU value is not a configurable value. It is set at the SAP by the 7705 SAR operating system. It defines the service payload capability of the service and is automatically set to be the same value as the access port MTU.</p>
3	Service MTU	<p>The service MTU value is a configurable value and is the same size as the VLL payload. The service MTU is sometimes called the VC-type MTU in the 7705 SAR documentation set. In Figure 34, NP stands for network processor.</p> <p>For CESoPSN with CAS service, ensure that the service MTU is set to a value large enough to account for the extra bytes appended to the packet payload for CAS bits. See Structured T1/E1 CES with CAS for more information.</p>
4	Path MTU	<p>The path MTU is configured at the SDP. It is the maximum that the SDP can transmit without rejecting and discarding the packet. The path MTU value is derived from the network port MTU value by subtracting the Layer 2 and Layer 2.5 overhead values (for MPLS) and the Layer 2 and Layer 3 overhead values (for GRE).</p> <p>If the network port SDP binding is Ethernet, then the following equations hold:</p> <ul style="list-style-type: none"> • For MPLS: Path MTU = Port MTU - (Ethernet header [14 bytes or 18 bytes] + Tunnel header + PW header) • For GRE: Path MTU = Port MTU - (Ethernet header [14 bytes or 18 bytes] + IP header [20 bytes] + Tunnel header [4 bytes] + PW header [4 bytes])
5	Network port MTU	<p>The network port MTU is a configurable value equal to the payload plus all headers (L2, IP (for GRE), tunnel and PW), up to the maximum supported value (hardware limit) of 1572 bytes.</p>

[Table 29](#) aids in calculating MTU values for various configurations and operating scenarios.



Note: Ethernet QinQ is not supported in this release and is shown in this table for reference purposes only.

Table 29: MTU Calculator — Service Creation (Worst Case)

[illegible]

**Notes:**

- In order to accommodate current and future services (including overhead), the MTU value for Gigabit Ethernet and PPP/MLPPP ports have the default value set to 1572 bytes. For 10/100 Ethernet ports, the MTU value is set to 1514 or 1518 bytes, depending on the encapsulation setting (null or dot1q).
- The default service MTU value is 1514 bytes; the maximum value is 1522 bytes.

Targeted LDP and MTU

The extended discovery mechanism for Label Distribution Protocol (LDP) sends LDP Targeted Hello messages to a specific address. This is known as targeted LDP or TLDP. Refer to RFC 5036 for detailed information about the extended discovery mechanism.

During the VLL service creation process (that is, using targeted LDP signaling), the MTU or payload size of a service is signaled to the far-end peer. MTU settings at both ends (near and far peers) must match in order for the VLL service to operate. [Table 30](#) shows the values that are expected to match.

Table 30: Matching MTU or Payload Values for Signaled VLL Services

	Apipe	Cpipe	Epipe	Ipipe
Payload size (bytes)		Yes		
Bit rate		Yes		
Maximum number of ATM cells	Yes			
Service MTU			Yes	Yes
Must match at both ends	Yes	Yes	Yes	Yes

Pseudowire Control Word

The PW control word (CW) is a 32-bit field that is inserted between the VC label and the Layer 2 frame. The presence of the control word is indicated by the C bit of the FEC element used in LDP signaling. The PW control word is described in RFC 4385.

The PW control word is supported for all implemented PW types (ATM N-to-1 cell mode, Ethernet VLLs, SAToP, CESoPSN, and IP PW).

The following points describe the behavior of the 7705 SAR when it receives a Label Mapping message for a PW. It is assumed that no Label Mapping message for the PW has been sent to the next PW router yet. The 7705 SAR operating system does the following.

- If the received Label Mapping message has C = 0 (where C refers to the C bit of the FEC element), a Label Mapping message with C = 0 is sent forward to the next router (or hop). In this case, the control word is not used.
- If the received Label Mapping message has C = 1 and the PW is locally configured such that the use of the control word is mandatory, then the 7705 SAR sends a Label Mapping message with C = 1. In this case, the control word is used. (Note: SAToP and CESoPSN are the only services that require the control word.)
- If the received Label Mapping message has C = 1 and the locally configured PW does not support use of an optional control word (that is, Ethernet or ATM N-to-1 cell mode PWs), then the 7705 SAR sends a new Label Mapping message in which the C bit is set to correspond to the locally configured preference for use of the control word (that is, C = 0).

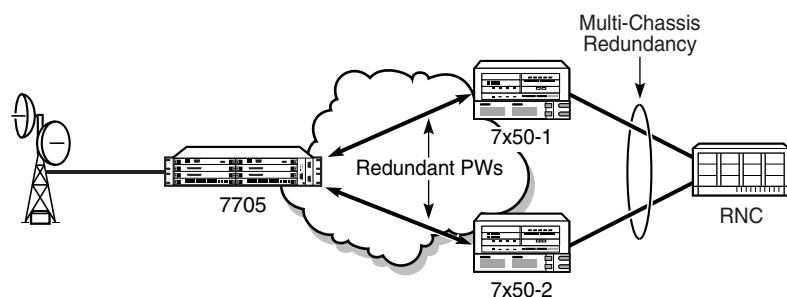
Pseudowire Redundancy

Pseudowire (PW) redundancy protects a PW and any services on the PW against endpoint failures. This differs from LSP redundancy and FRR, which offer protection against link and node failures within the backhaul network.

As shown in [Figure 35](#), in order to provide redundant PWs, the 7705 SAR must signal PWs to two endpoints at the MTSO (7x50-1 and 7x50-2), which is done using two spoke SDPs on the 7705 SAR. This configuration removes any single point of failure from a given network. If 7x50-1 loses all of its connectivity to the network or to the RNC, then the 7705 SAR can reroute the PW traffic to 7x50-2, which switches traffic to the RNC.

Note that for end-to-end protection, PW redundancy must operate with the multi-chassis (MC) redundancy feature running on the 7x50 SR nodes.

Figure 35: Pseudowire Redundancy



20225

PW redundancy applies to all VLL services available on the 7705 SAR: Apipe, Cpipe, Epipe, and Ipipe.

PW Redundancy Operation

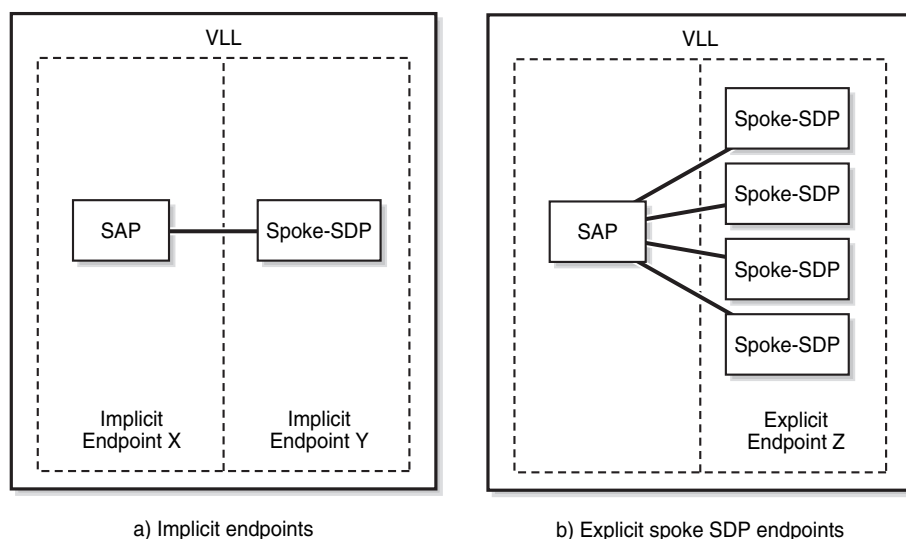
PW redundancy on the 7705 SAR is similar to a point-to-multipoint implementation for PWs (in the ingress to the egress direction). A single SAP can be bound to more than one spoke SDP; conversely, traffic from multiple spoke SDPs can all be switched to the same SAP. To implement PW redundancy, a PW service on the 7705 SAR must be able to accommodate more than one spoke SDP on the spoke SDP side. This is achieved using the concept of endpoints.

An endpoint can be thought of as a container for a single SAP, a single spoke SDP, or multiple spoke SDPs. [Figure 36](#) illustrates the model for a redundant VLL service based on the endpoints. Endpoints are implicit or explicit objects.

Implicit endpoints are transparent to the user and are not user-configurable. As shown in [Figure 36a](#), implicit endpoints mean that one endpoint is a SAP and another endpoint is a spoke SDP. Endpoints are considered implicit if the `endpoint` command is not used in the `config>service>xpipe>spoke-sdp` context, where `xpipe` refers to any of the VLL services.

Explicit endpoints are user-configurable and apply when there are multiple spoke SDPs. As shown in [Figure 36b](#), explicit endpoints mean that there can be multiple spoke SDPs associated with the endpoint. An endpoint created explicitly can have up to four spoke SDPs associated with it. The explicit endpoint method is used for PW redundancy. Explicit endpoints are user-configurable.

Figure 36: Implicit and Explicit Endpoint Objects



20226

The 7705 SAR supports the following types of endpoint objects:

- SAP — there can be only one SAP per PW endpoint (Endpoint X in [Figure 36a](#))
- Spoke SDP — from the perspective of a 7705 SAR, if there is only one SDP endpoint, then it is a spoke SDP endpoint and it is implicitly defined. In other words, there can be only one implicitly defined spoke SDP per PW endpoint (Endpoint Y in [Figure 36a](#)).
- Primary spoke SDP — there can be only one explicitly defined primary spoke SDP per PW endpoint (one of the spoke SDPs at Endpoint Z in [Figure 36b](#)). If a primary spoke SDP is defined, then there can be up to three secondary spoke SDPs per endpoint and the service can be revertive.
- Secondary spoke SDP — there can be up to four explicitly defined secondary spoke SDPs per endpoint if no primary spoke SDP is defined; otherwise, there can be up to three. Secondary spoke SDPs are assigned a precedence value that is used by the 7705 SAR OS to determine which secondary PW becomes active when the currently active PW fails (see [Selecting the Active Spoke SDP for PW Redundancy Configuration](#)).

Multiple spoke SDPs can be established between a 7705 SAR and any SR platform. For example, multiple spoke SDPs on a 7705 SAR can connect to a 7750 SR. In this case, the 7750 SR must be configured to use multi-chassis backup in conjunction with multi-segment PWs; that is, the 7750 SR nodes at the far end must support multi-chassis redundancy.

A PW service endpoint can only use a single active spoke SDP for transmission at any given time. A PW SAP can receive traffic from any of the endpoint spoke SDPs assigned to the service.

7705 SAR nodes support user-initiated manual switchover of the VLL path to the primary path or any of the secondary paths using the `force-switchover` command under the `tools>perform>service-id` context. A manual switchover is useful during planned outages such as node upgrade procedures.

Selecting the Active Spoke SDP for PW Redundancy Configuration

There are two main scenarios for configuring PW redundancy. One scenario uses a primary spoke SDP and provides revertive behavior. The other scenario uses only secondary spoke SDPs for non-revertive behavior.



Note: Non-revertive behavior is not supported on Cpipes.

Primary and Secondary Spoke SDPs

If a primary spoke SDP is defined, up to three secondary spoke SDPs can also be defined. The VLL service always uses the primary endpoint PW and only switches to a secondary PW when the primary PW is down. The PW service switches the path back to the primary PW when the primary PW is back up. The user can configure a timer to delay reverting back to the primary path or to never revert back. When the primary PW goes down, the 7705 SAR OS selects the secondary spoke SDP that is operationally up and has the highest precedence setting.

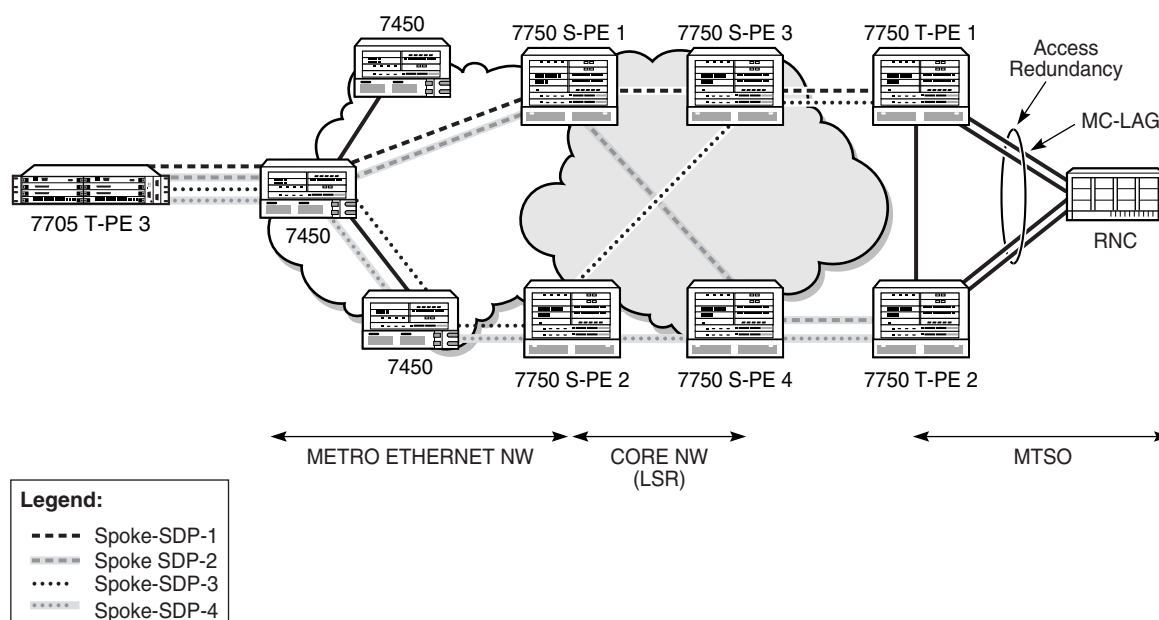
Secondary Spoke SDPs Only

If a primary spoke SDP is not defined, up to four secondary spoke SDPs can be defined. The user can configure the precedence of each secondary PW to indicate the order in which secondary PWs are activated. The secondary PW with the highest precedence is selected first. If two or more secondary spoke SDPs are assigned the same precedence, the 7705 SAR OS selects the secondary path that is operationally up and has the lowest spoke SDP identifier. There is no revertive behavior between secondary paths, which means that a secondary path will not switch to another secondary path of higher precedence if one becomes available.

The use of four secondary spoke SDPs is illustrated in [Figure 37](#), where:

- spoke SDP-1 goes over S-PE-1 to T-PE1 (red path) (S-PE is a switching PE and T-PE is a terminating PE)
- spoke SDP-2 goes over S-PE-1 to T-PE2 (green path)
- spoke SDP-3 goes over S-PE-2 to T-PE1 (violet path)
- spoke SDP-4 goes over S-PE-2 to T-PE2 (orange path)

Figure 37: Pseudowire Redundancy with Four Spoke SDPs

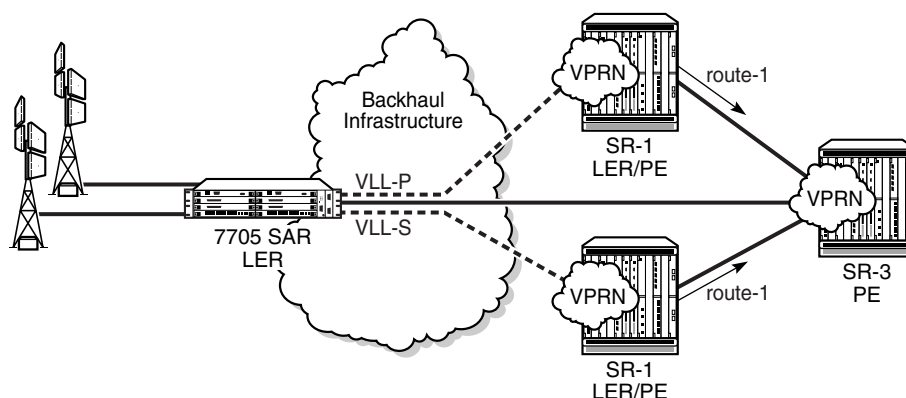


20227

Active/Standby Mode for Pseudowire Redundancy (Standby Signaling)

Pseudowire redundancy as described in the previous section operates in active/active mode; that is, the primary pseudowire is up and ready to transmit and receive traffic, and the secondary pseudowire is up and ready to receive traffic. In [Figure 38](#), if both pseudowires were active, this mode of operation would offer seamless redundancy in most cases. However, this mode could also potentially stress the IGP; for example, in active/active mode the number of routes advertised is greater than in active/standby mode. Another example is the duplication of Ethernet control frames to the 7705 SAR from a VPLS or VPRN service on an SR node through both primary and secondary VLLs.

Figure 38: Active/Standby Mode for Redundant Pseudowires



20694

Active/standby mode is introduced to address these issues. Active/standby mode is also referred to as standby signaling. Standby signaling is supported on all VLLs: Apipes, Cpipes, Epipes, and Ipipes.

In [Figure 38](#), the redundant pseudowires are terminated on a VPRN SAP (could also be a VPLS service) on an SR node. If standby signaling status is configured on one of the pseudowires, this information is transmitted to the SR. The SR node can then either withdraw the associated IP interface or routes or shut down the spoke SDP toward the SAR when the SR receives the standby status message. These actions avoid the problem of duplicate routes being sent to the SR node.

The CE connected to the redundant pseudowire endpoint on the 7705 SAR node is also made aware that the link to the far-end node is currently not active. However, prior to Release 4.0, pseudowire endpoints that were not terminated on a service (for example, endpoints connected to the CE) did not shut down the spoke SDP when the standby signaling message was received. The endpoints would continue to transmit data received via the associated SAP or service. In Release 4.0, the `standby-signaling-slave` command provides the option to shut down the spoke SDP at the endpoint when the standby status message is received.

Configuring a VLL Service with CLI

This section provides the information required to configure Virtual Leased Line (VLL) services using the command line interface.

Topics in this section include:

- [Common Configuration Tasks on page 206](#)
- [Configuring VLL Components on page 207](#)
 - [Creating an Apipe Service on page 208](#)
 - [Creating a Cpipe Service on page 212](#)
 - [Creating an Epipe Service on page 215](#)
 - [Creating an Ipipe Service on page 221](#)
 - [Configuring PW Switching on page 223](#)
 - [Configuring Ingress and Egress SAP Parameters on page 225](#)
 - [Using the Control Word on page 226](#)
 - [Configuring PW Redundancy on page 227](#)
- [Service Management Tasks on page 229](#)
 - [Modifying Service Parameters on page 229](#)
 - [Disabling a Service on page 231](#)
 - [Re-enabling a Service on page 233](#)
 - [Deleting a Service on page 233](#)

Common Configuration Tasks

The following list provides a brief overview of the tasks that must be performed to configure a VLL service.

- Associate the service with a customer ID.
 - Define SAP parameters.
 - Optional – select egress and ingress QoS policies (configured in `config>qos` context)
 - Optional – select ingress IP filter policies (for Epipes and Ipipes only)
 - Define spoke SDP parameters.
 - Optional – select egress and ingress vc label parameters
 - Optional – explicitly assign spoke SDP endpoints for pseudowire (PW) redundancy applications
 - Enable the service.
-

Configuring VLL Components

This section provides configuration examples for components of VLL services. Each component includes some or all of the following: introductory information, CLI syntax, a specific CLI example, and a sample CLI display output. Included are the following VLL components:

- Apipe
 - [Creating an Apipe Service](#)
 - [Configuring Apipe SAP Parameters](#)
 - [Configuring Apipe SDP Bindings](#)
- Cpipe
 - [Creating a Cpipe Service](#)
 - [Configuring Cpipe SAP Parameters](#)
 - [Configuring Cpipe SDP Bindings](#)
- Epipe
 - [Creating an Epipe Service](#)
 - [Configuring Epipe SAP Parameters](#)
 - [Configuring Epipe Spoke SDP Bindings](#)
- Ipipe
 - [Creating an Ipipe Service](#)
 - [Configuring Ipipe SAP Parameters](#)
 - [Configuring Ipipe SDP Bindings](#)
- [Configuring Ingress and Egress SAP Parameters](#)
- [Using the Control Word](#)
- [Configuring PW Redundancy](#)

Creating an Apipe Service

Use the following CLI syntax to create an Apipe service.

CLI Syntax: config>service# apipe *service-id* [customer *customer-id*] [create] [vpn *vpn-id*] [vc-type {atm-vcc|atm-vpc}] [vc-switching] description *description-string* service-mtu *octets* no shutdown

PE router 1 (A:ALU-41):

Example: A:ALU-41>config>service# apipe 5 customer 1 create
A:ALU-41config>service>apipe# description "apipe test"
A:ALU-41config>service>apipe# service-mtu 1400
A:ALU-41config>service>apipe# no shutdown
A:ALU-41config>service>apipe#

PE router 2 (A:ALU-42):

Example: A:ALU-42>config>service# apipe 5 customer 1 create
A:ALU-42>config>service>apipe# description "apipe test"
A:ALU-42>config>service>apipe# service-mtu 1400
A:ALU-42>config>service>apipe# no shutdown
A:ALU-42>config>service>apipe#

The following example displays the Apipe service creation output.

PE Router 1 (ALU-41):

```
A:ALU-41>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        no shutdown
    exit
...
-----
A:ALU-41>config>service#
```

PE Router 2 (ALU-42):

```
A:ALU-42>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        no shutdown
    exit
```


Configuring Apipe SAP Parameters

Use the following CLI syntax to configure Apipe SAP parameters. For ingress and egress configuration information, see [Configuring Ingress and Egress SAP Parameters](#).

CLI Syntax: `config>service# apipe service-id [customer customer-id]
[create] [vpn vpn-id] [vc-type {atm-vcc|atm-vpc}] [vc-switching]
sap sap-id [create]
accounting-policy acct-policy-id
atm
egress
traffic-desc traffic-desc-profile-id
ingress
traffic-desc traffic-desc-profile-id
oam
alarm-cells
collect-stats
description description-string
egress
qos policy-id
ingress
qos policy-id
no shutdown`

Example:

```
A:ALU-41>config>service# apipe 5
A:ALU-41>config>service>apipe# sap 1/1/1.1:0/32 create
A:ALU-41>config>service>apipe>sap# ingress
A:ALU-41>config>service>apipe>sap>ingress# qos 102
A:ALU-41>config>service>apipe>sap>ingress# exit
A:ALU-41>config>service>apipe>sap# egress
A:ALU-41>config>service>apipe>sap>egress# qos 103
A:ALU-41>config>service>apipe>sap>egress# exit
A:ALU-41>config>service>apipe>sap# no shutdown
A:ALU-41>config>service>apipe>sap# exit
A:ALU-41>config>service>apipe#
```

The following example displays the Apipe SAP configuration output for PE Router 1 (ALU-41).

```
A:ALU-41>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        sap 1/1/1.1:0/32 create
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        no shutdown
    exit
...
-----
```

To configure a basic local Apipe service (SAP-to-SAP), enter the `sap sap-id` command twice with different port IDs in the same service configuration.

The following example displays an ATM SAP-to-SAP configuration:

```
A:ALU-4>config>service# info
-----
...
    apipe 5 customer 1 create
        description "ATM sap2sap"
        service-mtu 1514
        sap 1/1/1.1:0/32
        sap 1/2/1.1:0/100
        no shutdown
    exit
...
-----
```

Configuring Apipe SDP Bindings

Use the following CLI syntax to create a spoke SDP binding with an Apipe service (for distributed service). For SDP configuration information, see [Configuring SDPs](#).

CLI Syntax: config>service# apipe *service-id* [customer *customer-id*] [create] [vpn *vpn-id*] [vc-type {atm-vcc|atm-vpc}] [vc-switching] spoke-sdp *sdp-id:vc-id* [create] cell-concatenation clp-change max-cells *cell-count* max-delay *delay-time* egress vc-label *egress-vc-label* ingress vc-label *ingress-vc-label* no shutdown

Example: A:ALU-41>config>service# apipe 5
A:ALU-41>config>service>apipe# spoke-sdp 1:5 create
A:ALU-41>config>service>apipe>spoke-sdp# no shutdown
A:ALU-41>config>service>apipe>spoke-sdp# exit

The following example displays the Apipe spoke SDP configuration output for PE Router 1 (ALU-41).

```
A:ALU-41>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        sap 1/1/1.1:0/32 create
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:5 create
        exit
        no shutdown
    exit
...
-----
A:ALU-41>config>service#
```

Creating a Cpipe Service

Use the following CLI syntax to create a Cpipe service.

CLI Syntax: config>service# cpipe *service-id* [customer *customer-id*] [create] [vpn *vpn-id*] [vc-type {satop-e1 | satop-t1 | cesopsn | cesopsn-cas}] [vc-switching] description *description-string* service-mtu *octets* no shutdown

Example: config>service# cpipe 234 customer 123 create vc-type cesopsn
 config>service>cpipe# description "cpipe test"
 config>service>cpipe# service-mtu 1400
 config>service>cpipe# no shutdown
 config>service>cpipe#

The following example displays the Cpipe service creation output for PE Router 1 (ALU-41).

```
A:ALU-41>config>service# info
-----
...
    cpipe 234 customer 123 create
        description "cpipe test"
        service-mtu 1400
        no shutdown
    exit
...
-----
A:ALU-41>config>service#
```

Configuring Cpipe SAP Parameters

Use the following CLI syntax to configure Cpipe SAP parameters. For ingress and egress configuration information, see [Configuring Ingress and Egress SAP Parameters](#).

CLI Syntax: config>service# cpipe *service-id* [customer *customer-id*] [create] [vpn *vpn-id*] [vc-type {satop-e1 | satop-t1 | cesopsn | cesopsn-cas}] [vc-switching] sap *sap-id* [create] cem [no] packet jitter-buffer *value* | payload-size *value* payload-size *value* [no] report-alarm [stray] [malformed] [pktloss] [overrun] [underrun] [rpktloss]

```

[rfault] [rrdi]
[no] rtp-header
[no] collect-stats
description description-string
no description
egress
    qos policy-id
    no qos
ingress
    qos policy-id
    no qos
[no] shutdown

```

Example:

```

A:ALU-41>config>service# cpipe 5 cesopn
A:ALU-41>config>service>cpipe# sap 1/1/1.1 create
A:ALU-41>config>service>cpipe>sap# ingress
A:ALU-41>config>service>cpipe>sap>ingress# qos 102
A:ALU-41>config>service>cpipe>sap>ingress# exit
A:ALU-41>config>service>cpipe>sap# egress
A:ALU-41>config>service>cpipe>sap>egress# qos 103
A:ALU-41>config>service>cpipe>sap>egress# exit
A:ALU-41>config>service>cpipe>sap# no shutdown
A:ALU-41>config>service>cpipe>sap# exit
A:ALU-41>config>service>cpipe#

```

The following example displays the Cpipe SAP configuration output for PE Router 1 (ALU-41).

```

A:ALU-41>config>service# info
-----
...
    cpipe 5 customer 1 create
        description "cpipe test"
        service-mtu 1400
        sap 1/1/1.1 create
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        no shutdown
    exit
...
-----
A:ALU-41>config>service#

```

To configure a basic local Cpipe service (SAP-to-SAP), enter the `sap sap-id` command twice with different port IDs in the same service configuration.

The following example displays a TDM SAP-to-SAP configuration:

```
A:ALU-4>config>service# info
-----
...
      cpipe 5 customer 1 create
        description "TDM sap2sap"
        service-mtu 1400
        sap 1/1/1.1
        sap 1/2/1.1
        no shutdown
      exit
...
-----
```

Configuring Cpipe SDP Bindings

Use the following CLI syntax to create a spoke SDP binding with a Cpipe service. For SDP configuration information, see [Configuring SDPs](#).

CLI Syntax: `config>service# cpipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-type {satop-e1 | satop-t1 | cesopsn | cesopsn-cas}] [vc-switching] spoke-sdp sdp-id:vc-id [create] egress vc-label egress-vc-label ingress vc-label ingress-vc-label [no] shutdown`

Example:

```
A:ALU-41>config>service# cpipe 5
A:ALU-41>config>service>cpipe# spoke-sdp 1:5 create
A:ALU-41>config>service>cpipe>spoke-sdp# no shutdown
A:ALU-41>config>service>cpipe>spoke-sdp# exit
```

The following example displays the Cpipe spoke SDP configuration output for PE Router 1 (ALU-41).

```
A:ALU-41>config>service# info
-----
...
    cpipe 5 customer 1 create
        description "cpipe test"
        service-mtu 1400
        sap 1/1/1.1 create
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:5 create
        exit
        no shutdown
    exit
...
-----
A:ALU-41>config>service#
```

Creating an Epipe Service

Use the following CLI syntax to create an Epipe service.

CLI Syntax: `config>service# epipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-switching] description description-string no shutdown`

Example: `config>service# epipe 500 customer 5 create`
`config>service>epipe$ description "Local epipe service"`
`config>service>epipe# no shutdown`

The following example displays the Epipe service creation output.

```
ALU-1>config>service# info
-----
    epipe 500 customer 5 vpn 500 create
        description "Local epipe service"
        no shutdown
    exit
-----
```

Configuring Epipe SAP Parameters

The 7705 SAR supports distributed Epipe service and local (SAP-to-SAP) Epipe service. A distributed Epipe consists of two SAPs on different nodes. A local Epipe consists of both SAPs on the same 7705 SAR. To configure a distributed Epipe service, you must configure service entities on the originating and far-end nodes.

Use the following CLI syntax to create distributed Epipe SAPs. For ingress and egress configuration information, see [Configuring Ingress and Egress SAP Parameters](#). For SAP ETH-CFM configuration information, see [Configuring ETH-CFM Parameters \(802.1ag and Y.1731\)](#).

CLI Syntax: `config>service# epipe service-id [customer customer-id]
[create] [vc-switching]
sap sap-id [create]
accounting-policy policy-id
collect-stats
description description-string
no shutdown
egress
qos policy-id
eth-cfm
ingress
filter [ip ip-filter-id]
qos policy-id`

Example:

```
ALU-1>epipe 5500 customer 5 create
config>service>epipe$ description "Distributed epipe
service to east coast"
config>service>epipe# sap 1/1/3:21 create
config>service>epipe>sap# ingress
config>service>epipe>sap>ingress# filter ip 1
config>service>epipe>sap>ingress# qos 555
config>service>epipe>sap>ingress# exit
config>service>epipe>sap# egress
config>service>epipe>sap>egress# qos 627
config>service>epipe>sap>egress# exit
config>service>epipe>sap# no shutdown
config>service>epipe>sap# exit
config>service>epipe#
```

```
ALU-2>config>service# epipe 5500 customer 5 create
config>service>epipe$ description "Distributed epipe
service to west coast"
config>service>epipe# sap 1/1/4:550 create
config>service>epipe>sap# ingress
config>service>epipe>sap>ingress# qos 654
config>service>epipe>sap>ingress# exit
```



```

config>service>epipe>sap# egress
config>service>epipe>sap>egress# qos 432
config>service>epipe>sap>egress# exit
config>service>epipe>sap# no shutdown
config>service>epipe#

```

The following example displays the SAP configuration output for ALU-1 and ALU-2.

```

ALU-1>config>service# info
-----
...
    epipe 5500 customer 5 vpn 5500 create
        description "Distributed epipe service to east coast"
        sap 1/1/3:21 create
            ingress
                filter ip 1
                qos 555
            exit
            egress
                qos 627
            exit
        exit
    exit
...
-----
ALU-1>config>service#

ALU-2>config>service# info
-----
...
    epipe 5500 customer 5 vpn 5500 create
        description "Distributed epipe service to west coast"
        sap 1/1/4:550 create
            ingress
                qos 654
            exit
            egress
                qos 432
            exit
        exit
    exit
...
-----
ALU-2>config>service#

```

To configure a basic local Epipe service (SAP-to-SAP), enter the `sap sap-id` command twice with different port IDs in the same service configuration.

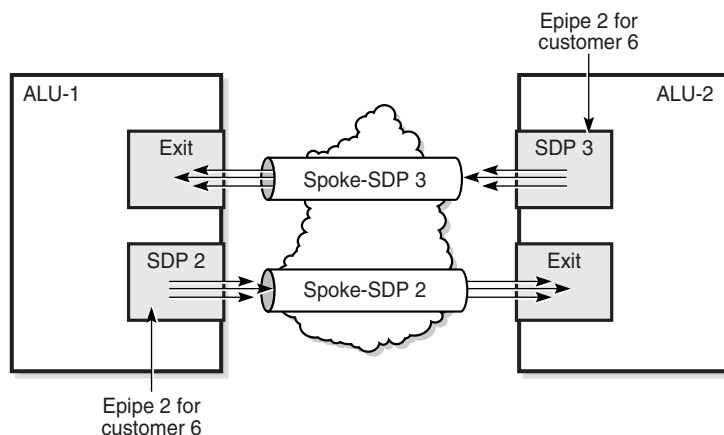
The following example displays an Ethernet SAP-to-SAP configuration:

```
A:ALU-4>config>service# info
-----
...
    epipe 2 customer 1 create
        description "Ethernet sap2sap"
        sap 1/1/1:1000
        sap 1/2/1:50
        no shutdown
    exit
...
-----
```

Configuring Epipe Spoke SDP Bindings

Figure 39 displays an example of a distributed Epipe service configuration between two routers, identifying the service and customer IDs and the unidirectional SDPs required to communicate to the far-end routers. The `spoke-sdp sdp-id:vc-id` must match on both sides.

Figure 39: SDPs — Unidirectional Tunnels



19484

An SDP must exist before it can be used with a spoke SDP. For SDP configuration information, see [Configuring SDPs](#).

To configure a spoke SDP for ETH-CFM support, see [Configuring ETH-CFM Parameters \(802.1ag and Y.1731\)](#).

Use the following CLI syntax to create a spoke SDP binding with an Epipe service.

CLI Syntax: `config>service# epipe service-id [customer customer-id]
[create] [vc-switching]
spoke-sdp sdp-id:vc-id [vc-type {ether|vlan}]
[create] vlan-vc-tag 0..4094
egress
vc-label egress-vc-label
eth-cfm
ingress
vc-label ingress-vc-label
no shutdown`

Example:

```
ALU-1>config>service# epipe 5500
config>service>epipe# spoke-sdp 2:123
config>service>epipe>spoke-sdp# egress
config>service>epipe>spoke-sdp>egress# vc-label 5500
config>service>epipe>spoke-sdp>egress# exit
config>service>epipe>spoke-sdp# ingress
config>service>epipe>spoke-sdp>ingress# vc-label 6600
config>service>epipe>spoke-sdp>ingress# exit
config>service>epipe>spoke-sdp# no shutdown

ALU-2>config>service# epipe 5500
config>service>epipe# spoke-sdp 2:123
config>service>epipe>spoke-sdp# egress
config>service>epipe>spoke-sdp>egress# vc-label 6600
config>service>epipe>spoke-sdp>egress# exit
config>service>epipe>spoke-sdp# ingress
config>service>epipe>spoke-sdp>ingress# vc-label 5500
config>service>epipe>spoke-sdp>ingress# exit
config>service>epipe>spoke-sdp# no shutdown
```

The following example displays the configuration output for binding an Epipe service between ALU-1 and ALU-2. This example assumes the SAPs have already been configured (see [Configuring Epipe SAP Parameters](#)).

```
ALU-1>config>service# info
-----
...
    epipe 5500 customer 5 vpn 5500 create
        description "Distributed epipe service to east coast"
        sap 1/1/3:21 create
            ingress
                filter ip 1
                qos 555
            exit
            egress
                qos 627
            exit
        exit
        spoke-sdp 2:123 create
            ingress
                vc-label 6600
            exit
            egress
                vc-label 5500
            exit
        exit
        no shutdown
    exit
...
-----
ALU-1>config>service#

ALU-2>config>service# info
-----
...
exit
    epipe 5500 customer 5 vpn 5500 create
        description "Distributed epipe service to west coast"
        sap 1/1/4:550 create
            ingress
                qos 654
            exit
            egress
                qos 432
            exit
        exit
        spoke-sdp 2:123 create
            ingress
                vc-label 5500
            exit
            egress
                vc-label 6600
            exit
        exit
        no shutdown
    exit
...
-----
```

Creating an Ipipe Service

Use the following CLI syntax to create an Ipipe service.

CLI Syntax: config>service# ipipe *service-id* [customer *customer-id*]
[vpn *vpn-id*] [vc-switching]
description *description-string*
no shutdown

The following example displays an Ipipe configuration example:

```
A:ALU-1>config>service# info
-----
...
    ipipe 202 customer 1 create
        description "eth_ipipe"
        no shutdown
    exit
-----
A:ALU-1>config>service#
```

Configuring Ipipe SAP Parameters

The following displays an Ipipe SAP configuration example:

```
A:ALU-48>config>service# info
-----
...
    ipipe 202 customer 1 create
        sap 1/1/2:444 create
            description "eth_ipipe"
            ce-address 31.31.31.1
        exit
        spoke-sdp 16:516 create
            ce-address 31.31.31.2
        exit
        no shutdown
    exit
...
-----
A:ALU-48>config>service#
```

The following displays a PPP to Ethernet local Ipipe example:

Example: config>service# ipipe 206 customer 1 create
config>service>ipipe\$ sap 1/1/2:447 create
config>service>ipipe>sap\$ description "eth_ppp_ipipe"
config>service>ipipe>sap\$ ce-address 33.33.33.1
config>service>ipipe>sap\$ no shutdown
config>service>ipipe>sap\$ exit
config>service>ipipe# spoke-sdp 15:516 create

```
config>service>ipipe>sap>spoke-sdp$ ce-address 33.33.33.2
config>service>ipipe>sap>spoke-sdp$ exit
config>service>ipipe>$ exit
config>service>ipipe# no shutdown
config>service>ipipe# exit
config>service#
```

The following displays the output:

```
A:ALU-48>config>service# info
-----
ipipe 206 customer 1 create
    sap 1/1/2:447 create
        description "eth_ppp_ipipe"
        ce-address 33.33.33.1
    exit
    spoke-sdp 15:516 create
        ce-address 33.33.33.2
    exit
    exit
    no shutdown
    exit
exit
-----
```

Configuring Ipipe SDP Bindings

The following displays an Ipipe SDP configuration example:

```
A:ALU-48>config>service# info
-----
...
    sdp 16 mpls create
        far-end 4.4.4.4
        ldp
        path-mtu 1600
        keep-alive
        shutdown
    exit
    no shutdown
    exit
...
    ipipe 207 customer 1 create
        shutdown
        sap 1/1/2:449 create
            description "Remote_Ipipe"
            ce-address 34.34.34.1
        exit
        spoke-sdp 16:516 create
            ce-address 34.34.34.2
        exit
    exit
...
-----
```

Configuring PW Switching

The `vc-switching` parameter defines a VLL service as a PW switching point, also called an S-PE. This is the point where a VLL service switches from one PW type to another. The `vc-switching` parameter must be specified when the VLL service is created.

Once a VLL service is configured as an S-PE, you cannot add a SAP to the configuration. The following example shows the error message generated by the CLI if you attempt to create a SAP on a VLL PW switching service.

Example:

```
*A:ALU>config>service>epipe 2 customer 1 create
vc-switching
*A:ALU>config>service>epipe$ sap 1/5/1 create
MINOR: SVCMGR #1311 SAP is not allowed under PW switching
service
*A:ALU>config>service>epipe$
```

Use the following CLI syntax to configure pseudowire switching VLL services.

CLI Syntax: `config>service# apipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-type {atm-vcc|atm-vpc}] [vc-switching] description description-string spoke-sdp sdp-id:vc-id no shutdown`

CLI Syntax: `config>service# cpipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-type {satop-el | satop-t1 | cesopsn | cesopsn-cas}] [vc-switching] description description-string service-mtu octets no shutdown`

CLI Syntax: `config>service# epipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-switching] description description-string spoke-sdp sdp-id:vc-id no shutdown`

CLI Syntax: `config>service# ipipe service-id [customer customer-id] [vpn vpn-id] [vc-switching] description description-string spoke-sdp sdp-id:vc-id no shutdown`

The following displays an example of the command usage to configure a VLL service as a PW switching service:

Example: ALU-1>config>service# apipe 5 customer 1 vpn 1
vc-switching create
config>service>apipe\$ description "Default apipe
description for service id 100"
config>service>apipe# spoke-sdp 3:1 create
config>service>apipe>spoke-sdp# exit
config>service>apipe# spoke-sdp 6:200 create
config>service>apipe>spoke-sdp# exit
config>service>apipe# no shutdown

The following example displays configurations for each service:

```
*A:ALA-48>config>service# info
-----
...
apipe 100 customer 1 vpn 1 vc-switching create
description "Default apipe description for service id 100"
spoke-sdp 3:1 create
exit
spoke-sdp 6:200 create
exit
no shutdown
exit
...
cpipe 107 customer 1 vpn 107 vc-switching vc-type satop-el create
description "Default cpipe description for service id 107"
spoke-sdp 3:7 create
exit
spoke-sdp 6:207 create
exit
no shutdown
exit
...
epipe 107 customer 1 vpn 108 vc-switching create
description "Default epipe description for service id 108"
spoke-sdp 3:8 create
exit
spoke-sdp 6:208 create
exit
no shutdown
exit
...
ipipe 108 customer 1 vpn 109 vc-switching create
description "Default ipipe description for service id 109"
spoke-sdp 3:9 create
exit
spoke-sdp 6:209 create
exit
no shutdown
exit
...
-----
*A:ALA-48>config>service#
```


Configuring Ingress and Egress SAP Parameters

By default, QoS policy ID 1 is applied to ingress and egress service SAPs. Existing QoS policies can be associated with service SAPs on ingress and egress ports.

Ingress and egress QoS SAP parameters can be applied to distributed Epipe and Ipipe service SAPs, and to Apipe, and Cpipe service SAPs.

By default, there are no IP filters associated with interfaces or services. IP filter policies can be applied to ingress Epipe and Ipipe service SAPs.

Example:

```

ALU-1>config>service# epipe 5500
config>service>epipe# sap 1/1/3:21
config>service>epipe>sap# ingress
config>service>epipe>sap>ingress# filter ip 1
config>service>epipe>sap>ingress# qos 555
config>service>epipe>sap>ingress# exit
config>service>epipe>sap# egress
config>service>epipe>sap>egress# qos 627
config>service>epipe>sap>egress# exit
config>service>epipe>sap#

```

The following example displays the Epipe SAP ingress and egress configuration output.

```

ALU-1>config>service#
-----
...
    epipe 5500 customer 5 vpn 5500 create
        description "Distributed epipe service to east coast"
        sap 1/1/3:21 create
            ingress
                filter ip 1
                qos 555
            exit
            egress
                qos 627
            exit
        exit
    spoke-sdp 2:123 create
        ingress
            vc-label 6600
        exit
        egress
            vc-label 5500
        exit
    exit
    no shutdown
    exit
-----
ALU-1>config>service#

```

Using the Control Word

The control word is mandatory for Cpipe SAToP and CESoPSN configurations. It is optional for Apipe, Epipe, and Ipipe configurations.

When the control word is enabled, the Admin Control Word is set to Preferred. Both sides of the VLL must be configured with a matching control word, either both enabled or both disabled, for the pipe to be up.

The control word state will be set to True or False depending on what is configured, either enabled (True) or disabled (False).

Example:

```
config>service# cpipe 2100 customer 1
config>service>cpipe$ description "Default cpipe
description for service id 2100"
config>service>cpipe$ sap 1/2/7.1:4 create
config>service>cpipe>sap$ description "Default sap
description for service id 2100"
config>service>cpipe>sap$ exit
config>service>cpipe# spoke-sdp 1:2001 create
config>service>cpipe>spoke-sdp$ control-word
config>service>cpipe>spoke-sdp$ exit
config>service>cpipe# no shutdown
```

The following example displays the control word configuration output for a Cpipe service.

```
*A:ALU-Dut-B>config>service>cpipe# info
-----
description "Default cpipe description for service id 2100"
sap 1/2/7.1:4 create
    description "Default sap description for service id 2100"
exit
spoke-sdp 1:2001 create
    control-word
exit
no shutdown
-----
*A:ALU-Dut-B>config>service>cpipe#
```

Control word cannot be disabled on Cpipe services. To disable the control word option on Apipe, Epipe, or Ipipe services, use the `no control-word` command.

Example:

```
config>service>apipe# spoke-sdp 1:2001 no control-word
config>service>apipe>spoke-sdp$ exit
```

Configuring PW Redundancy

For PW redundancy, create an explicit endpoint and then assign a primary spoke SDP and up to three secondary spoke SDPs, or up to four secondary spoke SDPs with no primary spoke SDP, to that endpoint.

CLI Syntax: config>service# cpipe *service-id* [customer *customer-id*]
[create]
 endpoint *endpoint-name* [create]
 spoke-sdp *sdp-id:vc-id* endpoint *endpoint-name*
 [create]
 precedence *precedence-value*
 no shutdown

Example: config>service# cpipe 2100
config>service>cpipe\$ endpoint "Endpoint_Y" create
config>service>cpipe\$ spoke-sdp 1:100 endpoint
 "Endpoint_Y" create
config>service>cpipe>spoke-sdp\$ precedence primary
config>service>cpipe\$ spoke-sdp 2:200 endpoint
 "Endpoint_Y" create
config>service>cpipe>spoke-sdp\$ precedence 1
no shutdown

The following example displays the PW redundancy configuration output for a Cpipe service.

```
*A:7705:Dut-C>config>service>cpipe# info
-----
      endpoint "Endpoint_Y" create
      exit
      spoke-sdp 1:100 endpoint "Endpoint_Y" create
          precedence primary
      exit
      spoke-sdp 2:200 endpoint "Endpoint_Y" create
          precedence 1
      exit
-----
*A:7705:Dut-C>config>service>cpipe#
```

Configuring PW Redundancy – Standby Signaling

For standby signaling, create an endpoint as shown in the preceding section, but specify an SDP as the standby signaling master and, optionally, a standby signaling slave (in the following example, precedence 1 indicates that the spoke SDP is the standby SDP).

CLI Syntax: `config>service# cpipe service-id [customer customer-id]
[create]
 endpoint endpoint-name [create]
 standby-signaling-master
 standby-signaling-slave
 exit
 spoke-sdp sdp-id:vc-id endpoint endpoint-name
 [create]
 precedence precedence-value
 no shutdown`

Example: `config>service cpipe 2100
config>service>cpipe# endpoint "Endpoint_Y" create
config>service>cpipe>endpoint# standby-signaling-master
config>service>cpipe>endpoint# standby-signaling-slave
config>service>cpipe# spoke-sdp 1:100 endpoint
 "Endpoint_Y" create
config>service>cpipe>spoke-sdp$ precedence primary
exit
config>service>cpipe# spoke-sdp 2:200 endpoint
 "Endpoint_Y" create
config>service>cpipe>spoke-sdp$ precedence 1
exit`

Service Management Tasks

The service management tasks are similar for Apipe, Cpipe, Epipe, and Ipipe services. This section discusses the following service management tasks:

- [Modifying Service Parameters](#)
- [Disabling a Service](#)
- [Re-enabling a Service](#)
- [Deleting a Service](#)

Modifying Service Parameters

Use the `show service service-using` command to display a list of configured VLL services.

To modify a VLL service:

1. Access the specific account by specifying the service ID.
2. Enter the service parameter to modify and then enter the new information.

PE router 1 (A:ALU-41):

Example:

```
A:ALU-41>config>service# apipe 5
A:ALU-41>config>service>apipe# sap 1/1/1.1:0/32 create
A:ALU-41>config>service>apipe>sap# accounting-policy 2
A:ALU-41>config>service>apipe>sap# exit
A:ALU-41>config>service>apipe# spoke-sdp 1:4
A:ALU-41>config>service>apipe>spoke-sdp# egress
A:ALU-41>config>service>apipe>spoke-sdp>egress# vc-label
2048
A:ALU-41>config>service>apipe>spoke-sdp>egress# exit
A:ALU-41>config>service>apipe>spoke-sdp# ingress
A:ALU-41>config>service>apipe>spoke-sdp>ingress# vc-label
18431
A:ALU-41>config>service>apipe>spoke-sdp>ingress# exit
A:ALU-41>config>service>apipe>spoke-sdp# exit
A:ALU-41>config>service>apipe#
```

PE router 2 (A:ALU-42):

Example:

```
A:ALU-42>config>service# apipe 5
A:ALU-42>config>service>apipe# sap 2/2/2.1:0/32 create
A:ALU-42>config>service>apipe>sap# accounting-policy 2
A:ALU-42>config>service>apipe>sap# exit
A:ALU-42>config>service>apipe# spoke-sdp 1:4
A:ALU-42>config>service>apipe>spoke-sdp# egress
A:ALU-42>config>service>apipe>spoke-sdp>egress# vc-label
18431
A:ALU-42>config>service>apipe>spoke-sdp>egress# exit
A:ALU-41>config>service>apipe>spoke-sdp# ingress
A:ALU-41>config>service>apipe>spoke-sdp>ingress# vc-label
2043
A:ALU-41>config>service>apipe>spoke-sdp>ingress# exit
A:ALU-42>config>service>apipe>spoke-sdp# exit
A:ALU-42>config>service>apipe#
```

The following example displays the configuration output when adding an accounting-policy to an existing SAP and modifying the spoke-sdp parameters on an existing Apipe service for PE Router 1 (ALU-41) and PE Router 2 (ALU-42).

Use a similar syntax to modify Cpipe, Epipe, and Ipipe services.

```
A:ALU-41>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        sap 1/1/1.1:0/32 create
            accounting-policy 2
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:4 create
            egress
                vc-label 2048
            ingress
                vc-label 18431
        exit
        no shutdown
    exit
...
-----
A:ALU-41>config>service#
```

```

A:ALU-42>config>service# info
-----
...
    apipe 5 customer 1 create
        description "apipe test"
        service-mtu 1400
        sap 2/2/2.1:0/32 create
            accounting-policy 2
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:4 create
            egress
                vc-label 18431
            ingress
                vc-label 2048
        exit
        no shutdown
    exit
...
-----
A:ALU-42>config>service#

```

Disabling a Service

A service can be shut down without deleting the service parameters.

Use the `shutdown` command to shut down a VLL service. The following CLI syntax displays the command to shut down an Apipe service. Use a similar syntax to shut down Cpipe, Epipe, and Ipipe services.

CLI Syntax:

```

config>service#
    apipe service-id
        shutdown

```

PE router 1 (A:ALU-41):

Example:

```

A:ALU-41>config>service# apipe 5
A:ALU-41>config>service>apipe# shutdown
A:ALU-41>config>service>apipe# exit

```

PE router 2 (A:ALU-42):

Example:

```

A:ALU-42>config>service# apipe 5
A:ALU-42>config>service>apipe# shutdown
A:ALU-42>config>service>apipe# exit

```

The following example displays the configuration output for deleting an Apipe service on PE Router 1 (ALU-41) and PE Router 2 (ALU-42).

```
A:ALU-41>config>service# info
-----
...
    apipe 5 customer 1 create
        shutdown
        description "apipe test"
        service-mtu 1400
        sap 1/1/1.1:0/32 create
            accounting-policy 2
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:4 create
            egress
                vc-label 16
        exit
        no shutdown
    exit
...
-----
A:ALU-41>config>service#

A:ALU-42>config>service# info
-----
...
    apipe 5 customer 1 create
        shutdown
        description "apipe test"
        service-mtu 1400
        sap 2/2/2.1:0/32 create
            accounting-policy 2
            ingress
                qos 102
            exit
            egress
                qos 103
            exit
        exit
        spoke-sdp 1:4 create
            egress
                vc-label 16
        exit
    exit
...
-----
A:ALU-42>config>service#
```


Re-enabling a Service

Use the `no shutdown` command to re-enable a previously disabled VLL service. The following CLI syntax displays the command to re-enable an Apipe service. Use a similar syntax to re-enable Cpipe, Epipe, and Ipipe services.

CLI Syntax: `config>service#
apipe service-id
no shutdown`

PE router 1 (A:ALU-41):

Example: `A:ALU-41>config>service# apipe 5
A:ALU-41>config>service>apipe# no shutdown
A:ALU-41>config>service>apipe# exit`

PE router 2 (A:ALU-42):

Example: `A:ALU-42>config>service# apipe 5
A:ALU-42>config>service>apipe# no shutdown
A:ALU-42>config>service>apipe# exit`

Deleting a Service

Use the `shutdown` command to delete a VLL service. The SAP, and any associated protocols and spoke SDPs, must be deleted from the VLL service before the VLL service can be deleted.

Perform the following steps to delete a service:

1. Shut down the SAP and SDP.
2. Delete the SAP and SDP.
3. Shut down the service.

Use the following syntax to delete Apipe services. Use a similar syntax to delete Cpipe, Epipe, and Ipipe services.

CLI Syntax:

```
config>service#  
    apipe service-id  
        sap sap-id  
            shutdown  
            exit  
        no sap sap-id  
        spoke-sdp [sdp-id:vc-id]  
            shutdown  
            exit  
        no spoke-sdp [sdp-id:vc-id]  
        shutdown  
        exit  
no apipe service-id
```

Example:

```
A:ALU-41>config>service# apipe 5  
A:ALU-41>config>service>apipe# sap 1/1/1.1:0/32  
A:ALU-41>config>service>apipe>sap# shutdown  
A:ALU-41>config>service>apipe>sap# exit  
A:ALU-41>config>service>apipe# no sap 1/1/1.1:0/32  
A:ALU-41>config>service>apipe# spoke-sdp 1:4  
A:ALU-41>config>service>apipe>spoke-sdp# shutdown  
A:ALU-41>config>service>apipe>spoke-sdp# exit  
A:ALU-41>config>service>apipe# no spoke-sdp 1:4  
A:ALU-41>config>service>apipe# shutdown  
A:ALU-41>config>service>apipe# exit  
A:ALU-41>config>service# no apipe 5
```

VLL Services Command Reference

Command Hierarchies

- [VLL Services Configuration Commands](#)
 - [Apipe Service Configuration Commands](#)
 - [Cpipe Service Configuration Commands](#)
 - [Epipe Service Configuration Commands](#)
 - [Ipipe Service Configuration Commands](#)
- [Show Commands](#)
- [Clear Commands](#)

VLL Services Configuration Commands

Apipe Service Configuration Commands

```

config
  — service
    — apipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-type {atm-vcc | atm-vpc}] [vc-switching]
    — no apipe service-id
      — description description-string
      — no description
      — [no] endpoint endpoint-name
        — description description-string
        — no description
        — revert-time [revert-time | infinite]
        — no revert-time
        — [no] standby-signaling-master
        — [no] standby-signaling-slave
      — sap sap-id [create]
      — no sap sap-id
        — accounting-policy acct-policy-id
        — no accounting-policy
        — atm
          — egress
            — traffic-desc traffic-desc-profile-id
            — no traffic-desc
          — ingress
            — traffic-desc traffic-desc-profile-id
            — no traffic-desc
          — oam
            — [no] alarm-cells
        — [no] collect-stats
        — description description-string
        — no description
        — egress
          — qos policy-id
          — no qos
        — ingress
          — qos policy-id
          — no qos
        — [no] shutdown
      — service-mtu octets
      — no service-mtu
      — [no] shutdown
      — spoke-sdp sdp-id:vc-id [create] [no-endpoint] (see Note)
      — spoke-sdp sdp-id:vc-id [create] endpoint endpoint-name
      — no spoke-sdp sdp-id:vc-id
        — cell-concatenation
          — [no] clp-change
          — max-cells cell-count
          — no max-cells [cell-count]
          — max-delay delay-time

```

- **no max-delay** *[delay-time]*
- **[no] control-word**
- **[no] egress**
 - **vc-label** *egress-vc-label*
 - **no vc-label** *[egress-vc-label]*
- **[no] ingress**
 - **vc-label** *ingress-vc-label*
 - **no vc-label** *[ingress-vc-label]*
- **precedence** *[precedence-value | primary]*
- **no precedence**
- **[no] shutdown**



Note: The spoke-sdp configuration does not apply to ATM SAP-to-SAP configuration (local service). It only applies to SAP-to-SDP configuration (distributed service).

Cpipe Service Configuration Commands

```

config
  — service
    — [no] cpipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-type {satop-e1 | satop-t1 | cesopsn | cesopsn-cas}] [vc-switching]
      — description description-string
      — no description
      — [no] endpoint endpoint-name
        — description description-string
        — no description
        — revert-time revert-time
        — no revert-time
        — [no] standby-signaling-master
        — [no] standby-signaling-slave
      — sap sap-id [create]
      — [no] sap sap-id
        — accounting-policy acct-policy-id
        — no accounting-policy
        — cem
          — [no] packet
            — [no] jitter-buffer jitter-buffer value | payload-size size
            — payload-size size
          — [no] report-alarm [stray] [malformed] [pktloss] [overrun] [underrun] [rpktloss] [rfault] [rrdi]
          — [no] rtp-header
        — [no] collect-stats
        — description description-string
        — no description
        — egress
          — qos policy-id
          — no qos
        — ingress
          — qos policy-id
          — no qos

```

- [no] **shutdown**
- **service-mtu** *octets*
- **no service-mtu**
- [no] **shutdown**
- **spoke-sdp** *sdp-id:vc-id* [create] [no-endpoint] (see Note)
- **spoke-sdp** *sdp-id:vc-id* [create] **endpoint** *endpoint-name*
- **no spoke-sdp** *sdp-id:vc-id*
 - [no] **control-word**
 - [no] **egress**
 - [no] **vc-label** *egress-vc-label*
 - [no] **ingress**
 - [no] **vc-label** *ingress-vc-label*
- **precedence** [*precedence-value* | **primary**]
- **no precedence**
- [no] **shutdown**



Note: The spoke-sdp configuration does not apply to TDM SAP-to-SAP configuration (local service). It only applies to SAP-to-SDP configuration (distributed service).

Epipe Service Configuration Commands

- ```

config
 — service
 — [no] epipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-switching]
 — description description-string
 — no description
 — [no] endpoint endpoint-name
 — description description-string
 — no description
 — revert-time [revert-time | infinite]
 — no revert-time
 — [no] standby-signaling-master
 — [no] standby-signaling-slave
 — sap sap-id [create]
 — no sap sap-id
 — accounting-policy acct-policy-id
 — no accounting-policy
 — [no] collect-stats
 — description description-string
 — no description
 — egress
 — qos policy-id
 — no qos
 — eth-cfm
 — mep mep-id domain md-index association ma-index
 [direction {up | down}]
 — no mep mep-id domain md-index association ma-index
 — [no] ais-enable
 — client-meg-level [level [level ...]]
 — [no] client-meg-level
 — interval {1 | 60}

```

```

— [no] interval
— priority priority-value
— [no] priority
— [no] ccm-enable
— ccm-ltm-priority priority
— no ccm-ltm-priority
— [no] dual-ended-loss-test-enable
— alarm-threshold percentage
— no alarm-threshold
— alarm-clear-threshold percentage
— no alarm-clear-threshold
— [no] eth-test-enable
— bit-error-threshold bit-errors
— [no] test-pattern {all-zeros | all-ones} [crc-
enable]
— low-priority-defect {allDef | macRemErrXcon |
remErrXcon | errXcon | xcon | noXcon}
— one-way-delay-threshold seconds
— [no] shutdown

— ethernet
— [no] llf
— ingress
— filter ip ip-filter-id
— no filter [ip ip-filter-id]
— qos policy-id
— no qos

— service-mtu octets
— no service-mtu
— [no] shutdown
— spoke-sdp sdp-id:vc-id [vc-type {ether | vlan}] [create] [no-endpoint]
— spoke-sdp sdp-id:vc-id [vc-type {ether | vlan}] [create] endpoint endpoint-name
— no spoke-sdp sdp-id:vc-id
— [no] control-word
— egress
— vc-label egress-vc-label
— no vc-label [egress-vc-label]
— eth-cfm
— mep mep-id domain md-index association ma-index
[direction {up | down}]
— no mep mep-id domain md-index association ma-index
— [no] ccm-enable
— ccm-ltm-priority priority
— no ccm-ltm-priority
— low-priority-defect {allDef | macRemErrXcon |
remErrXcon | errXcon | xcon | noXcon}
— [no] shutdown

— ingress
— vc-label ingress-vc-label
— no vc-label [ingress-vc-label]
— [no] shutdown
— precedence [precedence-value | primary]
— no precedence

```

- **vlan-vc-tag** *0..4094*
- **no vlan-vc-tag** [*0..4094*]



**Note:** The spoke-sdp configuration does not apply to Ethernet SAP-to-SAP configuration (local service). It only applies to SAP-to-SDP configuration (distributed service).

## Ipipe Service Configuration Commands

```

config
 — service
 — ipipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-switching]
 — [no] ipipe service-id
 — description description-string
 — no description
 — [no] endpoint endpoint-name
 — description description-string
 — no description
 — revert-time [revert-time | infinite]
 — no revert-time
 — [no] standby-signaling-master
 — [no] standby-signaling-slave
 — sap sap-id [create]
 — no sap sap-id
 — accounting-policy acct-policy-id
 — no accounting-policy
 — ce-address ip-address
 — no ce-address
 — no collect-stats
 — description description-string
 — no description
 — egress
 — qos policy-id
 — no qos
 — ingress
 — filter ip ip-filter-id
 — no filter [ip ip-filter-id]
 — qos policy-id
 — no qos
 — [no] ipcp
 — [no] assign-peer-ce-addr
 — [no] dns ip-address-1 [secondary ip-address-2]
 — [no] mac ieee-address
 — mac-refresh refresh-interval
 — no mac-refresh
 — [no] shutdown
 — service-mtu octets
 — no service-mtu
 — [no] shutdown
 — spoke-sdp sdp-id:vc-id [create] [no-endpoint]
 — spoke-sdp sdp-id:vc-id [create] endpoint endpoint-name
 — no spoke-sdp sdp-id:vc-id

```



- **ce-address** *ip-address*
- **no ce-address**
- **[no] control-word**
- **egress**
  - **vc-label** *egress-vc-label*
  - **no vc-label** [*egress-vc-label*]
- **ingress**
  - **vc-label** *ingress-vc-label*
  - **no vc-label** [*ingress-vc-label*]
- **[no] shutdown**
- **precedence** [*precedence-value* | **primary**]
- **no precedence**

## Show Commands

- show**
- **eth-cfm** (refer to the 7705 SAR OS OAM and Diagnostics Guide for show>eth-cfm commands)
  - **service**
    - **egress-label** *start-label* [*end-label*]
    - **id** *service-id*
      - **all**
      - **base**
      - **endpoint** *endpoint-name*
      - **labels**
      - **sap** [*sap-id*] [**detail**]
      - **sdp** [*sdp-id* | **far-end** *ip-address*] [**detail**]
    - **ingress-label** *start-label* [*end-label*]
    - **sap-using** [**sap** *sap-id*]
    - **sap-using** [**ingress** | **egress**] *atm-td-profile* *td-profile-id*
    - **sap-using** [**ingress** | **egress**] *qos-policy* *qos-policy-id*

## Clear Commands

- clear**
- **service**
    - **id** *service-id*
      - **arp**
      - **spoke-sdp** *sdp-id:vc-id* *ingress-vc-label*
  - **statistics**
    - **id** *service-id*
      - **counters**
      - **spoke-sdp** *sdp-id:vc-id* {**all** | **counters**}
    - **sap** *sap-id* {**all** | **cem** | **counters**}
    - **sdp** *sdp-id* **keep-alive**

---

## Command Descriptions

- [VLL Service Configuration Commands on page 243](#)
- [Show Commands on page 282](#)
- [Clear Commands on page 337](#)

---

## **VLL Service Configuration Commands**

- [Generic Commands on page 244](#)
- [VLL Global Commands on page 246](#)
- [VLL SAP Commands on page 253](#)
- [SAP cem Commands on page 258](#)
- [Service Billing Commands on page 261](#)
- [ETH-CFM Service Commands on page 262](#)
- [SAP QoS and IP Filter Policy Commands on page 269](#)
- [VLL SDP Commands on page 271](#)
- [SDP Cell Concatenation Commands on page 277](#)
- [ATM Commands on page 279](#)
- [ATM OAM Commands on page 281](#)

---

## Generic Commands

### description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>description</b> <i>description-string</i><br><b>no description</b>                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>apipe<br>config>service>apipe>endpoint<br>config>service>apipe>sap<br>config>service>cpipe<br>config>service>cpipe>endpoint<br>config>service>cpipe>sap<br>config>service>epipe<br>config>service>epipe>endpoint<br>config>service>epipe>sap<br>config>service>epipe>spoke-sdp<br>config>service>ipipe<br>config>service>ipipe>endpoint<br>config>service>ipipe>sap<br>config>service>ipipe>spoke-sdp |
| <b>Description</b> | This command creates a text description stored in the configuration file for a configuration context.<br><br>The <b>no</b> form of this command removes the string from the context.                                                                                                                                                                                                                                 |
| <b>Default</b>     | No description is associated with the configuration context.                                                                                                                                                                                                                                                                                                                                                         |
| <b>Parameters</b>  | <i>description-string</i> — the description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.                                                                                                                        |

### shutdown

|                |                                                                                                                                                                                                                                                                                        |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>  | <b>[no] shutdown</b>                                                                                                                                                                                                                                                                   |
| <b>Context</b> | config>service>apipe<br>config>service>apipe>sap<br>config>service>apipe>spoke-sdp<br>config>service>cpipe<br>config>service>cpipe>sap<br>config>service>cpipe>spoke-sdp<br>config>service>epipe<br>config>service>ipipe<br>config>service>ipipe>sap<br>config>service>ipipe>spoke-sdp |

**Description** The **shutdown** command administratively disables an entity. The operational state of the entity is disabled as well as the operational state of any entities contained within. When disabled, an entity does not change, reset, or remove any configuration settings or statistics. Many objects must be shut down before they can be deleted. Many entities must be explicitly enabled using the **no shutdown** command.

The **no** form of this command places the entity into an administratively enabled state.

Services are created in the administratively down (**shutdown**) state. When a **no shutdown** command is entered, the service becomes administratively up and then tries to enter the operationally up state. Default administrative states for services and service entities are described in the following Special Cases.

### Special Cases

**Service Admin State** — bindings to an SDP within the service will be put into the out-of-service state when the service is shut down. While the service is shut down, all customer packets are dropped and counted as discards for billing and debugging purposes.

**Service Operational State** — a service is considered operational if at least one SAP and one SDP are operational.

**SDP (global)** — when an SDP is shut down at the global service level, all bindings to that SDP are put into the out-of-service state and the SDP itself is put into the administratively and operationally down states. Packets that would normally be transmitted using this SDP binding will be discarded and counted as dropped packets.

**SDP (service level)** — shutting down an SDP within a service only affects traffic on that service from entering or being received from the SDP. The SDP itself may still be operationally up for other services.

---

## VLL Global Commands

### apipe

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>apipe</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ] [ <b>create</b> ] [ <b>vpn</b> <i>vpn-id</i> ] [ <b>vc-type</b> { <b>atm-vcc</b>   <b>atm-vpc</b> }] [ <b>vc-switching</b> ]<br><b>no apipe</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | This command configures a point-to-point ATM service. The Apipe service provides a point-to-point L2 VPN connection to a local or remote SAP. An Apipe can connect an ATM endpoint locally (in the same 7705 SAR) or over a PSN to a remote endpoint of the same type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Parameters</b>  | <p><i>service-id</i> — uniquely identifies a service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>create</b> — keyword used to create an Apipe. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context</p> <p><i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>vpn-id</i> — specifies the VPN ID number that allows you to identify virtual private networks (VPNs) by a VPN identification number. If this parameter is not specified, the VPN ID uses the same service ID number.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p> <p><b>vc-type</b> — specifies a 15-bit value that defines the type of the VC signaled to the peer. Its values are defined in <i>draft-ietf-pwe3-iana-allocation</i> and it defines both the signaled VC type as well as the resulting datapath encapsulation over the Apipe.</p> <p><b>Values</b> atm-vcc, atm-vpc</p> <p><b>Default</b> atm-vcc</p> <p><b>vc-switching</b> — specifies that pseudowire switching signaling is used for the spoke SDPs configured for this service</p> |

## cpipe

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] cpipe</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ] [ <b>create</b> ] [ <b>vpn</b> <i>vpn-id</i> ] [ <b>vc-type</b> { <b>satop-e1</b>   <b>satop-t1</b>   <b>cesopsn</b>   <b>cesopsn-cas</b> }] [ <b>vc-switching</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command configures a circuit emulation service utilizing MPLS or GRE encapsulation. The <b>vc-type</b> defines the type of unstructured or structured circuit emulation service to be configured. All other parameters ( <b>service-id</b> , <b>customer</b> ) have common usage with other service types.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Default</b>     | <b>no cpipe</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Parameters</b>  | <p><i>service-id</i> — uniquely identifies a service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>create</b> — keyword used to create a Cpipe. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context.</p> <p><i>vpn-id</i> — specifies the VPN ID number that allows you to identify virtual private networks (VPNs) by a VPN identification number. If this parameter is not specified, the VPN ID uses the same service ID number.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p> <p><b>vc-type</b> — specifies a value that defines the type of the VC signaled to the peer. This optional parameter is included when the Cpipe service is created.</p> <p><b>Values</b> satop-e1: unstructured E1 circuit emulation service<br/>satop-t1: unstructured DS1 circuit emulation service<br/>cesopsn: basic structured <math>n \times 64</math> kb/s circuit emulation service<br/>cesopsn-cas: structured <math>n \times 64</math> kb/s circuit emulation service with signaling</p> <p><b>Default</b> cesopsn</p> <p><b>vc-switching</b> — specifies that pseudowire switching signaling is used for the spoke SDPs configured for this service</p> |

## epipe

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] epipe service-id [customer customer-id] [create] [vpn vpn-id] [vc-switching]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command configures a point-to-point Ethernet service. An Epipe connects two endpoints defined as SAPs. Both SAPs are defined on separate routers (7705 SAR routers or other Alcatel-Lucent service routers) connected over the service provider network. When the endpoint SAPs are separated by the service provider network, the far-end SAP is generalized into an SDP. This SDP describes a destination 7705 SAR and the encapsulation method used to reach it.</p> <p>No MAC learning or filtering is provided (or needed) on an Epipe.</p> <p>When a service is created, the <b>customer</b> keyword and <i>customer-id</i> must be specified, which associates the service with a customer. The <i>customer-id</i> must already exist, having been created using the <b>customer</b> command in the service context. Once a service has been created with a customer association, it is not possible to edit the customer association. The service must be deleted and recreated with a new customer association.</p> <p>Once a service is created, the use of the <b>customer</b> <i>customer-id</i> is optional for navigating into the service configuration context. Attempting to edit a service with the incorrect <i>customer-id</i> specified will result in an error.</p> <p>By default, Epipe services do not exist until they are explicitly created with this command.</p> <p>The <b>no</b> form of this command deletes the Epipe service instance with the specified <i>service-id</i>. The service cannot be deleted until the service has been shut down.</p> |
| <b>Parameters</b>  | <p><i>service-id</i> — uniquely identifies a service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>create</b> — keyword used to create an Epipe. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context</p> <p><i>vpn-id</i> — specifies the VPN ID number that allows you to identify virtual private networks (VPNs) by a VPN ID. If this parameter is not specified, the VPN ID uses the same service ID number.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p> <p><b>vc-switching</b> — specifies that pseudowire switching signaling is used for the spoke SDPs configured for this service</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             |



## ipipe

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ipipe</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ] [ <b>create</b> ] [ <b>vpn</b> <i>vpn-id</i> ] [ <b>vc-switching</b> ] [ <b>no</b> ] <b>ipipe</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | This command configures an IP interworking service. An Ipipe can connect an Ethernet or PPP/MLPPP SAP over an MPLS or IP network to a remote Ethernet or PPP/MLPP SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>  | <p><i>service-id</i> — uniquely identifies a service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>create</b> — keyword used to create an Ipipe. The <b>create</b> keyword requirement can be enabled/disabled in the <b>environment&gt;create</b> context.</p> <p><i>vpn-id</i> — specifies the VPN ID number that allows you to identify virtual private networks (VPNs) by a VPN ID. If this parameter is not specified, the VPN ID uses the same service ID number.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p> <p><b>vc-switching</b> — specifies that pseudowire switching signaling is used for the spoke SDPs configured for this service</p> |

## endpoint

|                    |                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | [ <b>no</b> ] <b>endpoint</b> <i>endpoint-name</i>                                           |
| <b>Context</b>     | config>service>apipe<br>config>service>cpipe<br>config>service>epipe<br>config>service>ipipe |
| <b>Description</b> | This command provides access to the service endpoint context.                                |
| <b>Parameters</b>  | <i>endpoint-name</i> — specifies an endpoint name (up to 32 alphanumeric characters)         |

## revert-time

|                    |                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>revert-time</b> [ <i>revert-time</i>   <b>infinite</b> ]<br><b>no revert-time</b>                                                                                                                                 |
| <b>Context</b>     | config>service>apipe>endpoint<br>config>service>cpipe>endpoint<br>config>service>epipe>endpoint<br>config>service>ipipe>endpoint                                                                                     |
| <b>Description</b> | This command configures the time to wait before reverting back to the primary spoke SDP defined on this service endpoint, after having switched over to a backup spoke SDP after a failure of the primary spoke SDP. |



**Note:** The **infinite** option (for non-revertive behavior) does not apply to Cpipes.

|                   |                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>revert-time</i> — specifies the time, in seconds, to wait before reverting to the primary SDP |
| <b>Values</b>     | 0 to 600                                                                                         |
|                   | <b>infinite</b> — causes the endpoint to be non-revertive                                        |

## standby-signaling-master

|                    |                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] standby-signaling-master</b>                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>apipe>endpoint<br>config>service>cpipe>endpoint<br>config>service>epipe>endpoint<br>config>service>ipipe>endpoint                                                                                                                                            |
| <b>Description</b> | This command sends the pseudowire standby bit (value 0x00000020) to the targeted LDP (TLDP) peer whenever a spoke-SDP of the endpoint is selected as a standby (see <a href="#">precedence</a> ). This bit informs the far end that the pseudowire is not currently active. |
| <b>Default</b>     | <b>no standby-signaling-master</b>                                                                                                                                                                                                                                          |

## standby-signaling-slave

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] standby-signaling-slave</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>apipe>endpoint<br>config>service>cpipe>endpoint<br>config>service>epipe>endpoint<br>config>service>ipipe>endpoint                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command shuts down the spoke-SDP when the pseudowire standby bit (value 0x00000020) is received from a targeted LDP (TLDP) peer. In order to have standby-signaling-slave working properly end-to-end, standby-signaling-master must be enabled on the ingress LER (see <a href="#">standby-signaling-master</a>).</p> <p>When the spoke-SDP is shut down, an alarm is raised.</p> <p>The <b>no</b> form of the command disables the shutting down of the spoke-SDP, and data received via the associated SAP or service continues to be transmitted.</p> |
| <b>Default</b>     | <b>no standby-signaling-slave</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## service-mtu

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>service-mtu <i>octets</i></b><br><b>no service-mtu</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>apipe<br>config>service>cpipe<br>config>service>epipe<br>config>service>ipipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command configures the service payload (Maximum Transmission Unit – MTU), in octets, for the service. This MTU value overrides the service-type default MTU.</p> <p>The <b>service-mtu</b> defines the payload capabilities of the service. It is used by the system to validate the SAP and SDP binding's operational state within the service.</p> <p>The service MTU and a SAP's service delineation encapsulation overhead (4 bytes for a dot1q tag) is used to derive the required MTU of the physical port or channel on which the SAP was created. If the required payload is larger than the port or channel MTU, then the SAP will be placed in an inoperative state. If the required MTU is equal to or less than the port or channel MTU, the SAP will be able to transition to the operative state.</p> <p>When binding an SDP to a service, the service MTU is compared to the path MTU associated with the SDP. The path MTU can be administratively defined in the context of the SDP. The default or administrative path MTU can be dynamically reduced due to the MTU capabilities discovered by the tunneling mechanism of the SDP or the egress interface MTU capabilities based on the next hop in the tunnel path. If the service MTU is larger than the path MTU, the SDP binding for the service will be placed in an inoperative state. If the service MTU is equal to or less than the path MTU, then the SDP binding will be placed in an operational state.</p> |

In the event that a service MTU, port or channel MTU, or path MTU is dynamically or administratively modified, then all associated SAP and SDP binding operational states are automatically re-evaluated.

The **no** form of this command returns the default service-mtu for the indicated service type to the default value.

**Parameters** *octets* — specifies the size of the MTU, expressed as a decimal integer

**Values** 1 to 1514

**Default** apipe: 1508  
cpipe: 1514  
epipe: 1514  
ipipe: 1500

[Table 31](#) displays MTU values for specific VC types.

**Table 31: Maximum Transmission Unit Values**

| VC-Type                               | Example of Service MTU | Advertised MTU |
|---------------------------------------|------------------------|----------------|
| Ethernet                              | 1514                   | 1500           |
| Ethernet (with preserved dot1q)       | 1518                   | 1504           |
| VLAN (dot1p transparent to MTU value) | 1514                   | 1500           |

---

## VLL SAP Commands

### sap

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sap sap-id [create]</b><br><b>no sap sap-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>apipe<br>config>service>cpipe<br>config>service>epipe<br>config>service>ipipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command creates a SAP within a service. Each SAP must be unique.</p> <p>All SAPs must be explicitly created with the <b>create</b> keyword. If no SAPs are created within a service or an IP interface, a SAP will not exist on that object.</p> <p>To edit SAP parameters, enter an existing SAP without the <b>create</b> keyword.</p> <p>A SAP can only be associated with a single service. The SAP is owned by the service in which it was created. A SAP can only be defined on a port that has been configured as an access port in the <b>config&gt;port port-id</b> context using the <b>mode access</b> command. Fractional TDM ports are always access ports. Refer to the 7705 SAR OS Interface Configuration Guide.</p> <p>If a port is shut down, all SAPs on that port become operationally down. When a service is shut down, SAPs for the service are not displayed as operationally down although all traffic traversing the service will be discarded. The operational state of a SAP is relative to the operational state of the port on which the SAP is defined.</p> <p>The following SAP types are supported:</p> <ul style="list-style-type: none"> <li>• ATM VPI/VCI on an ATM port for vc-type atm-vcc</li> <li>• ATM VPI on an ATM port for vc-type atm-vpc</li> <li>• Ethernet-Ethernet</li> <li>• SAToP</li> <li>• CESoPSN (with and without CAS)</li> <li>• PPP IPCP encapsulation of an IPv4 packet for Ipipe service (RFC 1332)</li> <li>• MLPPP bundle</li> <li>• Ethernet SAPs supporting null and dot1q for Ipipe service</li> </ul> <p>The <b>no</b> form of this command deletes the SAP with the specified port. When a SAP is deleted, all configuration parameters for the SAP will also be deleted.</p> |
| <b>Default</b>     | <b>no sap</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**Parameters** *sap-id* — specifies the physical port identifier portion of the SAP definition

The *sap-id* can be configured in one of the formats described in [Table 32](#).

**Table 32: SAP ID Configurations**

| Type    | Syntax                                      | Example                                                                                                                          |
|---------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| port-id | <i>slot/mda/port[.channel]</i>              | 1/1/5                                                                                                                            |
| null    | <i>[port-id   bundle-id]</i>                | <i>port-id</i> : 1/1/3<br><i>bundle-id</i> : bundle-ppp-1/1.1                                                                    |
| dot1q   | <i>[port-id   bundle-id]:qtag1</i>          | <i>port-id</i> :qtag1: 1/1/3:100<br><i>bundle-id</i> : bundle-ppp-1/1.1                                                          |
| atm     | <i>[port-id   bundle-id][:vpi/vci  vpi]</i> | <i>port-id</i> : 1/1/1.1<br><i>bundle-id</i> : bundle-ima-1/1.1<br>bundle-ppp-1/1.1<br><i>vpi/vci</i> : 16/26<br><i>vpi</i> : 16 |
| cem     | slot/mda/port.channel                       | 1/1/1.3                                                                                                                          |
| ipcp    | slot/mda/port.channel                       | 1/2/2.4                                                                                                                          |

**Values** *sap-id*:

|                                 |                                                        |
|---------------------------------|--------------------------------------------------------|
| null                            | <i>[port-id   bundle-id]</i>                           |
| dot1q                           | <i>[port-id   bundle-id]:qtag1</i>                     |
| atm                             | <i>[port-id   bundle-id][:vpi/vci  vpi  vpi1.vpi2]</i> |
| cem                             | <i>slot/mda/port.channel</i>                           |
| ipcp                            | <i>slot/mda/port.channel</i>                           |
| port-id                         | <i>slot/mda/port[.channel]</i>                         |
| bundle-type-slot/mda.bundle-num |                                                        |
| bundle                          | keyword                                                |
| type                            | ima, ppp                                               |
| bundle-num                      | 1 to 10                                                |
| qtag1                           | 0 to 4094                                              |
| vpi                             | NNI 0 to 4095<br>UNI 0 to 255                          |
| vci                             | 1, 2, 5 to 65535                                       |

*port-id* — specifies the physical port ID in the *slot/mda/port* format

If the card in the slot has an adapter card installed, the *port-id* must be in the slot\_number/MDA\_number/port\_number format. For example, 1/2/3 specifies port 3 on MDA 2 in slot 1.

The *port-id* must reference a valid port type. When the *port-id* parameter represents TDM channels, the port ID must include the channel ID. A period “.” separates the physical port from the *channel-id*. The port must be configured as an access port.

*bundle-id* — specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter. The command syntax must be configured as follows:

*bundle-id:* **bundle-type-slot-id/mda-slot.bundle-num**  
*bundle-id* value range: 1 to 10

For example:

```
*A:ALU-12>config# port bundle-ppp-5/1.1
*A:ALU-12>config>port# multilink-bundle
```

*qtag1* — specifies the encapsulation value used to identify the SAP on the port or sub-port. If this parameter is not specifically defined, the default value is 0.

**Values**      *qtag1*: 0 to 4094

The values depend on the encapsulation type configured for the interface. [Table 33](#) describes the allowed values for the port and encapsulation types.

**Table 33: Port and Encapsulation Values**

| Port Type | Encap-Type | Allowed Values | Comments                                                                                                                               |
|-----------|------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Ethernet  | Null       | —              | The SAP is identified by the port.                                                                                                     |
| Ethernet  | Dot1q      | 0 to 4094      | The SAP is identified by the 802.1Q tag on the port. Note that a 0 <i>qtag1</i> value also accepts untagged packets on the dot1q port. |

**create** — keyword used to create a SAP instance. The **create** keyword requirement can be enabled/disabled in the **environment>create** context.

## mac

|                    |                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mac</b> <i>ieee-address</i>                                                                                                                                      |
| <b>Context</b>     | config>service>ipipe>sap                                                                                                                                                 |
| <b>Description</b> | This command assigns a specific MAC address to an Ipipe Ethernet SAP.<br><br>The <b>no</b> form of this command returns the MAC address of the SAP to the default value. |
| <b>Default</b>     | The default is the physical MAC address associated with the Ethernet interface where the SAP is configured.                                                              |
| <b>Parameters</b>  | <i>ieee-address</i> — specifies the 48-bit MAC address in the form aa:bb:cc:dd:ee:ff or aa-bb-cc-dd-ee-ff where aa, bb, cc, dd, ee, and ff are hexadecimal numbers       |

## mac-refresh

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mac-refresh</b> <i>refresh-interval</i><br><b>no mac-refresh</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>ipipe>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command specifies the interval between ARP requests sent on an Ipipe Ethernet SAP. When the SAP is first enabled, an ARP request will be sent to the attached CE device and the received MAC address will be used in addressing unicast traffic to the CE. Although this MAC address will not expire while the Ipipe SAP is enabled and operational, it is verified by sending periodic ARP requests at the specified interval.</p> <p>The <b>no</b> form of this command restores <b>mac-refresh</b> to the default value.</p> |
| <b>Default</b>     | 14400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Parameters</b>  | <i>refresh-interval</i> — specifies the interval, in seconds, between ARP requests sent on an Ipipe Ethernet SAP                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Values</b>      | 0 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## ipcp

|                    |                                                                                                                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] ipcp</b>                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>ipipe>sap                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables the context to configure IPCP. Within this context, IPCP extensions can be configured to define the remote IP address and DNS IP address to be signaled via IPCP on the associated PPP interface.</p> <p>This command is only applicable if the associated SAP is a PPP/MLPPP interface.</p> |

## assign-peer-ce-addr

|                    |                                                                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] assign-peer-ce-addr</b>                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>ipipe>sap>ipcp                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command assigns the IP address, defined by the <b>config&gt;service&gt;ipipe&gt;sap&gt;ce-address</b> command, to the far end of the associated PPP/MLPPP link via IPCP extensions. This command is only applicable if the associated SAP or port is a PPP/MLPPP interface with an IPCP encapsulation.</p> |
| <b>Default</b>     | <b>no assign-peer-ce-addr</b>                                                                                                                                                                                                                                                                                      |



## dns

|                    |                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] dns</b> <i>ip-address-1</i> [ <b>secondary</b> <i>ip-address-2</i> ]                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>ipipe>sap>ipcp                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | This command defines the dns address(es) to be assigned to the far end of the associated PPP/MLPPP link via IPCP extensions. This command is only applicable if the associated SAP or port is a PPP/MLPPP interface with an IPCP encapsulation.                                                                                                           |
| <b>Default</b>     | <b>no dns</b>                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>ip-address-1</i> — specifies a unicast IPv4 address for the primary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> <p><i>ip-address-2</i> — specifies a unicast IPv4 address for the secondary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> |

## ethernet

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>ethernet</b>                                                |
| <b>Context</b>     | config>service>epipe>sap                                       |
| <b>Description</b> | Use this command to configure Ethernet properties for the SAP. |

## llf

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] llf</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>epipe>sap>ethernet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command enables Link Loss Forwarding (LLF) on an Ethernet port. LLF can only be enabled on Ethernet ports configured for null encapsulation.</p> <p>LLF provides an end-to-end OAM fault notification for Ethernet VLL service. When LLF is enabled and there is a local fault on the pseudowire or service, or a remote fault on the SAP or pseudowire, the Ethernet port is brought down. Using label withdrawal or T-LDP status bits, LLF signals to connected equipment that the VLL is down. LLF stops signaling when the fault disappears.</p> <p>The <b>no</b> form of the command disables LLF.</p> |

---

## SAP cem Commands

### cem

|                    |                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>cem</b>                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>cpipe>sap                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command configures the circuit emulation service parameters on a Cpipe.</p> <p>This command is blocked for all SAPs except for E1, DS1 and <math>n \times 64</math> kb/s channels configured for encap-type cem.</p> |

### packet

|                    |                                                                             |
|--------------------|-----------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] packet</b>                                                          |
| <b>Context</b>     | config>service>cpipe>sap>cem                                                |
| <b>Description</b> | This command enables the context to configure packet parameters on the SAP. |

### jitter-buffer

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] jitter-buffer <i>value</i>   <i>payload-size size</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>cpipe>sap>cem>packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | This command defines the size of the receive jitter buffer for the circuit emulation service SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Default</b>     | <p>The default value varies depending on the SAP bandwidth, as follows:</p> <ul style="list-style-type: none"> <li>• 5 ms, where SAP bandwidth <math>\geq 16</math> DS0s (1024 kb/s)</li> <li>• 8 ms, where SAP bandwidth is between 5 and 15 DS0s (between 320 and 960 kb/s)</li> <li>• 16 ms, where SAP bandwidth is between 2 and 4 DS0s (between 128 and 256 kb/s)</li> <li>• 32 ms, where SAP bandwidth = 1 DS0 (64 kb/s)</li> </ul>                                                                                                                                                                                                                                                     |
| <b>Parameters</b>  | <p><i>value</i> — This parameter describes the size of the receive jitter buffer, expressed in milliseconds. The range of supported values is 2 to 250 ms. Setting the value to 0 sets the default (depends on SAP bandwidth). The buffer size must be set to at least 3 times the value of the packetization delay and no greater than 32 times the value of the packetization delay.</p> <p>To calculate the size of the buffer (in bytes), multiply the value of the buffer size (in ms) by the SAP TDM bandwidth (in bits per second) and divide by 8. After the initialization of the circuit emulation service, transmission of TDM data begins when the buffer is half full (50%).</p> |

*size* — For convenience, the payload size can be configured at the same time as the jitter buffer. This avoids any configuration errors due to interactions between the jitter buffer and payload size settings. See [payload-size](#).

## payload-size

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>payload-size size</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>cpipe>sap>cem>packet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | This parameter defines the payload size for one circuit emulation service packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Default</b>     | For SAToP, see <a href="#">Table 19</a> . For CESoPSN without CAS, see <a href="#">Table 20</a> . For CESoPSN with CAS, see <a href="#">Table 21</a> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Parameters</b>  | <p><i>size</i> — The bytes value defines the payload size (in octets) to be encapsulated in one circuit emulation service packet. The valid range of supported values is 2 to 1514 bytes. The packetization delay for the circuit emulation service can be calculated by multiplying the payload size (in octets) by 8 (bits/octet) and then dividing by the SAP TDM bandwidth (in bits per second).</p> <p>For CESoPSN with CAS, the configured value of the payload size does not need to include the extra bytes for the transport of CAS bits. Note that the configured value of the <b>service-mtu</b> size takes the extra CAS bytes into account. See <a href="#">Structured T1/E1 CES with CAS</a> for details.</p> <p>For CESoPSN, the payload size may be specified as the number of bytes to be included in the packet.</p> <p>For SAToP circuit emulation services, the payload size must be specified in multiples of 32 bytes. The minimum value is 64 bytes for both SAToP T1 and SAToP E1.</p> <p><b>Interactions</b> — The jitter-buffer value must be greater than or equal to twice the payload size to ensure that a frame arrives prior to the start of play-out. Therefore, the payload size may have to be decreased prior to setting the jitter-buffer value. Alternatively, the jitter-buffer value may have to be increased prior to setting the payload-size.</p> |

## report-alarm

|                    |                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] report-alarm [stray] [malformed] [pktloss] [overrun] [underrun] [rpktloss] [rfault] [rrdi]</b>     |
| <b>Context</b>     | config>service>cpipe>sap>cem                                                                               |
| <b>Description</b> | This command enables or disables alarm reporting for CES circuit alarm conditions.                         |
| <b>Default</b>     | <p><b>On:</b> stray, malformed, pktloss, overrun and underun</p> <p><b>Off:</b> rpktloss, rfault, rrdi</p> |

|                   |                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <b>stray</b> — reports the reception of packets not destined for this CES circuit                                    |
|                   | <b>malformed</b> — reports the reception of packets not properly formatted as CES packets                            |
|                   | <b>pktloss</b> — reports the lack of reception of CES packets                                                        |
|                   | <b>overrun</b> — reports the reception of too many CES packets resulting in an overrun of the receive jitter buffer  |
|                   | <b>underrun</b> — reports the reception of too few CES packets resulting in an underrun of the receive jitter buffer |
|                   | <b>rpktloss</b> — reports that the remote peer is currently in packet loss status                                    |
|                   | <b>rfault</b> — reports that the remote TDM interface is currently not in service                                    |
|                   | <b>rrdi</b> — reports that the remote TDM interface is currently in RDI status                                       |

### rtp-header

|                    |                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] rtp-header</b>                                                                                                                                                                  |
| <b>Context</b>     | config>service>cpipe>sap>cem                                                                                                                                                            |
| <b>Description</b> | <p>This optional command inserts RTP headers operating in absolute mode in the CES packets.</p> <p>The <b>no</b> form of this command will not insert RTP headers into CES packets.</p> |
| <b>Default</b>     | <b>no rtp-header</b>                                                                                                                                                                    |

---

## Service Billing Commands

### accounting-policy

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>accounting-policy</b> <i>acct-policy-id</i><br><b>no accounting-policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>apipe>sap<br>config>service>cpipe>sap<br>config>service>epipe>sap<br>config>service>ipipe>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command creates the accounting policy context that can be applied to a SAP. An accounting policy must be defined before it can be associated with a SAP. If the <i>policy-id</i> does not exist, an error message is generated.</p> <p>A maximum of one accounting policy can be associated with a SAP at one time. Accounting policies are configured in the <b>config&gt;log</b> context.</p> <p>The <b>no</b> form of this command removes the accounting policy association from the SAP, and the accounting policy reverts to the default.</p> |
| <b>Default</b>     | <b>no accounting-policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <i>acct-policy-id</i> — the accounting <i>policy-id</i> as configured in the <b>config&gt;log&gt;accounting-policy</b> context                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Values</b>      | 1 to 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### collect-stats

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>apipe>sap<br>config>service>cpipe>sap<br>config>service>epipe>sap<br>config>service>ipipe>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | <p>This command enables accounting and statistical data collection for the SAP. When applying accounting policies, the data, by default, is collected in the appropriate records and written to the designated billing file.</p> <p>When the <b>no collect-stats</b> command is issued, the statistics are still accumulated by the CSM. However, the CPU will not obtain the results and write them to the billing file. If a subsequent <b>collect-stats</b> command is issued, the counters written to the billing file include all the traffic while the <b>no collect-stats</b> command was in effect.</p> |
| <b>Default</b>     | <b>collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

---

## ETH-CFM Service Commands

### eth-cfm

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| <b>Syntax</b>      | <b>eth-cfm</b>                                                    |
| <b>Context</b>     | config>service>epipe>sap<br>config>service>epipe>spoke-sdp        |
| <b>Description</b> | This command enables the context to configure ETH-CFM parameters. |

### mep

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mep</b> <i>mep-id</i> <b>domain</b> <i>md-index</i> <b>association</b> <i>ma-index</i> [ <b>direction</b> { <b>up</b>   <b>down</b> }]<br><b>no mep</b> <i>mep-id</i> <b>domain</b> <i>md-index</i> <b>association</b> <i>ma-index</i>                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm<br>config>service>epipe>spoke-sdp>eth-cfm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command provisions an 802.1ag or a Y.1731 maintenance association endpoint (MEP).<br><br>In Release 4.0, the 7705 SAR supports Up and Down MEPs on Ethernet SAPs (802.1ag and Y.1731), and Down MEPs on Ethernet spoke SDPs (802.1ag only).<br><br>The <b>no</b> form of the command reverts to the default values.                                                                                                                                                                                                                                                        |
| <b>Parameters</b>  | <i>mep-id</i> — specifies the maintenance association endpoint identifier<br><div><b>Values</b> 1 to 8191</div> <i>md-index</i> — specifies the maintenance domain (MD) index value<br><div><b>Values</b> 1 to 4294967295</div> <i>ma-index</i> — specifies the MA index value<br><div><b>Values</b> 1 to 4294967295</div> <b>up</b>   <b>down</b> — specifies the direction in which the maintenance association (MEP) faces on the bridge port ( <b>up</b> sends Continuity Check messages (CCMs) towards the fabric, <b>down</b> sends CCMs towards the egress port or line) |

## ais-enable

|                    |                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] ais-enable</b>                                                                                     |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep                                                                       |
| <b>Description</b> | This command enables the generation and the reception of AIS messages and applies to Y.1731 SAP MEPs only. |
| <b>Default</b>     | disabled                                                                                                   |

## client-meg-level

|                    |                                                                                                                                                                                                                                                       |               |        |                |   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|----------------|---|
| <b>Syntax</b>      | <b>client-meg-level</b> [ <i>level</i> [ <i>level</i> ...]]<br><b>no client-meg-level</b>                                                                                                                                                             |               |        |                |   |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>ais-enable                                                                                                                                                                                                       |               |        |                |   |
| <b>Description</b> | This command configures the client Maintenance Entity Group (MEG) level(s) to use for AIS message generation. Up to seven levels can be provisioned, with the restriction that the client (remote) MEG level must be higher than the local MEG level. |               |        |                |   |
| <b>Parameters</b>  | <i>level</i> — specifies the client MEG level <table> <tr> <td><b>Values</b></td><td>1 to 7</td></tr> <tr> <td><b>Default</b></td><td>1</td></tr> </table>                                                                                            | <b>Values</b> | 1 to 7 | <b>Default</b> | 1 |
| <b>Values</b>      | 1 to 7                                                                                                                                                                                                                                                |               |        |                |   |
| <b>Default</b>     | 1                                                                                                                                                                                                                                                     |               |        |                |   |

## interval

|                    |                                                                                                                             |                |   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------|---|
| <b>Syntax</b>      | <b>interval</b> {1   60}<br><b>[no] interval</b>                                                                            |                |   |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>ais-enable                                                                             |                |   |
| <b>Description</b> | This command specifies the transmission interval of AIS messages in seconds.                                                |                |   |
| <b>Parameters</b>  | 1   60 — the transmission interval of AIS messages in seconds. <table> <tr> <td><b>Default</b></td><td>1</td></tr> </table> | <b>Default</b> | 1 |
| <b>Default</b>     | 1                                                                                                                           |                |   |

## priority

|                    |                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>priority</b> <i>priority-value</i><br><b>no priority</b>                                                               |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>ais-enable                                                                           |
| <b>Description</b> | This command specifies the priority of AIS messages originated by the MEP, which is used for priority-mapping OAM frames. |
| <b>Parameters</b>  | <i>priority-value</i> — specifies the priority value of the AIS messages originated by the node                           |
| <b>Values</b>      | 0 to 7                                                                                                                    |
| <b>Default</b>     | 7                                                                                                                         |

## ccm-enable

|                    |                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] ccm-enable</b>                                                                                                                 |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep<br>config>service>epipe>spoke-sdp>eth-cfm>mep                                                     |
| <b>Description</b> | This command enables the generation of CCM messages.<br><br>The <b>no</b> form of the command disables the generation of CCM messages. |

## ccm-ltm-priority

|                    |                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ccm-ltm-priority</b> <i>priority</i><br><b>no ccm-ltm-priority</b>                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep<br>config>service>epipe>spoke-sdp>eth-cfm>mep                                                                                                                                                                                                                                                        |
| <b>Description</b> | This command specifies the priority value for Continuity Check messages (CCMs) and linktrace messages (LTMs) transmitted by the MEP.<br><br>The default priority is 7, which means that CCM frames map to the NC forwarding class by default.<br><br>The <b>no</b> form of the command removes the priority value from the configuration. |
| <b>Default</b>     | 7                                                                                                                                                                                                                                                                                                                                         |
| <b>Parameters</b>  | <i>priority</i> — specifies the priority of CCM and LTM messages                                                                                                                                                                                                                                                                          |
| <b>Values</b>      | 0 to 7                                                                                                                                                                                                                                                                                                                                    |



## dual-ended-loss-test-enable

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] dual-ended-loss-test-enable</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command enables dual-ended loss measurement testing on a MEP. When enabled, the test runs in the background.</p> <p>CCM must be enabled before the dual-ended loss measurement test can be enabled.</p> <p>The dual-ended and single-ended loss measurement tests are mutually exclusive tests. When the dual-ended loss measurement test is enabled, the single-ended test is not available.</p> <p>The <b>no</b> form of the command disables the dual-ended loss measurement test.</p> <p>This command applies only to Y.1731 MEPs.</p> |
| <b>Default</b>     | <b>enabled</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## alarm-threshold

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>alarm-threshold <i>percentage</i></b><br><b>[no] alarm-threshold</b>                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>dual-ended-loss-test-enable                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command specifies the alarm threshold ratio for frame loss measurement, where <i>percentage</i> is defined as (the total number of Tx frames) divided by (the total number of frames dropped) expressed as a percentage. When the alarm threshold is reached, an alarm is raised.</p> <p>The <b>no</b> form of the command removes the priority value from the configuration. Setting the percentage to 0.00 is equivalent to using the <b>no</b> form of the command.</p> |
| <b>Parameters</b>  | <i>percentage</i> — 0.00 to 100.00, adjustable in 0.01% increments                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Default</b>     | 0.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## alarm-clear-threshold

|                    |                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>alarm-clear-threshold <i>percentage</i></b><br><b>[no] alarm-clear-threshold</b>                                                                                                                                                    |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>dual-ended-loss-test-enable                                                                                                                                                                       |
| <b>Description</b> | <p>This command configures a clearing alarm threshold for frame loss measurement, where <i>percentage</i> is defined as (the total number of Tx frames) divided by (the total number of frames dropped) expressed as a percentage.</p> |

If a dual-ended-loss alarm is outstanding and the alarm-clear-threshold is configured to a non-zero value, the dual-ended-loss clear alarm will not be raised until the dual-ended-loss ratio drops below the alarm-clear-threshold. If the alarm-clear-threshold is configured to 0, the dual-ended-loss clear alarm is raised immediately when the dual-ended-loss ratio drops below the alarm threshold.

This functionality prevents too many alarms from being generated if the loss ratio is toggling above and below the alarm threshold.

The alarm-clear-threshold cannot be greater than the alarm-threshold.

Setting the percentage to 0 means that no alarm-clear-threshold is configured; clear alarm traps will continue to be sent when the loss ratio is no longer above the alarm threshold. This is equivalent to using the **no** form of the command.

**Parameters**     *percentage* — 0.00 to 100.00, adjustable in 0.01% increments  
                          **Default**     0.00

## eth-test-enable

**Syntax**     **[no] eth-test-enable**

**Context**     config>service>epipe>sap>eth-cfm>mep

**Description**     This command enables an Ethernet (signal) test (ETH-Test) on a MEP. When enabled, the test runs in the background. This command applies to Y.1731 SAP MEPs only.

For this test, operators must configure ETH-Test parameters on both sender and receiver nodes. The ETH-Test can then be run using the following OAM command:

```
oam eth-cfm eth-test mac-address mep mep-id domain md-index
association ma-index [priority priority] [data-length data-length]
```

A check is done on the provisioning and the test commands to ensure that the MEP is a Y.1731 MEP. If the MEP is not a Y.1731 MEP, the operation fails and an error message in the CLI and SNMP will indicate the problem. A Y.1731 MEP has domain format **none** and association format **icc-based**.

The **no** form of the command disables the ETH-Test on a MEP.

**Default**     **enabled**

## bit-error-threshold

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |   |               |            |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|---------------|------------|
| <b>Syntax</b>      | <b>bit-error-threshold</b> <i>bit-errors</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |   |               |            |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>eth-test-enable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                |   |               |            |
| <b>Description</b> | <p>This command configures a threshold for raising SNMP traps for one-way CFM tests.</p> <p>For bit-error-threshold tests, test results are available only at the destination node. In order for the network management system to collect the results, SNMP traps need to be raised. This threshold is used to control when to raise a trap. When the number of bit errors reaches the threshold, an SNMP trap is raised.</p> <p>Configuring a threshold value of 0 will cause the node to raise an SNMP trap for every one-way test it receives.</p> |                |   |               |            |
| <b>Parameters</b>  | <p><i>bit-errors</i> — the bit-error threshold</p> <table> <tr> <td><b>Default</b></td><td>1</td></tr> <tr> <td><b>Values</b></td><td>0 to 11840</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                   | <b>Default</b> | 1 | <b>Values</b> | 0 to 11840 |
| <b>Default</b>     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |   |               |            |
| <b>Values</b>      | 0 to 11840                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |   |               |            |

## test-pattern

|                    |                                                                                                                                                                                                                                             |                |           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|
| <b>Syntax</b>      | <b>test-pattern</b> { <b>all-zeros</b>   <b>all-ones</b> } [ <b>crc-enable</b> ]<br><b>no test-pattern</b>                                                                                                                                  |                |           |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep>eth-test-enable                                                                                                                                                                                        |                |           |
| <b>Description</b> | <p>This command configures the test pattern for ETH-Test frames.</p> <p>The <b>no</b> form of the command removes the values from the configuration.</p>                                                                                    |                |           |
| <b>Parameters</b>  | <p><b>all-zeros</b>   <b>all-ones</b> — specifies to use all zeros or all ones in the test pattern</p> <table> <tr> <td><b>Default</b></td><td>all-zeros</td></tr> </table> <p><b>crc-enable</b> — specifies to generate a CRC checksum</p> | <b>Default</b> | all-zeros |
| <b>Default</b>     | all-zeros                                                                                                                                                                                                                                   |                |           |

## low-priority-defect

|                    |                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>low-priority-defect</b> { <b>allDef</b>   <b>macRemErrXcon</b>   <b>remErrXcon</b>   <b>errXcon</b>   <b>xcon</b>   <b>noXcon</b> } |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep<br>config>service>epipe>spoke-sdp>eth-cfm>mep                                                     |
| <b>Description</b> | This command specifies the lowest-priority defect that is allowed to generate a fault alarm.                                           |
| <b>Default</b>     | remErrXcon                                                                                                                             |
| <b>Parameters</b>  | <b>allDef</b> — DefRDICCM, DefMACstatus, DefRemoteCCM, DefErrorCCM, and DefXconCCM                                                     |

**macRemErrXcon** — DefMACstatus, DefRemoteCCM, DefErrorCCM, and DefXconCCM

**remErrXcon** — only DefRemoteCCM, DefErrorCCM, and DefXconCCM

**errXcon** — only DefErrorCCM and DefXconCCM

**xcon** — only DefXconCCM

**noXcon** — no defects DefXcon or lower are to be reported

## one-way-delay-threshold

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                |   |               |          |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|---------------|----------|
| <b>Syntax</b>      | <b>one-way-delay-threshold</b> <i>seconds</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |   |               |          |
| <b>Context</b>     | config>service>epipe>sap>eth-cfm>mep                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                |   |               |          |
| <b>Description</b> | <p>This command configures a threshold for raising SNMP traps for one-way CFM tests.</p> <p>For one-way-delay-threshold tests, test results are available only at the destination node. In order for the network management system to collect the results, SNMP traps need to be raised. This threshold is used to control when to raise a trap. When the delay time reaches the threshold, an SNMP trap is raised.</p> <p>Configuring a threshold value of 0 will cause the node to raise an SNMP trap for every one-way test it receives.</p> |                |   |               |          |
| <b>Parameters</b>  | <p><i>seconds</i> — the delay time threshold value</p> <table> <tr> <td><b>Default</b></td><td>3</td></tr> <tr> <td><b>Values</b></td><td>0 to 600</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                           | <b>Default</b> | 3 | <b>Values</b> | 0 to 600 |
| <b>Default</b>     | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |   |               |          |
| <b>Values</b>      | 0 to 600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |   |               |          |

---

## SAP QoS and IP Filter Policy Commands

### egress

|                    |                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>apipe>sap<br>config>service>cpipe>sap<br>config>service>epipe>sap<br>config>service>ipipe>sap                                                                                                       |
| <b>Description</b> | This command enables the context to configure egress SAP Quality of Service (QoS) policies.<br><br>If no sap-egress QoS policy is defined, the system default sap-egress QoS policy is used for egress processing. |

### ingress

|                    |                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                                                                                    |
| <b>Context</b>     | config>service>apipe>sap<br>config>service>cpipe>sap<br>config>service>epipe>sap<br>config>service>ipipe>sap                                                                                      |
| <b>Description</b> | This command enables the context to configure ingress SAP QoS policies.<br><br>If no sap-ingress QoS policy is defined, the system default sap-ingress QoS policy is used for ingress processing. |

### filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>no filter</b> [ <b>ip</b> <i>ip-filter-id</i> ]                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>epipe>sap>ingress<br>config>service>ipipe>sap>ingress                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | This command associates an IP filter policy with an ingress Epipe or Ipipe SAP.<br><br>Filter policies control the forwarding and dropping of packets based on IP matching criteria. Only one filter can be applied to a SAP at a time.<br><br>The <i>ip-filter-id</i> must already be defined before the <b>filter</b> command is executed. If the filter policy does not exist, the operation will fail and an error message will be displayed. |

The **no** form of the command removes any configured filter ID association with the SAP. The filter policy cannot be deleted until it is removed from all SAPs where it is applied.

**Default**     **no filter**

**Parameters**     *ip-filter-id* — the IP filter policy ID number

**Values**         1 to 65535

## qos

**Syntax**         **qos** *policy-id*  
**no qos**

**Context**         config>service>apipe>sap>egress  
config>service>apipe>sap>ingress  
config>service>cpipe>sap>egress  
config>service>cpipe>sap>ingress  
config>service>epipe>sap>egress  
config>service>epipe>sap>ingress  
config>service>ipipe>sap>egress  
config>service>ipipe>sap>ingress

**Description**     This command associates a QoS policy with an ingress or egress SAP.

QoS ingress and egress policies are important for the enforcement of SLA agreements. The policy ID must be defined prior to associating the policy with a SAP. If the *policy-id* does not exist, an error will be returned.

The **qos** command is used to associate both ingress and egress QoS policies. The **qos** command only allows ingress policies to be associated on SAP ingress and egress policies on the SAP egress. Attempts to associate a QoS policy of the wrong type returns an error.

Only one ingress and one egress QoS policy can be associated with a SAP at one time. Attempts to associate a second QoS policy of a given type will return an error.

By default, no specific QoS policy is associated with the SAP for ingress or egress, so the default QoS policy is used.

The **no** form of this command removes the QoS policy association from the SAP, and the QoS policy reverts to the default.

**Parameters**     *policy-id* — associates the ingress or egress policy ID with the SAP on ingress or egress. The policy ID must already exist.

**Values**         1 to 65535

---

## VLL SDP Commands

### spoke-sdp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>create</b> ] [ <b>no-endpoint</b> ]<br><b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>create</b> ] <b>endpoint</b> <i>endpoint-name</i><br><b>no spoke-sdp</b> <i>sdp-id:vc-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>apipe<br>config>service>cpipe<br>config>service>ipipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command binds a service to an existing Service Destination Point (SDP). The syntax for an Epipe spoke SDP has additional parameters. See <a href="#">spoke-sdp</a> for the Epipe syntax.</p> <p>A spoke SDP is treated as the equivalent of a traditional bridge “port” where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke SDPs or SAPs) and not transmitted on the port on which it was received.</p> <p>The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service will be down.</p> <p>The SDP must already be defined in the <b>config&gt;service&gt;sdp</b> context in order to associate an SDP with a service. If the <b>sdp</b> <i>sdp-id</i> is not already configured, an error message is generated. If the <i>sdp-id</i> does exist, a binding between that <i>sdp-id</i> and the service is created.</p> <p>SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end 7705 SAR devices can participate in the service.</p> <p>The <b>endpoint</b> command allows multiple spoke SDPs to be associated with the endpoint, providing PW redundancy capability. The endpoint must be defined using the <b>create</b> command before multiple spoke SDPs can be associated with the endpoint. The <b>no-endpoint</b> command removes the endpoint and the spoke SDP associations.</p> <p>The <b>no</b> form of the <b>spoke-sdp</b> command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to a service. Once removed, no packets are forwarded to the far-end router.</p> |
| <b>Default</b>     | <b>no</b> <i>sdp-id</i> is bound to a service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <i>sdp-id</i> — uniquely identifies the SDP<br><div style="margin-left: 20px;"><b>Values</b>      1 to 17407</div> <i>vc-id</i> — identifies the virtual circuit<br><div style="margin-left: 20px;"><b>Values</b>      1 to 4294967295</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

*endpoint-name* — specifies the name of the service endpoint

**no-endpoint** — removes a spoke SDP association

## spoke-sdp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>vc-type</b> { <b>ether</b>   <b>vlan</b> }] [ <b>create</b> ] [ <b>no-endpoint</b> ]<br><b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>vc-type</b> { <b>ether</b>   <b>vlan</b> }] [ <b>create</b> ] <b>endpoint</b> <i>endpoint-name</i><br><b>no spoke-sdp</b> <i>sdp-id:vc-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>epipe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command binds an Epipe service to an existing Service Destination Point (SDP). The syntax for an Apipe, Cpipe, or Ipipe spoke SDP has additional parameters. See <a href="#">spoke-sdp</a> for the Apipe, Cpipe, or Ipipe syntax.</p> <p>A spoke SDP is treated as the equivalent of a traditional bridge “port” where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke SDPs or SAPs) and not transmitted on the port on which it was received.</p> <p>The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service will be down.</p> <p>The SDP must already be defined in the <b>config&gt;service&gt;sdp</b> context in order to associate an SDP with an Epipe service. If the <b>sdp</b> <i>sdp-id</i> is not already configured, an error message is generated. If the <i>sdp-id</i> does exist, a binding between that <i>sdp-id</i> and the service is created.</p> <p>SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end 7705 SAR devices can participate in the service.</p> <p>The <b>endpoint</b> command allows multiple spoke SDPs to be associated with the endpoint, providing PW redundancy capability. The endpoint must already be defined in the <b>config&gt;service&gt;epipe</b> context in order to associate multiple spoke SDPs with the endpoint.</p> <p>The <b>no</b> form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to a service. Once removed, no packets are forwarded to the far-end router.</p> |
| <b>Default</b>     | <b>no sdp-id is bound to a service</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <p><i>sdp-id</i> — uniquely identifies the SDP</p> <p><b>Values</b> 1 to 17407</p> <p><i>vc-id</i> — identifies the virtual circuit</p> <p><b>Values</b> 1 to 4294967295</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



**vc-type** — overrides the default VC type signaled for the spoke binding to the far end of the SDP. The VC type is a 15-bit quantity containing a value that represents the type of VC. The actual signaling of the VC type depends on the signaling parameter defined for the SDP. If signaling is disabled, the **vc-type** command can still be used to define the dot1q value expected by the far-end provider equipment. A change of the binding's VC type causes the binding to signal the new VC type to the far end when signaling is enabled.

VC types are derived according to IETF *draft-martini-l2circuit-trans-mpls*.

- The VC type value for Ethernet is 0x0005.
- The VC type value for an Ethernet VLAN is 0x0004.

**Values** ether | vlan

**ether** — defines the VC type as Ethernet. The **ethernet** and **vlan** keywords are mutually exclusive. When the VC type is not defined, then the default is Ethernet for spoke SDP bindings. Defining Ethernet is the same as executing **no vc-type** and restores the default VC type for the spoke SDP binding.

**vlan** — defines the VC type as VLAN. The **ethernet** and **vlan** keywords are mutually exclusive. When the VC type is not defined, then the default is Ethernet for spoke SDP bindings. The VLAN VC-type requires at least one dot1Q tag within each encapsulated Ethernet packet transmitted to the far end.

*endpoint-name* — specifies the name of the service endpoint

**no-endpoint** — removes a spoke SDP association

## egress

|                    |                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                                                        |
| <b>Context</b>     | config>service>apipe>spoke-sdp<br>config>service>cpipe>spoke-sdp<br>config>service>epipe>spoke-sdp<br>config>service>ipipe>spoke-sdp |
| <b>Description</b> | This command configures the egress SDP context.                                                                                      |

## ingress

|                    |                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                       |
| <b>Context</b>     | config>service>apipe>spoke-sdp<br>config>service>cpipe>spoke-sdp<br>config>service>epipe>spoke-sdp<br>config>service>ipipe>spoke-sdp |
| <b>Description</b> | This command configures the ingress SDP context.                                                                                     |

## precedence

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>precedence</b> [ <i>precedence-value</i>   <b>primary</b> ]<br><b>no precedence</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>apipe>spoke-sdp<br>config>service>cpipe>spoke-sdp<br>config>service>epipe>spoke-sdp<br>config>service>ipipe>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command specifies the precedence of the spoke SDP when there are multiple spoke SDPs associated with one service endpoint. One SDP binding can be assigned to be the primary SDP binding, leaving three bindings for secondary bindings, or, if no primary spoke SDP is defined, up to four secondary spoke SDPs can be configured. When an SDP binding goes down, the next highest precedence SDP binding will begin to forward traffic.</p> <p>The <b>no</b> form of the command returns the precedence value to the default.</p> |
| <b>Default</b>     | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Parameters</b>  | <p><i>precedence-value</i> — specifies the spoke SDP precedence</p> <p><b>Values</b> 1 to 4 (where 1 is the highest precedence)</p> <p><b>primary</b> — makes the specified spoke SDP the primary spoke SDP (primary is indicated on the CLI display as the value 0)</p>                                                                                                                                                                                                                                                                    |

## vc-label

|                    |                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label</b> <i>egress-vc-label</i><br><b>no vc-label</b> [ <i>egress-vc-label</i> ]                                                                          |
| <b>Context</b>     | config>service>apipe>spoke-sdp>egress<br>config>service>cpipe>spoke-sdp>egress<br>config>service>epipe>spoke-sdp>egress<br>config>service>ipipe>spoke-sdp>egress |
| <b>Description</b> | This command configures the egress VC label.                                                                                                                     |
| <b>Parameters</b>  | <p><i>egress-vc-label</i> — indicates a specific connection</p> <p><b>Values</b> 16 to 1048575</p>                                                               |

## vc-label

|                    |                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label</b> <i>ingress-vc-label</i><br><b>no vc-label</b> [ <i>ingress-vc-label</i> ]                                                                            |
| <b>Context</b>     | config>service>apipe>spoke-sdp>ingress<br>config>service>cpipe>spoke-sdp>ingress<br>config>service>epipe>spoke-sdp>ingress<br>config>service>ipipe>spoke-sdp>ingress |
| <b>Description</b> | This command configures the ingress VC label.                                                                                                                        |
| <b>Parameters</b>  | <i>ingress-vc-label</i> — indicates a specific connection                                                                                                            |
| <b>Values</b>      | 2048 to 18431                                                                                                                                                        |

## vlan-vc-tag

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vlan-vc-tag</b> <i>0..4094</i><br><b>no vlan-vc-tag</b> [ <i>0..4094</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>epipe>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command specifies an explicit dot1q value used when encapsulating to the SDP far end. When signaling is enabled between the near and far end, the configured dot1q tag can be overridden by a received TLV specifying the dot1q value expected by the far end. This signaled value must be stored as the remote signaled dot1q value for the binding. The provisioned local dot1q tag must be stored as the administrative dot1q value for the binding.</p> <p>When the dot1q tag is not defined, the default value of zero is stored as the administrative dot1q value. Setting the value to zero is equivalent to not specifying the value.</p> <p>The <b>no</b> form of this command disables the command</p> |
| <b>Default</b>     | <b>no vlan-vc-tag</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <i>0..4094</i> — specifies a valid VLAN identifier to bind an 802.1Q VLAN tag ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## ce-address

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ce-address</b> <i>ip-address</i><br><b>no ce-address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ipipe>sap<br>config>service>ipipe>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | This command specifies the IP address of the CE device associated with an Ipipe SAP or spoke SDP. In the case of a SAP, it is the address of the CE device directly attached to the SAP. For a spoke SDP, it is the address of the CE device reachable through that spoke SDP (for example, attached to the SAP on the remote node). The address must be a host address (no subnet addresses are accepted) as there must be only one CE device attached to an Ipipe SAP. The CE address specified at one end of an Ipipe will be used in processing ARP messages at the other endpoint, as the router acts as a proxy for ARP messages. |
| <b>Default</b>     | none                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <i>ip-address</i> — specifies the IP address of the CE device associated with an Ipipe SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## control-word

|                    |                                                                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>control-word</b><br><b>no control-word</b>                                                                                                                                                    |
| <b>Context</b>     | config>service>apipe>spoke-sdp<br>config>service>cpipe>spoke-sdp<br>config>service>epipe>spoke-sdp<br>config>service>ipipe>spoke-sdp                                                             |
| <b>Description</b> | This command indicates whether the control word is used or not. The value of the control word is negotiated with the peer.<br><br>This command is mandatory for SAToP and CESoPSN encapsulation. |

---

## SDP Cell Concatenation Commands

### cell-concatenation

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>cell-concatenation</b>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>apipe>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command enables the context to provide access to the various options that control the termination of ATM cell concatenation into an MPLS frame. Several options can be configured simultaneously. The concatenation process for a given MPLS packet ends when the first concatenation termination condition is met. The concatenation parameters apply only to ATM N-to-1 cell mode VLL.</p> <p>Frame boundaries are not configurable.</p> |

### clp-change

|                    |                                                                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] clp-change</b>                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>apipe>spoke-sdp>cell-concatenation                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables the configuration of CLP change to be an indication to complete the cell concatenation operation.</p> <p>The <b>no</b> form of the command resets the configuration to ignore the CLP change as an indication to complete the cell concatenation.</p> |

### max-cells

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>max-cells</b> <i>cell-count</i><br><b>no max-cells</b> [ <i>cell-count</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>apipe>spoke-sdp>cell-concatenation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command enables the configuration of the maximum number of ATM cells to accumulate in an MPLS packet. The remote peer will also signal the maximum number of concatenated cells it is willing to accept in an MPLS packet. When the lesser of the configured value and the signaled value is reached, the MPLS packet is queued for transmission onto the pseudowire. It is ensured that the MPLS packet MTU conforms to the configured service MTU.</p> <p>If the max-delay and jitter buffer options are not configured, then the maximum number of cells allowed in a single VLL frame must be less than the configured service-mtu size.</p> <p>The <b>no</b> form of this command sets max-cells to the value “1”, indicating that no concatenation will be performed.</p> |

**Parameters** *cell-count* — specifies the maximum number of ATM cells to be accumulated in an MPLS packet before queuing the packet for transmission onto the pseudowire

**Values** 1 to 29

**Default** 1

## max-delay

**Syntax** **max-delay** *delay-time*  
**no max-delay** [*delay-time*]

**Context** config>service>apipe>spoke-sdp>cell-concatenation

**Description** This command enables the configuration of the maximum amount of time to wait while performing ATM cell concatenation into an MPLS packet before transmitting the MPLS packet. This places an upper bound on the amount of delay introduced by the concatenation process. When this amount of time is reached from when the first ATM cell for this MPLS packet was received, the MPLS packet is queued for transmission onto the pseudowire.

The **no** form of this command resets max-delay to its default value.

**Parameters** *delay-time* — specifies the maximum amount of time, in hundreds of microseconds, to wait before transmitting the MPLS packet with whatever ATM cells have been received. For example, a value of 1 equals 100  $\mu$ s, and a value of 400 equals 40000  $\mu$ s, or 40 ms.

**Values** 1 to 400

**Default** 400

---

## ATM Commands

### atm

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>atm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>apipe>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command enables access to the context to configure ATM-related attributes. This command can only be used when a given context (for example, a channel or SAP) supports ATM functionality such as:</p> <ul style="list-style-type: none"><li>• configuring ATM port or ATM port-related functionality on T1/E1 ASAP Adapter cards or OC3/STM1 Adapter cards</li><li>• configuring ATM-related configuration for ATM-based SAPs that exist on T1/E1 ASAP Adapter cards or on OC3/STM1 Adapter cards</li></ul> <p>If ATM functionality is not supported for a given context, the command returns an error.</p> |

### egress

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                     |
| <b>Context</b>     | config>service>apipe>sap>atm                                                                      |
| <b>Description</b> | This command provides access to the context to configure egress ATM traffic policies for the SAP. |

### ingress

|                    |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                     |
| <b>Context</b>     | config>service>apipe>sap>atm                                                                       |
| <b>Description</b> | This command provides access to the context to configure ingress ATM traffic policies for the SAP. |

## traffic-desc

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>traffic-desc</b> <i>traffic-desc-profile-id</i><br><b>no traffic-desc</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>apipe>sap>atm>egress<br>config>service>apipe>sap>atm>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command assigns an ATM traffic descriptor profile to a given context (for example, a SAP).</p> <p>When configured under the ingress context, the specified traffic descriptor profile defines the traffic contract in the forward direction.</p> <p>When configured under the egress context, the specified traffic descriptor profile defines the traffic contract in the backward direction.</p> <p>The <b>no</b> form of the command reverts the traffic descriptor to the default traffic descriptor profile.</p> |
| <b>Default</b>     | The default traffic descriptor (trafficDescProfileId. = 1) is associated with newly created PVCC-delimited SAPs.                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Parameters</b>  | <i>traffic-desc-profile-id</i> — specifies a defined traffic descriptor profile (see the QoS <b>atm-td-profile</b> command)                                                                                                                                                                                                                                                                                                                                                                                                   |



---

## ATM OAM Commands

### oam

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>oam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>apipe>sap>atm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables the context to configure OAM functionality for a PVCC delimiting a SAP.</p> <p>The T1/E1 ASAP Adapter cards and 4-port OC3/STM1 Clear Channel Adapter card support the generation of F4 (VP) and F5 (VC) AIS cells when the Apipe service is operationally down. When the Apipe service is operationally up, OAM cells are transported over the Apipe and are transparent to the 7705 SAR. This capability is in accordance with ITU-T Recommendation I.610 - B-ISDN Operation and Maintenance.</p> |

### alarm-cells

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] alarm-cells</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>apipe>sap>atm>oam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command configures AIS/RDI fault management on a PVCC. Fault management allows PVCC terminations to monitor and report the status of their connection by propagating fault information through the network and by driving the PVCC's operational status.</p> <p>The 7705 SAR Apipe does not support PVCC terminations. Instead, it allows OAM cells to be transported transparently from end-to-end. When this command is enabled, AIS cells are generated when an Apipe or corresponding SAP is operationally down.</p> <p>The <b>no</b> command disables alarm-cells functionality for the Apipe. When alarm-cells functionality is disabled, AIS cells are not generated as result of the Apipe or corresponding SAP going into the operationally down state.</p> |
| <b>Default</b>     | <b>enabled</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## Show Commands

all

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>all</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | This command displays detailed information for all aspects of the service.                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Output</b>      | <p>The following output is an example of service-id all information, and <a href="#">Table 34</a> describes the fields. Following the table are output examples for:</p> <ul style="list-style-type: none"> <li>• <a href="#">Sample Output (Apipe ATMVpc Service)</a></li> <li>• <a href="#">Sample Output (Cpipe Service)</a></li> <li>• <a href="#">Sample Output (Epipe Service)</a></li> <li>• <a href="#">Sample Output (Ipipe Service)</a></li> </ul> |

### Sample Output (Apipe ATMVcc Service)

```

=====
*A:ALU-A>show>service# id 2 all
=====
Service Detailed Information
=====
Service Id : 2 Vpn Id : 0
Service Type : Apipe VLL Type : ATMVCC
Customer Id : 2
Last Status Change: 03/11/2008 19:58:19
Last Mgmt Change : 03/28/2008 19:49:51
Admin State : Down Oper State : Down
MTU : 1508
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1

Service Destination Points (SDPs)

Sdp Id 2:2 -(138.120.38.1)

SDP Id : 2:2 Type : Spoke
VC Type : ATMVCC VC Tag : 0
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 138.120.38.1 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a

```

```

Admin ControlWord : Not Preferred Oper ControlWord : False
Admin BW(Kbps) : 0 Oper BW(Kbps) : 0
Last Status Change : 03/11/2008 19:58:19 Signaling : TLDP
Last Mgmt Change : 03/28/2008 19:49:51
Endpoint : N/A Precedence : 4
Class Fwding State : Down
Flags : SdpOperDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall
Mac Move : Ukwn Blockable Level : Unknown
Peer Pw Bits : None
Peer Fault Ip : None
Peer Vccv CV Bits : None
Peer Vccv CC Bits : None

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octs. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0

Associated LSP LIST :
No LSPs Associated

```

-----  
APIPE Service Destination Point specifics  
-----

```

Admin Concat Limit : 1 Oper Concat Limit : 1
Peer Concat Limit : n/a Max Concat Delay : 400

```

Number of SDPs : 1  
-----

-----  
Service Access Points  
-----

-----  
SAP 1/4/1.1:0/32  
-----

```

Service Id : 2
SAP : 1/4/1.1:0/32 Encap : atm
Admin State : Up Oper State : Down
Flags : ServiceAdminDown PortOperDown L2OperDown
Multi Svc Site : None
Last Status Change : 03/11/2008 19:58:19
Last Mgmt Change : 03/28/2008 19:35:51
Sub Type : regular

Admin MTU : 1572 Oper MTU : 1572
Ingr IP Fltr-Id : n/a Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max

```

```
Endpoint : N/A
Acct. Pol : None
Collect Stats : Disabled
```

## ----- QoS

```
Ingress qos-policy : 1
Shared Q plcy : n/a
Egress qos-policy : 1
Multipoint shared : Disabled
```

## ----- Sap Statistics

```
Last Cleared Time : N/A
```

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | n/a    |
| Off. HiPrio             | : 39192 | n/a    |
| Off. LowPrio            | : n/a   | n/a    |

## Queueing Stats(Ingress QoS Policy 1)

|              |         |       |
|--------------|---------|-------|
| Dro. HiPrio  | : 0     | n/a   |
| Dro. LowPrio | : n/a   | n/a   |
| For. InProf  | : 19596 | 19596 |
| For. OutProf | : 19596 | 19596 |

## Queueing Stats(Egress QoS Policy 1)

|              |         |       |
|--------------|---------|-------|
| Dro. InProf  | : 0     | n/a   |
| Dro. OutProf | : n/a   | n/a   |
| For. InProf  | : 39192 | 39192 |
| For. OutProf | : n/a   | n/a   |

## ----- Sap per Queue stats

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 39192 | n/a    |
| Off. LoPrio                          | : n/a   | n/a    |
| Dro. HiPrio                          | : 0     | n/a    |
| Dro. LoPrio                          | : n/a   | n/a    |
| For. InProf                          | : 19596 | 19596  |
| For. OutProf                         | : 19596 | 19596  |

## Egress Queue 1

|              |         |       |
|--------------|---------|-------|
| For. InProf  | : 39192 | 39192 |
| For. OutProf | : n/a   | n/a   |
| Dro. InProf  | : 0     | n/a   |
| Dro. OutProf | : n/a   | n/a   |

## ----- ATM SAP Configuration Information

|                              |                              |
|------------------------------|------------------------------|
| Ingress TD Profile : 1       | Egress TD Profile : 1        |
| Alarm Cell Handling: Enabled | AAL-5 Encap : n/a            |
| OAM Termination : Disabled   | Periodic Loopback : Disabled |

```

Service Endpoints

```

```
No Endpoints found.
=====
```

**Table 34: Show Service-ID All Command Output Fields**

| Label                               | Description                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Service Detailed Information</b> |                                                                                           |
| Service Id                          | Identifies the service by its ID number                                                   |
| VPN Id                              | Identifies the VPN by its ID number                                                       |
| Service Type                        | Specifies the type of service                                                             |
| VLL Type                            | Specifies the VLL type                                                                    |
| Description                         | Displays generic information about the service                                            |
| Customer Id                         | Identifies the customer by its ID number                                                  |
| Last Status Change                  | Displays the date and time of the most recent status change to this service               |
| Last Mgmt Change                    | Displays the date and time of the most recent management-initiated change to this service |
| Admin State                         | Specifies the desired state of the service                                                |
| Oper State                          | Specifies the operating state of the service                                              |
| MTU                                 | Specifies the service MTU                                                                 |
| Vc Switching                        | Specifies whether the service is configured as a PW switching point                       |
| SAP Count                           | Displays the number of SAPs specified for this service                                    |
| SDP Bind Count                      | Displays the number of SDPs bound to this service                                         |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                    | Description                                                                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Destination Points (SDPs)</b> |                                                                                                                                                                            |
| Description                              | Displays generic information about the SDP                                                                                                                                 |
| SDP Id                                   | Identifies the SDP                                                                                                                                                         |
| Type                                     | Identifies the service SDP binding type (for example, spoke)                                                                                                               |
| VC Type                                  | Displays the VC type for the SDP (for example, CESoPSN)                                                                                                                    |
| VC Tag                                   | The explicit dot1Q value used when encapsulating to the SDP far end                                                                                                        |
| Admin Path MTU                           | Specifies the desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |
| Oper Path MTU                            | Specifies the actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented  |
| Far End                                  | Displays the IP address of the remote end of the MPLS or GRE tunnel defined by this SDP                                                                                    |
| Delivery                                 | Specifies the type of delivery used by the SDP (MPLS or GRE)                                                                                                               |
| Admin State                              | Specifies the administrative state of this SDP                                                                                                                             |
| Oper State                               | Specifies the operational state of this SDP                                                                                                                                |
| Acct. Pol                                | The accounting policy ID assigned to the SAP                                                                                                                               |
| Collect Stats                            | Specifies whether collect stats is enabled                                                                                                                                 |
| Ingress Label                            | Displays the label used by the far-end device to send packets to this device in this service by this SDP                                                                   |
| Egress Label                             | Displays the label used by this device to send packets to the far-end device in this service by this SDP                                                                   |
| Admin ControlWord                        | Specifies the administrative state of the control word: Preferred (control word enabled) or Not Preferred (control word disabled)                                          |
| Oper ControlWord                         | Specifies the operational state of the control word: True (control word enabled) or False (control word disabled)                                                          |
| Last Status Change                       | Specifies the time of the most recent operating status change to this spoke SDP                                                                                            |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                        | Description                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Signaling                    | Specifies the signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on this SDP                                         |
| Last Mgmt Change             | Specifies the time of the most recent management-initiated change to this spoke SDP                                                                                       |
| Flags                        | Displays the conditions that affect the operating status of this spoke SDP. Display output includes PathMTUtooSmall, SdpOperDown, NoIngVCLLabel, NoEgrVCLLabel, and so on |
| Mac Move                     | Indicates the administrative state of the MAC movement feature associated with the service                                                                                |
| Peer Pw Bits                 | Displays the setting of the pseudowire peer bits. Display output includes pwNotforwarding, psnIngressFault, psnEgressFault, lacIngressFault, lacEgressFault               |
| Peer Fault Ip                | N/A                                                                                                                                                                       |
| Peer Vccv CV Bits            | Displays the setting of the pseudowire peer VCCV control verification bits (lspPing)                                                                                      |
| Peer Vccv CC Bits            | Displays the setting of the pseudowire peer VCCV control channel bits (pwe3ControlWord and/or mplsRouterAlertLabel)                                                       |
| <b>Keepalive Information</b> |                                                                                                                                                                           |
| Admin State                  | Specifies the administrative state of the keepalive protocol                                                                                                              |
| Oper State                   | Specifies the operational state of the keepalive protocol                                                                                                                 |
| Hello Time                   | Specifies how often the SDP Echo Request messages are transmitted on this SDP                                                                                             |
| Hello Msg Len                | Specifies the length of the SDP Echo Request messages transmitted on this SDP                                                                                             |
| Max Drop Count               | Specifies the maximum number of consecutive SDP Echo Request messages that can be unacknowledged before the keepalive protocol reports a fault                            |
| Hold Down Time               | Specifies the amount of time to wait before the keepalive operating status is eligible to enter the alive state                                                           |
| <b>Statistics</b>            |                                                                                                                                                                           |
| I. Fwd. Pkts.                | Specifies the number of forwarded ingress packets                                                                                                                         |
| I. Dro. Pkts.                | Specifies the number of dropped ingress packets                                                                                                                           |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                    | Description                                                                                                                 |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| I. Fwd. Octs.                            | Specifies the number of forwarded ingress octets                                                                            |
| I. Dro. Octs.                            | Specifies the number of dropped ingress octets                                                                              |
| E. Fwd. Pkts.                            | Specifies the number of forwarded egress packets                                                                            |
| E. Fwd. Octets                           | Specifies the number of forwarded egress octets                                                                             |
| <b>Eth-Cfm Configuration Information</b> |                                                                                                                             |
| Md-index                                 | Displays the value of the MD index                                                                                          |
| Direction                                | Displays the direction of the MEP                                                                                           |
| Ma-index                                 | Displays the value of the MA index                                                                                          |
| Admin                                    | Displays the administrative state of the MEP (enabled or disabled)                                                          |
| MepId                                    | Displays the MEP-ID                                                                                                         |
| CCM-Enable                               | Displays the status of the Continuity Check Message (CCM)                                                                   |
| LowestDefectPri                          | Displays a configured value that defects are evaluated against                                                              |
| HighestDefect                            | Displays the highest defect                                                                                                 |
| Defect Flags                             | Indicates the defect flags                                                                                                  |
| Mac Address                              | Displays the MAC address (the MAC address for a spoke SDP is the system MAC address; for a SAP, it is the port MAC address) |
| CcmLtmPriority                           | Displays the priority of the CCM Linktrace Message (LTM)                                                                    |
| CcmTx                                    | Displays the number of CCM transmissions                                                                                    |
| CcmSequenceErr                           | Displays the number of CCM sequence errors                                                                                  |
| DmrRepliesTx                             | Displays the number of delay measurement replies transmitted                                                                |
| LmrRepliesTx                             | Displays the number of loss measurement replies transmitted                                                                 |
| Dual-Loss Test                           | Displays the status of the dual-ended loss measurement test (enabled or disabled)                                           |
| Dual-Loss Thresh                         | Displays the frame error threshold beyond which an alarm will be raised. The threshold is expressed as a percentage.        |
| Eth-Ais                                  | Displays the status of the ETH-AIS test (enabled or disabled)                                                               |
| Eth-Ais Rx Ais                           | Indicates whether any ETH-AIS messages have been received                                                                   |



**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                      | Description                                                                                                                                                                                                                                                                                             |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eth-Ais Tx Priorit*        | Displays the priority value of a transmitted ETH-AIS frame                                                                                                                                                                                                                                              |
| Eth-Ais Rx Interv*         | Indicates the interval of a received ETH-AIS frame                                                                                                                                                                                                                                                      |
| Eth-Ais Tx Interva*        | Displays the interval of a transmitted ETH-AIS frame                                                                                                                                                                                                                                                    |
| Eth-Ais Tx Counte*         | Displays the number of ETH-AIS frames that have been sent                                                                                                                                                                                                                                               |
| Eth-Ais Tx Levels          | Indicates the MD level of transmitted ETH-AIS frames                                                                                                                                                                                                                                                    |
| Eth-Tst                    | Indicates the status of the ETH-Test (enabled or disabled)                                                                                                                                                                                                                                              |
| LbRxReply                  | Displays the number of received loopback (LB) replies                                                                                                                                                                                                                                                   |
| LbRxBadOrder               | Displays the number of LB replies that have been received in the wrong order                                                                                                                                                                                                                            |
| LbRxBadMsdu                | Displays the number of LB replies that have been received with the wrong destination MAC address (MSDU = MAC Service Data Unit)                                                                                                                                                                         |
| LbTxReply (Total)          | Displays the total number of LBRs (loopback replies) transmitted from this MEP                                                                                                                                                                                                                          |
| LbTxReplyNoTLV             | Displays the number of LBRs (loopback replies) transmitted from this MEP with no TLV<br><br>Note that because only LBMs with no TLVs are used for throughput testing, the LbTxReply (Total), LbTxReplyNoTLV, and LbTxReplyWithTLV counters can help debug problems if throughput testing is not working |
| LbTxReplyWithTLV           | Displays the number of LBRs (loopback replies) transmitted from this MEP with TLV                                                                                                                                                                                                                       |
| LbNextSequence             | Displays the sequence number of the next LB transmission                                                                                                                                                                                                                                                |
| LtNextSequence             | Displays the sequence number of the next Linktrace (LT) message transmitted                                                                                                                                                                                                                             |
| LtRxUnexplained            | Displays the number of the unexplained Linktrace (LT) messages                                                                                                                                                                                                                                          |
| <b>Associated LSP LIST</b> |                                                                                                                                                                                                                                                                                                         |
| Lsp Name                   | Specifies the name of the static LSP                                                                                                                                                                                                                                                                    |
| Admin State                | Specifies the administrative state of the associated LSP                                                                                                                                                                                                                                                |
| Oper State                 | Specifies the operational state of the associated LSP                                                                                                                                                                                                                                                   |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                            | Description                                                                                                                                               |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Time Since Last Tr*                              | Specifies the time that the associated static LSP has been in service                                                                                     |
| <b>APIPE Service Destination Point specifics</b> |                                                                                                                                                           |
| Admin Concat Limit                               | Specifies the administrative (configured) value for the maximum number of cells for cell concatenation, as defined via the <code>max-cells</code> command |
| Oper Concat Limit                                | Specifies the operational value for the maximum number of cells for cell concatenation                                                                    |
| Peer Concat Limit                                | Specifies the far-end value for the maximum number of cells for cell concatenation                                                                        |
| Max Concat Delay                                 | Specifies the amount of time to wait while cell concatenation is occurring, as defined via the <code>max-delay</code> command                             |
| <b>CPIPE Service Destination Point specifics</b> |                                                                                                                                                           |
| Local Bit-rate                                   | Specifies the number of DS0s used by the local SDP                                                                                                        |
| Peer Bit-rate                                    | Specifies the number of DS0s used by the far-end SDP                                                                                                      |
| Local Payload Size                               | Specifies the local payload size, in bytes, used by the local SDP                                                                                         |
| Peer Payload Size                                | Specifies the peer payload size, in bytes, used by the far-end SDP                                                                                        |
| Local Sig Pkts                                   | Specifies the type of signaling packets used by the local SDP                                                                                             |
| Peer Sig Pkts                                    | Specifies the type of signaling packets used by the far-end SDP                                                                                           |
| Local CAS Framing                                | Specifies the type of CAS framing used by the local SDP                                                                                                   |
| Peer CAS Framing                                 | Specifies the type of CAS framing used by the far-end SDP                                                                                                 |
| Local RTP Header                                 | Specifies whether the local router inserts the RTP header                                                                                                 |
| Peer RTP Header                                  | Specifies whether the peer router inserts the RTP header                                                                                                  |
| Number of SDPs                                   | Specifies the number of SDPs bound to the service                                                                                                         |
| <b>IPIPE Service Destination Point specifics</b> |                                                                                                                                                           |
| Precedence                                       | Specifies the precedence level of the SDP binding                                                                                                         |
| IpipeSdpBindCeIpAd*                              | Specifies the IP address of the Ipipe spoke-sdp                                                                                                           |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                        | Description                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Access Points</b> |                                                                                                                                                                            |
| Service Id                   | Identifies the service                                                                                                                                                     |
| SAP                          | Specifies the ID of the access port where this SAP is defined                                                                                                              |
| Encap                        | Specifies the encapsulation type for this SAP on the access port                                                                                                           |
| Admin State                  | Specifies the desired state of the SAP                                                                                                                                     |
| Oper State                   | Specifies the operating state of the SAP                                                                                                                                   |
| Flags                        | Specifies the conditions that affect the operating status of this SAP. Display output includes ServiceAdminDown, PortOperDown, and so on.                                  |
| Last Status Change           | Specifies the date and time of the most recent status change to this SAP                                                                                                   |
| Last Mgmt Change             | Specifies the date and time of the most recent management-initiated change to this SAP                                                                                     |
| Dot1Q Ethertype              | Identifies the value of the dot1q Ethertype                                                                                                                                |
| LLF Admin State              | Specifies the Link Loss Forwarding administrative state                                                                                                                    |
| LLF Oper State               | Specifies the Link Loss Forwarding operational state                                                                                                                       |
| Admin MTU                    | Specifies the desired largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented |
| Oper MTU                     | Specifies the actual largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented  |
| Ingr IP Fltr-ID              | Specifies the ingress IP filter policy ID assigned to the SAP                                                                                                              |
| Egr IP Fltr-Id               | Specifies the egress IP filter policy ID assigned to the SAP                                                                                                               |
| Ingr Mac Fltr-ID             | Specifies the ingress MAC filter policy ID assigned to the SAP                                                                                                             |
| Egr Mac Fltr-Id              | Specifies the egress MAC filter policy ID assigned to the SAP                                                                                                              |
| Acct. Pol                    | Specifies the accounting policy applied to the SAP                                                                                                                         |
| Collect Stats                | Specifies whether accounting statistics are collected on the SAP                                                                                                           |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                        | Description                                                                                                                      |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>IPIPE Service Access Points specifics</b> |                                                                                                                                  |
| Ipipe SAP ARP Entry Info                     | Displays the MAC address of the connected CE address after being resolved through the ARP mechanism                              |
| <b>QOS</b>                                   |                                                                                                                                  |
| Ingress qos-policy                           | Displays the SAP ingress QoS policy ID                                                                                           |
| Egress qos-policy                            | Displays the SAP egress QoS policy ID                                                                                            |
| <b>SAP Statistics</b>                        |                                                                                                                                  |
| Last Cleared Time                            | Displays the date and time that a clear command was issued on statistics                                                         |
| <b>Forwarding Engine Stats</b>               |                                                                                                                                  |
| Dropped                                      | Indicates the number of packets or octets dropped by the forwarding engine                                                       |
| Off. HiPrio                                  | Indicates the number of high-priority packets or octets offered to the forwarding engine                                         |
| Off. LowPrio                                 | Indicates the number of low-priority packets offered to the forwarding engine                                                    |
| <b>Queueing Stats (Ingress QoS Policy)</b>   |                                                                                                                                  |
| Dro. HiPrio                                  | Indicates the number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy                   |
| Dro. LowPrio                                 | Indicates the number of low-priority packets discarded, as determined by the SAP ingress QoS policy                              |
| For. InProf                                  | Indicates the number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy     |
| For. OutProf                                 | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                     | Description                                                                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Queueing Stats (Egress QoS Policy)</b> |                                                                                                                                 |
| Dro. InProf                               | Indicates the number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy                      |
| Dro. OutProf                              | Indicates the number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy                  |
| For. InProf                               | Indicates the number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy     |
| For. OutProf                              | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy |
| <b>Sap per Queue stats</b>                |                                                                                                                                 |
| Ingress Queue <i>n</i>                    | Specifies the index of the ingress QoS queue of this SAP, where <i>n</i> is the index number                                    |
| Off. HiPrio                               | Indicates the packets or octets count of the high-priority traffic for the SAP (offered)                                        |
| Off. LoPrio                               | Indicates the packets or octets count of the low-priority traffic for the SAP (offered)                                         |
| Dro. HiPrio                               | Indicates the number of high-priority traffic packets/octets dropped                                                            |
| Dro. LoPrio                               | Indicates the number of low-priority traffic packets/octets dropped                                                             |
| For. InProf                               | Indicates the number of in-profile packets or octets (rate below CIR) forwarded                                                 |
| For. OutPro                               | Indicates the number of out-of-profile octets (rate above CIR) forwarded                                                        |
| Egress Queue <i>n</i>                     | Specifies the index of the egress QoS queue of the SAP, where <i>n</i> is the index number                                      |
| For. InProf                               | Indicates the number of in-profile packets or octets (rate below CIR) forwarded                                                 |
| For. OutProf                              | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded                                             |
| Dro. InProf                               | Indicates the number of in-profile packets or octets dropped for the SAP                                                        |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dro. OutProf                             | Indicates the number of out-of-profile packets or octets discarded                                                                                                                                                                                                                                                                                                                                                    |
| <b>ATM SAP Configuration Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ingress TD Profile                       | The profile ID of the traffic descriptor applied to the ingress SAP                                                                                                                                                                                                                                                                                                                                                   |
| Egress TD Profile                        | The profile ID of the traffic descriptor applied to the egress SAP                                                                                                                                                                                                                                                                                                                                                    |
| Alarm Cell Handling                      | Indicates that OAM cells are being processed                                                                                                                                                                                                                                                                                                                                                                          |
| OAM Termination                          | Indicates whether this SAP is an OAM termination point                                                                                                                                                                                                                                                                                                                                                                |
| <b>CEM SAP Configuration Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Endpoint Type                            | Specifies the type of endpoint                                                                                                                                                                                                                                                                                                                                                                                        |
| Bit-rate                                 | Specifies the number of DS0s or timeslots in the channel group                                                                                                                                                                                                                                                                                                                                                        |
| Payload Size                             | Specifies the number of octets contained in the payload of a TDM PW packet when the packet is transmitted                                                                                                                                                                                                                                                                                                             |
| Jitter Buffer                            | Specifies the size of the receive jitter buffer, expressed in milliseconds                                                                                                                                                                                                                                                                                                                                            |
| Use RTP Header                           | Specifies whether RTP headers are used in CES packets (Yes or No)                                                                                                                                                                                                                                                                                                                                                     |
| CAS Framing                              | Specifies the type of CAS framing                                                                                                                                                                                                                                                                                                                                                                                     |
| Effective PVDT                           | Displays the peak-to-peak packet delay variation (PDV) used by the circuit emulation service.<br>Since the operating system may adjust the jitter buffer setting in order to ensure no packet loss, the configured jitter buffer value may not be the value used by the system. The effective PVDT provides an indication that the PVD has been adjusted by the operating system (see <a href="#">Jitter Buffer</a> ) |
| Cfg Alarm                                | Specifies the alarms that have alarm reporting enabled                                                                                                                                                                                                                                                                                                                                                                |
| Alarm Status                             | Indicates the current alarm state (for example, stray, malformed, packet loss, overrun, underrun, remote packet loss, remote fault, or remote RDI)                                                                                                                                                                                                                                                                    |

**Table 34: Show Service-ID All Command Output Fields (Continued)**

| Label                     | Description                                                                                            |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| <b>CEM SAP Statistics</b> |                                                                                                        |
| Packets                   | (Column heading) Displays the number of packets counted for the statistic since the last counter reset |
| Seconds                   | (Column heading) Displays the number of seconds elapsed for the statistic since the last counter reset |
| Events                    | (Column heading) Displays the number of events counted for the statistic since the last counter reset  |
| Egress Stats              | Indicates that the following statistics are egress statistics                                          |
| Forwarded                 | Displays the number of forwarded packets                                                               |
| Missing                   | Displays the number of missing packets                                                                 |
| Reordered and Forwarded   | Displays the number of packets that have been reordered and forwarded                                  |
| Underrun                  | Displays the accumulated number of underrun packets for the number of underrun events                  |
| Overrun                   | Displays the accumulated number of overrun packets for the number of overrun events                    |
| Misordered Dropped        | Displays the number of misordered packets that have been dropped                                       |
| Malformed Dropped         | Displays the number of malformed packets that have been dropped                                        |
| Error                     | Displays the accumulated number of seconds that have passed while any error has occurred               |
| Severely Error            | Displays the accumulated number of seconds that have passed while severe errors has occurred           |
| Unavailable               | Displays the accumulated number of seconds that have passed while the Cpipe is unavailable             |
| Failure Count             | Displays the accumulated number of failed events                                                       |
| Jitter Buffer Depth       | Displays the number of packets sitting in the jitter buffer at that instant for a given Cpipe          |
| Ingress Stats             | Indicates that the following statistics are ingress statistics                                         |
| Forwarded                 | Displays the number of forwarded packets                                                               |
| Dropped                   | Displays the number of dropped packets                                                                 |

**Sample Output (Apipe ATMVpc Service)**

```
=====
*A:ALU-A>show>service# id 5 all
```

```
=====
Service Detailed Information
=====
```

```
Service Id : 5 Vpn Id : 5
Service Type : Apipe VLL Type : ATMVPC
Customer Id : 2
Last Status Change: 03/11/2008 19:58:19
Last Mgmt Change : 04/01/2008 16:51:59
Admin State : Down Oper State : Down
MTU : 1508
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1
```

```

Service Destination Points(SDPs)

```

```

Sdp Id 5:5 -(138.120.20.1)

```

```
SDP Id : 5:5 Type : Spoke
VC Type : ATMVPC VC Tag : 0
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 138.120.20.1 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Admin ControlWord : Not Preferred Oper ControlWord : False
Admin BW(Kbps) : 0 Oper BW(Kbps) : 0
Last Status Change : 03/11/2008 19:58:19 Signaling : TLDP
Last Mgmt Change : 04/01/2008 16:51:59
Endpoint : N/A Precedence : 4
Class Fwding State : Down
Flags : SdpOperDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall

Mac Move : Ukwn Blockable Level : Unknown
Peer Pw Bits : None
Peer Fault Ip : None
Peer Vccv CV Bits : None
Peer Vccv CC Bits : None
```

```

KeepAlive Information :

```

```
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10
```

```

Statistics :

```

```
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octs. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
```

```

Associated LSP LIST :
```



No LSPs Associated

-----  
APIPE Service Destination Point specifics  
-----

|                         |                        |
|-------------------------|------------------------|
| Admin Concat Limit : 1  | Oper Concat Limit : 1  |
| Peer Concat Limit : n/a | Max Concat Delay : 400 |

-----  
Number of SDPs : 1  
-----

-----  
Service Access Points  
-----

-----  
SAP 1/4/14.1:55  
-----

|                    |                         |                   |            |
|--------------------|-------------------------|-------------------|------------|
| Service Id         | : 5                     |                   |            |
| SAP                | : 1/4/14.1:55           | Encap             | : atm      |
| Admin State        | : Up                    | Oper State        | : Down     |
| Flags              | : ServiceAdminDown      |                   |            |
|                    | PortOperDown L2OperDown |                   |            |
| Multi Svc Site     | : None                  |                   |            |
| Last Status Change | : 03/11/2008 19:58:19   |                   |            |
| Last Mgmt Change   | : 04/01/2008 17:03:42   |                   |            |
| Sub Type           | : regular               |                   |            |
| Admin MTU          | : 1572                  | Oper MTU          | : 1572     |
| Ingr IP Fltr-Id    | : n/a                   | Egr IP Fltr-Id    | : n/a      |
| Ingr Mac Fltr-Id   | : n/a                   | Egr Mac Fltr-Id   | : n/a      |
| tod-suite          | : None                  | qinq-pbit-marking | : both     |
| Egr Agg Rate Limit | : max                   |                   |            |
| Endpoint           | : N/A                   |                   |            |
| Acct. Pol          | : None                  | Collect Stats     | : Disabled |

-----  
QOS  
-----

|                        |                              |
|------------------------|------------------------------|
| Ingress qos-policy : 1 | Egress qos-policy : 1        |
| Shared Q plcy : n/a    | Multipoint shared : Disabled |

-----  
Sap Statistics  
-----

Last Cleared Time : N/A

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | n/a    |
| Off. HiPrio             | : 30    | n/a    |
| Off. LowPrio            | : n/a   | n/a    |

Queueing Stats(Ingress QoS Policy 1)

|              |       |     |
|--------------|-------|-----|
| Dro. HiPrio  | : 0   | n/a |
| Dro. LowPrio | : n/a | n/a |
| For. InProf  | : 15  | 15  |
| For. OutProf | : 15  | 15  |

```

Queueing Stats(Egress QoS Policy 1)
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a
For. InProf : 30 30
For. OutProf : n/a n/a

Sap per Queue stats

 Packets Octets

Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio : 30 n/a
Off. LoPrio : n/a n/a
Dro. HiPrio : 0 n/a
Dro. LoPrio : n/a n/a
For. InProf : 15 15
For. OutProf : 15 15

Egress Queue 1
For. InProf : 30 30
For. OutProf : n/a n/a
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a

ATM SAP Configuration Information

Ingress TD Profile : 1 Egress TD Profile : 1
Alarm Cell Handling: Enabled
OAM Termination : Disabled Periodic Loopback : Disabled

Service Endpoints

No Endpoints found.
=====
*A:ALU-A>show>service#

```

### Sample Output (Cpipe Service)

```

=====
*A:ALU-A>show>service# id 51 all
=====
Service Detailed Information
=====
Service Id : 51 Vpn Id : 0
Service Type : Cpipe VLL Type : CESoPSN
Description : Henry Cpipe
Customer Id : 2
Last Status Change: 03/11/2008 19:58:19
Last Mgmt Change : 03/31/2008 20:41:13
Admin State : Down Oper State : Down
MTU : 1514
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1

Service Destination Points (SDPs)

```

```

Sdp Id 51:51 -(138.120.38.1)

SDP Id : 51:51 Type : Spoke
VC Type : CESoPSN VC Tag : 0
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 138.120.38.1 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Admin ControlWord : Preferred Oper ControlWord : True
Admin BW(Kbps) : 0 Oper BW(Kbps) : 0
Last Status Change : 03/11/2008 19:58:19 Signaling : TLDP
Last Mgmt Change : 03/31/2008 20:41:13
Endpoint : N/A Precedence : 4
Class Fwding State : Down
Flags : SdpOperDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall

Mac Move : Ukwn Blockable Level : Unknown
Peer Pw Bits : None
Peer Fault Ip : None
Peer Vccv CV Bits : None
Peer Vccv CC Bits : None

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 100 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octs. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0

Associated LSP LIST :
No LSPs Associated

CPIPE Service Destination Point specifics

Local Bit-rate : 10 Peer Bit-rate : n/a
Local Payload Size : 160 Peer Payload Size : n/a
Local Sig Pkts : No Sig. Peer Sig Pkts : No Sig.
Local CAS Framing : No CAS Peer CAS Framing : No CAS
Local RTP Header : Yes Peer RTP Header : No
Local Differential : No Peer Differential : No
Local Timestamp : 0 Peer Timestamp : 0

Number of SDPs : 1

Service Access Points

```

-----  
 SAP 1/4/5.1  
 -----

|                    |                                    |                   |           |
|--------------------|------------------------------------|-------------------|-----------|
| Service Id         | : 51                               |                   |           |
| SAP                | : 1/4/5.1                          | Encap             | : cem     |
| Admin State        | : Up                               | Oper State        | : Down    |
| Flags              | : ServiceAdminDown<br>PortOperDown |                   |           |
| Multi Svc Site     | : None                             |                   |           |
| Last Status Change | : 03/11/2008 19:58:19              |                   |           |
| Last Mgmt Change   | : 03/31/2008 21:38:50              |                   |           |
| Sub Type           | : regular                          |                   |           |
|                    |                                    |                   |           |
| Admin MTU          | : 1572                             | Oper MTU          | : 1572    |
| Ingr IP Fltr-Id    | : n/a                              | Egr IP Fltr-Id    | : n/a     |
| Ingr Mac Fltr-Id   | : n/a                              | Egr Mac Fltr-Id   | : n/a     |
| tod-suite          | : None                             | qinq-pbit-marking | : both    |
| Egr Agg Rate Limit | : max                              |                   |           |
| Endpoint           | : N/A                              |                   |           |
|                    |                                    |                   |           |
| Acct. Pol          | : Default                          | Collect Stats     | : Enabled |

-----  
 QOS  
 -----

|                    |       |                   |            |
|--------------------|-------|-------------------|------------|
| Ingress qos-policy | : 1   | Egress qos-policy | : 1        |
| Shared Q plcy      | : n/a | Multipoint shared | : Disabled |

-----  
 Sap Statistics  
 -----

Last Cleared Time : N/A

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | 0      |
| Off. HiPrio             | : 0     | 0      |
| Off. LowPrio            | : n/a   | n/a    |

Queueing Stats(Ingress QoS Policy 1)

|              |       |     |
|--------------|-------|-----|
| Dro. HiPrio  | : 0   | 0   |
| Dro. LowPrio | : n/a | n/a |
| For. InProf  | : 0   | 0   |
| For. OutProf | : 0   | 0   |

Queueing Stats(Egress QoS Policy 1)

|              |       |     |
|--------------|-------|-----|
| Dro. InProf  | : n/a | n/a |
| Dro. OutProf | : n/a | n/a |
| For. InProf  | : n/a | n/a |
| For. OutProf | : n/a | n/a |

-----  
 Sap per Queue stats  
 -----

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 0     | 0      |
| Off. LoPrio                          | : n/a   | n/a    |
| Dro. HiPrio                          | : 0     | 0      |

```

Dro. LoPrio : n/a n/a
For. InProf : 0 0
For. OutProf : 0 0

```

## Egress Queue 1

```

For. InProf : n/a n/a
For. OutProf : n/a n/a
Dro. InProf : n/a n/a
Dro. OutProf : n/a n/a

```

-----  
CEM SAP Configuration Information

```

Endpoint Type : NxDS0 Bit-rate : 10
Payload Size : 160 Jitter Buffer : 8
Use RTP Header : Yes Differential : No
Timestamp Freq : 0 CAS Framing : No CAS
Effective PDVT : +/-4

```

```

Cfg Alarm : stray malformed pktloss overrun underrun
Alarm Status :

```

-----  
CEM SAP Statistics

|                     | Packets | Seconds | Events |
|---------------------|---------|---------|--------|
| Egress Stats        |         |         |        |
| Forwarded           | : 0     |         |        |
| Dropped             | : 0     |         |        |
| Missing             | : 0     |         |        |
| Reordered Forwarded | : 0     |         |        |
| Underrun            | : 0     |         | 0      |
| Overrun             | : 0     |         | 0      |
| Misordered Dropped  | : 0     |         |        |
| Malformed Dropped   | : 0     |         |        |
| LBit Dropped        | : 0     |         |        |
| Multiple Dropped    | : 0     |         |        |
| Error               | :       | 0       |        |
| Severely Error      | :       | 0       |        |
| Unavailable         | :       | 0       |        |
| Failure Count       | :       |         | 0      |
| Jitter Buffer Depth | : 0     |         |        |
| Ingress Stats       |         |         |        |
| Forwarded           | : 0     |         |        |
| Dropped             | : 0     |         |        |

-----  
Service Endpoints

```

No Endpoints found.
=====

```

**Sample Output (Epipe Service)**

A:ALU-1&gt;show&gt;service&gt;id# all

```

=====
Service Detailed Information
=====
Service Id : 2
Service Type : Epipe
Customer Id : 1
Last Status Change: 07/13/2009 18:50:40
Last Mgmt Change : 07/13/2009 18:50:40
Admin State : Down Oper State : Down
MTU : 1514
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1

Service Destination Points (SDPs)

Sdp Id 1:11 -(10.10.10.10)

SDP Id : 1:11 Type : Spoke
VC Type : Ether VC Tag : n/a
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 10.10.10.10 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Admin ControlWord : Not Preferred Oper ControlWord : False
Admin BW(Kbps) : 0 Oper BW(Kbps) : 0
Last Status Change : 07/13/2009 18:50:40 Signaling : TLDP
Last Mgmt Change : 07/13/2009 18:50:40 Force Vlan-Vc : Disabled
Endpoint : N/A Precedence : 4
Class Fwding State : Down
Flags : SvcAdminDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall
Time to RetryReset : 476014240 seconds Retries Left : -1
Mac Move : Ukwn Blockable Level : Unknown
Peer Pw Bits : None
Peer Fault Ip : None
Peer Vccv CV Bits : None
Peer Vccv CC Bits : None

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octets : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0

Eth-Cfm Configuration Information

```

```

Md-index : 1 Direction : Down
Ma-index : 1 Admin : Disabled
MepId : 2 CCM-Enable : Disabled
LowestDefectPri : macRemErrXcon HighestDefect : none
Defect Flags : None
Mac Address : a4:58:ff:00:00:00 CcmLtmPriority : 7
CcmTx : 0 CcmSequenceErr : 0
LbRxReply : 0 LbRxBadOrder : 0
LbRxBadMsdu : 0 LbTxReply : 0
LbNextSequence : 1 LtNextSequence : 1
LtrXUnexplained : 0

```

Associated LSP LIST :  
No LSPs Associated

```

Number of SDPs : 1

```

```

Service Access Points

```

```

SAP 1/5/1

```

```

Service Id : 2
SAP : 1/5/1 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 : PortOperDown
Multi Svc Site : None
Last Status Change : 07/13/2009 18:50:40
Last Mgmt Change : 07/13/2009 18:50:40
Sub Type : regular
Dot1Q Ethertype : 0x8100 QinQ Ethertype : 0x8100

LLF Admin State : Down LLF Oper State : Clear
Admin MTU : 1514 Oper MTU : 1514
Ingr IP Fltr-Id : n/a Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max
Endpoint : N/A
Q Frame-Based Acct : Disabled
Vlan-translation : None

Acct. Pol : None Collect Stats : Disabled

```

```

QOS

```

```

Ingress qos-policy : 1 Egress qos-policy : 1
Shared Q plcy : n/a Multipoint shared : Disabled

```

```

Sap Statistics

```

```

Last Cleared Time : N/A

```

## VLL Services Command Reference

```

 Packets Octets
Forwarding Engine Stats
Dropped : 0 0
Off. HiPrio : 0 0
Off. LowPrio : 0 0

Queueing Stats(Ingress QoS Policy 1)
Dro. HiPrio : 0 0
Dro. LowPrio : 0 0
For. InProf : 0 0
For. OutProf : 0 0

Queueing Stats(Egress QoS Policy 1)
Dro. InProf : 0 0
Dro. OutProf : 0 0
For. InProf : 0 0
For. OutProf : 0 0

Sap per Queue stats

 Packets Octets

Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio : 0 0
Off. LoPrio : 0 0
Dro. HiPrio : 0 0
Dro. LoPrio : 0 0
For. InProf : 0 0
For. OutProf : 0 0

Egress Queue 1
For. InProf : 0 0
For. OutProf : 0 0
Dro. InProf : 0 0
Dro. OutProf : 0 0

Eth-Cfm Configuration Information

Md-index : 1 Direction : Down
Ma-index : 1 Admin : Disabled
MepId : 1 CCM-Enable : Disabled
LowestDefectPri : macRemErrXcon HighestDefect : none
Defect Flags : None
Mac Address : 00:00:00:00:00:00
CcmTx : 0 CcmSequenceErr : 0
LbRxReply : 0 LbRxBadOrder : 0
LbRxBadMsdu : 0 LbTxReply : 0
LbNextSequence : 1 LtNextSequence : 1
LtRxUnexplained : 0

Service Endpoints

No Endpoints found.
=====
A:ALU-1>show>service>id#

```



**Sample Output (Ipipe Service)**

```
*A:ALU-A# show service id 1301 all
```

```
=====
Service Detailed Information
=====
Service Id : 1301
Service Type : Ipipe
Description : Default ipipe description for service id 1301
Customer Id : 1
Last Status Change: 01/20/2009 16:44:14
Last Mgmt Change : 01/20/2009 16:02:02
Admin State : Up Oper State : Up
MTU : 1514
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1

Service Destination Points(SDPs)

Sdp Id 123:1301 -(10.20.1.3)

Description : Default sdp description
SDP Id : 123:1301 Type : Spoke
VC Type : Ipipe VC Tag : 0
Admin Path MTU : 0 Oper Path MTU : 1516
Far End : 10.20.1.3 Delivery : LDP

Admin State : Up Oper State : Up
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 131069 Egress Label : 131069
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Admin ControlWord : Not Preferred Oper ControlWord : False
Admin BW(Kbps) : 0 Oper BW(Kbps) : 0
Last Status Change : 01/20/2009 16:05:49 Signaling : TLDP
Last Mgmt Change : 01/20/2009 16:02:02
Endpoint : N/A Precedence : 4
Class Fwding State : Down
Flags : None
Time to RetryReset : 1 seconds Retries Left : 213236003
Mac Move : Ukwn Blockable Level : Unknown
Peer Pw Bits : None
Peer Fault Ip : None
Peer Vccv CV Bits : lspPing
Peer Vccv CC Bits : mplsRouterAlertLabel

Ipipe Sdp Bind Info :
IpipeSdpBindCeIpAd*: 88.1.10.4

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 600 I. Dro. Pkts. : 0
I. Fwd. Octs. : 60000 I. Dro. Octs. : 0
```

```

E. Fwd. Pkts. : 21817053 E. Fwd. Octets : 1919900664

```

```

Number of SDPs : 1

```

```

Service Access Points

```

```

SAP 1/2/8:11

```

```

Service Id : 1301
SAP : 1/2/8:11 Encap : q-tag
Description : Default sap description for service id 1301
Admin State : Up Oper State : Up
Flags : None
Multi Svc Site : None
Last Status Change : 01/20/2009 16:44:14
Last Mgmt Change : 01/21/2009 16:31:04
Sub Type : regular
Dot1Q Ethertype : 0x8100 QinQ Ethertype : 0x8100

Admin MTU : 1572 Oper MTU : 1572
Ingr IP Fltr-Id : n/a Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max
Endpoint : N/A
Q Frame-Based Acct : Disabled

Acct. Pol : Default Collect Stats : Enabled
Ce IP Address : 88.1.10.3
SAP MAC Address : 00:1a:f0:bd:ab:b0 Mac Refresh Inter*: 14400

```

```

Ipipe SAP ARP Entry Info

```

```

88.1.10.3 00:00:15:b9:6b:73 dynamic 03h52m50s

```

```

QOS

```

```

Ingress qos-policy : 13 Egress qos-policy : 13
Shared Q plcy : n/a Multipoint shared : Disabled

```

```

Sap Statistics

```

```

Last Cleared Time : 01/21/2009 14:19:23

```

|                         | Packets    | Octets     |
|-------------------------|------------|------------|
| Forwarding Engine Stats |            |            |
| Dropped                 | : 0        | 0          |
| Off. HiPrio             | : 19961282 | 1556979996 |
| Off. LowPrio            | : 1840167  | 143533026  |

```

Queueing Stats(Ingress QoS Policy 13)
Dro. HiPrio : 0
Dro. LowPrio : 0

```

|              |            |           |
|--------------|------------|-----------|
| For. InProf  | : 10730245 | 836959110 |
| For. OutProf | : 11071204 | 863553912 |

## Queueing Stats (Egress QoS Policy 13)

|              |       |       |
|--------------|-------|-------|
| Dro. InProf  | : 0   | 0     |
| Dro. OutProf | : 0   | 0     |
| For. InProf  | : 0   | 0     |
| For. OutProf | : 600 | 46800 |

## Sap per Queue stats

|                                      | Packets   | Octets    |
|--------------------------------------|-----------|-----------|
| Ingress Queue 1 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 2 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 3 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 4 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 6582217 | 513412926 |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 4932647 | 384746466 |
| For. OutProf                         | : 1649570 | 128666460 |
| Egress Queue 1                       |           |           |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |
| Egress Queue 2                       |           |           |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 200     | 15600     |
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |
| Egress Queue 3                       |           |           |
| For. InProf                          | : 0       | 0         |

```
For. OutProf : 200 15600
Dro. InProf : 0 0
Dro. OutProf : 0 0

Egress Queue 4
For. InProf : 0 0
For. OutProf : 200 15600
Dro. InProf : 0 0
Dro. OutProf : 0 0

Service Endpoints

No Endpoints found.
=====
*A:ALU-A#
```

base

|                    |                                                                                                                                    |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>base</b>                                                                                                                        |
| <b>Context</b>     | show>service>id                                                                                                                    |
| <b>Description</b> | This command displays basic information about the service specified by the ID, including service type, description, SAPs and SDPs. |
| <b>Output</b>      | The following output is an example of service-id base information, and <a href="#">Table 35</a> describes the fields.              |

**Sample Output (Apipe ATMVcc Base)**

```
=====
*A:ALU-12# show service id 701 base
```

```
=====
Service Basic Information
=====
```

```
Service Id : 701 Vpn Id : 701
Service Type : Apipe VLL Type : ATMVCC
Description : Default apipe description for service id 701
Customer Id : 1
Last Status Change: 02/10/2008 03:30:03
Last Mgmt Change : 02/10/2008 03:35:10
Admin State : Up Oper State : Down
MTU : 1508
Vc Switching : False
SAP Count : 1 SDP Bind Count : 1
```

```

Service Access & Destination Points

```

| Identifier               | Type | AdmMTU | OprMTU | Adm | Opr  |
|--------------------------|------|--------|--------|-----|------|
| sap:1/1/9.1:10/50        | atm  | 1572   | 1572   | Up  | Down |
| sdp:101:701 S(10.20.1.3) | n/a  | 0      | 1514   | Up  | Up   |

```
[<sap-id>] indicates a Managed SAP
=====
```

**Table 35: Show Service-ID Base Output Fields**

| Label                            | Description                                                                               |
|----------------------------------|-------------------------------------------------------------------------------------------|
| <b>Service Basic Information</b> |                                                                                           |
| Service Id                       | Identifies the service by its ID number                                                   |
| VPN Id                           | Identifies the VPN by its ID number                                                       |
| Service Type                     | Specifies the type of service                                                             |
| VLL Type                         | Specifies the VLL type                                                                    |
| Description                      | Displays generic information about the service                                            |
| Customer Id                      | Identifies the customer by its ID number                                                  |
| Last Status Change               | Displays the date and time of the most recent status change to this service               |
| Last Mgmt Change                 | Displays the date and time of the most recent management-initiated change to this service |
| Admin State                      | Specifies the desired state of the service                                                |
| Oper State                       | Specifies the operating state of the service                                              |

**Table 35: Show Service-ID Base Output Fields (Continued)**

| <b>Label</b>                                 | <b>Description</b>                                                                                                                                                                             |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MTU                                          | Specifies the service MTU                                                                                                                                                                      |
| SAP Count                                    | Displays the number of SAPs specified for this service                                                                                                                                         |
| SDP Bind Count                               | Displays the number of SDPs bound to this service                                                                                                                                              |
| <b>Service Access and Destination Points</b> |                                                                                                                                                                                                |
| Identifier                                   | Lists the SAP and SDP                                                                                                                                                                          |
| Type                                         | Specifies the signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on the SDP                                                               |
| AdmMTU                                       | Specifies the desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end edge services router (ESR), without requiring the packet to be fragmented |
| OprMTU                                       | Specifies the actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end ESR, without requiring the packet to be fragmented                         |
| Adm                                          | Indicates the operating state of the SAP or SDP                                                                                                                                                |
| Opr                                          | Indicates the operating state of the SAP or SDP                                                                                                                                                |

## egress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command displays services using the range of egress labels.</p> <p>If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed.</p> <p>If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using this range of labels are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>                                                                   |
| <b>Parameters</b>  | <p><i>start-label</i> — indicates the starting egress label value for which to display services using the label range. If only <i>start-label</i> is specified, services only using <i>start-label</i> are displayed.</p> <p><b>Values</b>        0, 2048 to 131071</p> <p><i>end-label</i> — indicates the ending egress label value for which to display services using the label range</p> <p><b>Default</b>        the <i>start-label</i> value</p> <p><b>Values</b>        2049 to 131071</p> |
| <b>Output</b>      | The following output is an example of service egress-label information, and <a href="#">Table 36</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                         |

**Sample Output**

```
*A:ALU-12# show service egress-label 0 131071
```

```
=====
Martini Service Labels
=====
```

| Svc Id | Sdp Binding | Type | I.Lbl  | E.Lbl  |
|--------|-------------|------|--------|--------|
| 1      | 101:1       | Spok | 131049 | 0      |
| 103    | 101:103     | Spok | 131067 | 131067 |
| 104    | 301:104     | Spok | 131066 | 131067 |
| 105    | 501:105     | Spok | 131065 | 131068 |
| 303    | 101:303     | Spok | 131064 | 131066 |
| 304    | 301:304     | Spok | 131063 | 131064 |
| 305    | 501:305     | Spok | 131062 | 131065 |
| 701    | 101:701     | Spok | 131059 | 131064 |
| 702    | 101:702     | Spok | 131058 | 131063 |
| 703    | 501:703     | Spok | 131057 | 131064 |
| 704    | 501:704     | Spok | 131056 | 131063 |
| 705    | 301:705     | Spok | 131055 | 131062 |
| 706    | 301:706     | Spok | 131054 | 131061 |
| 805    | 201:805     | Spok | 131053 | 131062 |
| 806    | 201:806     | Spok | 131052 | 131061 |
| 807    | 401:807     | Spok | 131051 | 131060 |
| 808    | 401:808     | Spok | 131050 | 131059 |

```

903 201:903 Spok 131061 131065
904 401:904 Spok 131060 131063

```

```

Number of Bindings Found : 19

```

**Table 36: Show Service Egress Label Output Fields**

| Label                    | Description                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------|
| Svc Id                   | Identifies the service                                                                                     |
| Sdp Binding              | Identifies the SDP                                                                                         |
| Type                     | Specifies the SDP binding type (for example, spoke)                                                        |
| I. Lbl                   | Displays the VC label used by the far-end device to send packets to this device in this service by the SDP |
| E. Lbl                   | Displays the VC label used by this device to send packets to the far-end device in this service by the SDP |
| Number of bindings found | Indicates the total number of SDP bindings that exist within the specified egress label range              |

## id

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                    |
| <b>Context</b>     | show>service                                                   |
| <b>Description</b> | This command displays information for a particular service-id. |
| <b>Parameters</b>  | <i>service-id</i> — identifies the service in the domain       |

## ingress-label

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress-label</b> <i>start-label</i> [ <i>end-label</i> ]      |
| <b>Context</b>     | show>service                                                      |
| <b>Description</b> | This command displays services using the range of ingress labels. |

If only the mandatory *start-label* parameter is specified, only services using the specified label are displayed.

If both *start-label* and *end-label* parameters are specified, the services using this range of labels are displayed.

Use the **show router vprn-service-id ldp bindings** command to display dynamic labels.



**Parameters** *start-label* — indicates the starting ingress label value for which to display services using the label range. If only *start-label* is specified, services only using *start-label* are displayed.

**Values** 0, 2048 to 131071

*end-label* — indicates the ending ingress label value for which to display services using the label range

**Default** the *start-label* value

**Values** 2049 to 131071

**Output** The following output is an example of service ingress-label information, and [Table 37](#) describes the fields.

### Sample Output

```
*A:ALU-12# show service ingress-label 0
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

100 300:100 Spok 0 0
200 301:200 Spok 0 0
300 302:300 Spok 0 0
400 400:400 Spok 0 0

Number of Bindings Found : 4

*A:ALU-12#
```

**Table 37: Show Service Ingress Label Output Fields**

| Label                    | Description                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------|
| Svc ID                   | Identifies the service                                                                                          |
| SDP Binding              | Identifies the SDP                                                                                              |
| Type                     | Specifies the SDP binding type (for example, spoke)                                                             |
| I.Lbl                    | Displays the ingress label used by the far-end device to send packets to this device in this service by the SDP |
| E.Lbl                    | Displays the egress label used by this device to send packets to the far-end device in this service by the SDP  |
| Number of Bindings Found | Indicates the number of SDP bindings within specified the label range                                           |

## endpoint

|                    |                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>endpoint</b> <i>endpoint-name</i>                                                                                                                |
| <b>Context</b>     | show>service>id                                                                                                                                     |
| <b>Description</b> | This command displays the endpoint configuration status of the active spoke SDP and lists the primary and secondary spoke SDPs used by the service. |
| <b>Output</b>      | The following output is an example of service-id endpoint information, and <a href="#">Table 38</a> describes the fields.                           |

**Sample Output**

```
*A:7705:Dut-C>show>service>id# endpoint Endpoint_Y

=====
Service 6 endpoints
=====
Endpoint name : Endpoint_Y
Revert time : 0
Act Hold Delay : 0
Ignore Standby Signaling : false
Suppress Standby Signaling : true
Tx Active : none
Tx Active Up Time : 0d 00:00:00
Revert Time Count Down : N/A
Tx Active Change Count : 0
Last Tx Active Change : 02/12/2009 19:16:37

Members

Spoke-sdp : 6:6 Precedence:0
Spoke-sdp : 7:7 Precedence:1
=====
*A:7705:Dut-C>show>service>id# info
```

**Table 38: Service-ID Endpoint Output Fields**

| Label                    | Description                                                                                                                       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Service endpoints</b> |                                                                                                                                   |
| Endpoint name            | Identifies the endpoint                                                                                                           |
| Revert time              | Displays the revert time setting for the active spoke SDP                                                                         |
| Act Hold Delay           | Not applicable                                                                                                                    |
| Ignore Standby Signaling | Indicates whether standby signaling is ignored<br>True — standby signaling is ignored<br>False — standby signaling is not ignored |

**Table 38: Service-ID Endpoint Output Fields (Continued)**

| Label                      | Description                                                                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Suppress Standby Signaling | Indicates whether standby signaling is suppressed<br>True — standby signaling is suppressed<br>False — standby signaling is not suppressed                             |
| Tx Active                  | Identifies the actively transmitting spoke SDP                                                                                                                         |
| Tx Active Up Time          | Indicates the length of time that the active spoke SDP has been up                                                                                                     |
| Revert Time Count Down     | Not applicable                                                                                                                                                         |
| Tx Active Change Count     | Indicates the number of times that there has been a change of active spoke SDPs                                                                                        |
| Last Tx Active Change      | Indicates the date and time when a different spoke SDP became the actively transmitting spoke SDP                                                                      |
| <b>Members</b>             |                                                                                                                                                                        |
| Spoke-sdp                  | Identifies the primary and secondary spoke SDPs that are associated with this endpoint and shows their precedence value (0 precedence indicates the primary spoke SDP) |

## labels

|                    |                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>labels</b>                                                                                                           |
| <b>Context</b>     | show>service>id                                                                                                         |
| <b>Description</b> | This command displays the labels being used by the service.                                                             |
| <b>Output</b>      | The following output is an example of service-id labels information, and <a href="#">Table 39</a> describes the fields. |

### Sample Output

```
*A:ALU-12# show service id 1 labels
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

1 10:1 Spok 0 0

Number of Bound SDPs : 1

*A:ALU-12#
```

**Table 39: Service-ID Labels Output Fields**

| Label       | Description                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------|
| Svc Id      | Identifies the service                                                                                     |
| Sdp Binding | Identifies the SDP bound to the service                                                                    |
| Type        | Indicates the SDP binding type (for example, spoke)                                                        |
| I. Lbl      | Displays the VC label used by the far-end device to send packets to this device in this service by the SDP |
| E. Lbl      | Displays the VC label used by this device to send packets to the far-end device in this service by the SDP |

## sap

**Syntax** **sap** *sap-id* [**detail**]

**Context** show>service>id

**Description** This command displays information for the SAPs associated with the service.

If no optional parameters are specified, a summary of all associated SAPs is displayed.

**Parameters** *sap-id* — identifies the SAPs for the service in the form *slot/mda/port[channel]*

**detail** — displays detailed information for the SAP

**Output** The following output is an example of service-id SAP information, and [Table 40](#) describes the fields. Following the table are output examples for:

- [Sample Output \(Epipe\)](#)
- [Sample Output \(Ipipe\)](#)

### Sample Output (Apipe)

```
*A:ALU-12>show>service>id# sap 1/4/1.1:2 detail
```

```
=====
Service Access Points (SAP)
=====
```

```
Service Id : 2
SAP : 1/4/1.1:2 Encap : atm
Description : Apipe SAP
Admin State : Up Oper State : Down
Flags : PortOperDown L2OperDown
Multi Svc Site : None
Last Status Change : 04/30/2008 13:55:04
Last Mgmt Change : 05/07/2008 15:51:51
```

```

Sub Type : regular

Admin MTU : 1572
Ingr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a
tod-suite : None
Egr Agg Rate Limit : max
Endpoint : N/A

Oper MTU : 1572
Egr IP Fltr-Id : n/a
Egr Mac Fltr-Id : n/a
qinq-pbit-marking : both

Acct. Pol : None
Collect Stats : Disabled

```

---

QOS

---

```

Ingress qos-policy : 1
Shared Q plcy : n/a
Egress qos-policy : 1
Multipoint shared : Disabled

```

---

Sap Statistics

---

```

Last Cleared Time : N/A

```

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | n/a    |
| Off. HiPrio             | : 21900 | n/a    |
| Off. LowPrio            | : n/a   | n/a    |

## Queueing Stats(Ingress QoS Policy 1)

|              |         |       |
|--------------|---------|-------|
| Dro. HiPrio  | : 0     | n/a   |
| Dro. LowPrio | : n/a   | n/a   |
| For. InProf  | : 10950 | 10950 |
| For. OutProf | : 10950 | 10950 |

## Queueing Stats(Egress QoS Policy 1)

|              |         |       |
|--------------|---------|-------|
| Dro. InProf  | : 0     | n/a   |
| Dro. OutProf | : n/a   | n/a   |
| For. InProf  | : 21900 | 21900 |
| For. OutProf | : n/a   | n/a   |

---

Sap per Queue stats

---

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 21900 | n/a    |
| Off. LoPrio                          | : n/a   | n/a    |
| Dro. HiPrio                          | : 0     | n/a    |
| Dro. LoPrio                          | : n/a   | n/a    |
| For. InProf                          | : 10950 | 10950  |
| For. OutProf                         | : 10950 | 10950  |

## Egress Queue 1

|              |         |       |
|--------------|---------|-------|
| For. InProf  | : 21900 | 21900 |
| For. OutProf | : n/a   | n/a   |
| Dro. InProf  | : 0     | n/a   |
| Dro. OutProf | : n/a   | n/a   |

---

ATM SAP Configuration Information

---

```

Ingress TD Profile : 1 Egress TD Profile : 1
Alarm Cell Handling: Enabled
OAM Termination : Disabled Periodic Loopback : Disabled
=====
*A:ALU-12>show>service>id#

```

**Table 40: Service-ID SAP Output Fields**

| Label                        | Description                                                                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Access Points</b> |                                                                                                                                                                            |
| Service Id                   | Identifies the service                                                                                                                                                     |
| SAP                          | Specifies the ID of the access port where this SAP is defined                                                                                                              |
| Encap                        | Specifies the encapsulation type for this SAP on the access port                                                                                                           |
| Admin State                  | Specifies the desired state of the SAP                                                                                                                                     |
| Oper State                   | Specifies the operating state of the SAP                                                                                                                                   |
| Flags                        | Specifies the conditions that affect the operating status of this SAP<br><br>Display output includes ServiceAdminDown, PortOperDown, and so on                             |
| Last Status Change           | Specifies the date and time of the most recent status change to this SAP                                                                                                   |
| Last Mgmt Change             | Specifies the date and time of the most recent management-initiated change to this SAP                                                                                     |
| Dot1Q Ethertype              | Identifies the value of the dot1q Ethertype                                                                                                                                |
| LLF Admin State              | Specifies the Link Loss Forwarding administrative state                                                                                                                    |
| LLF Oper State               | Specifies the Link Loss Forwarding operational state                                                                                                                       |
| Admin MTU                    | Specifies the desired largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented |
| Oper MTU                     | Specifies the actual largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented  |
| Ingr IP Fltr-Id              | Specifies the ingress IP filter policy ID assigned to the SAP                                                                                                              |
| Egr IP Fltr-Id               | Specifies the egress IP filter policy ID assigned to the SAP                                                                                                               |
| Ingr Mac Fltr-Id             | Specifies the ingress MAC filter policy ID assigned to the SAP                                                                                                             |

**Table 40: Service-ID SAP Output Fields (Continued)**

| <b>Label</b>                               | <b>Description</b>                                                                                                               |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Egr Mac Fltr-Id                            | Specifies the egress MAC filter policy ID assigned to the SAP                                                                    |
| Acct. Pol                                  | Specifies the accounting policy applied to the SAP                                                                               |
| Collect Stats                              | Specifies whether accounting statistics are collected on the SAP                                                                 |
| <b>QoS</b>                                 |                                                                                                                                  |
| Ingress qos-policy                         | Displays the SAP ingress QoS policy ID                                                                                           |
| Egress qos-policy                          | Displays the SAP egress QoS policy ID                                                                                            |
| <b>SAP Statistics</b>                      |                                                                                                                                  |
| Last Cleared Time                          | Displays the date and time that a clear command was issued on statistics                                                         |
| <b>Forwarding Engine Stats</b>             |                                                                                                                                  |
| Dropped                                    | Indicates the number of packets or octets dropped by the forwarding engine                                                       |
| Off. HiPrio                                | Indicates the number of high-priority packets or octets offered to the forwarding engine                                         |
| Off. LowPrio                               | Indicates the number of low-priority packets offered to the forwarding engine                                                    |
| <b>Queueing Stats (Ingress QoS Policy)</b> |                                                                                                                                  |
| Dro. HiPrio                                | Indicates the number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy                   |
| Dro. LowPrio                               | Indicates the number of low-priority packets discarded, as determined by the SAP ingress QoS policy                              |
| For. InProf                                | Indicates the number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy     |
| For. OutProf                               | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy |
| <b>Queueing Stats (Egress QoS Policy)</b>  |                                                                                                                                  |
| Dro. InProf                                | Indicates the number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy                       |
| Dro. OutProf                               | Indicates the number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy                   |
| For. InProf                                | Indicates the number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy      |

**Table 40: Service-ID SAP Output Fields (Continued)**

| <b>Label</b>                             | <b>Description</b>                                                                                                              |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| For. OutProf                             | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy |
| <b>Sap per Queue stats</b>               |                                                                                                                                 |
| Ingress Queue n                          | Specifies the index of the ingress QoS queue of this SAP, where n is the index number                                           |
| Off. HiPrio                              | Indicates the number of packets or octets of high-priority traffic for the SAP (offered)                                        |
| Off. LoPrio                              | Indicates the number or packets or octets of low-priority traffic for the SAP (offered)                                         |
| Dro. HiPrio                              | Indicates the number of high-priority traffic packets or octets dropped                                                         |
| Dro. LoPrio                              | Indicates the number of low-priority traffic packets or octets dropped                                                          |
| For. InProf                              | Indicates the number of in-profile packets or octets (rate below CIR) forwarded                                                 |
| For. OutProf                             | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded                                             |
| Egress Queue n                           | Specifies the index of the egress QoS queue of the SAP, where n is the index number                                             |
| For. InProf                              | Indicates the number of in-profile packets or octets (rate below CIR) forwarded                                                 |
| For. OutProf                             | Indicates the number of out-of-profile packets or octets (rate above CIR) forwarded                                             |
| Dro. InProf                              | Indicates the number of in-profile packets or octets dropped for the SAP                                                        |
| Dro. OutProf                             | Indicates the number of out-of-profile packets or octets discarded                                                              |
| <b>Eth-Cfm Configuration Information</b> |                                                                                                                                 |
| Md-index                                 | Displays the value of the MD index                                                                                              |
| Direction                                | Displays the direction of the MEP                                                                                               |
| Ma-index                                 | Displays the value of the MA index                                                                                              |
| Admin                                    | Displays the administrative state of the MEP (enabled or disabled)                                                              |
| MepId                                    | Displays the MEP-ID                                                                                                             |
| CCM-Enable                               | Displays the status of the Continuity Check Message (CCM)                                                                       |



**Table 40: Service-ID SAP Output Fields (Continued)**

| <b>Label</b>        | <b>Description</b>                                                                                                              |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------|
| LowestDefectPri     | Displays a configured value that defects are evaluated against                                                                  |
| HighestDefect       | Displays the highest defect                                                                                                     |
| Defect Flags        | Indicates the defect flags                                                                                                      |
| Mac Address         | Displays the MAC address (the MAC address for a spoke SDP is the system MAC address; for a SAP, it is the port MAC address)     |
| CcmLtmPriority      | Displays the priority of the CCM Linktrace Message (LTM)                                                                        |
| CcmTx               | Displays the number of CCM transmissions                                                                                        |
| CcmSequenceErr      | Displays the number of CCM sequence errors                                                                                      |
| DmrRepliesTx        | Displays the number of delay measurement replies transmitted                                                                    |
| LmrRepliesTx        | Displays the number of loss measurement replies transmitted                                                                     |
| Dual-Loss Test      | Displays the status of the dual-ended loss measurement test (enabled or disabled)                                               |
| Dual-Loss Thresh    | Displays the frame error threshold beyond which an alarm will be raised. The threshold is expressed as a percentage.            |
| Eth-Ais             | Displays the status of the ETH-AIS test (enabled or disabled)                                                                   |
| Eth-Ais Rx Ais      | Indicates whether any ETH-AIS messages have been received                                                                       |
| Eth-Ais Tx Priorit* | Displays the priority value of a transmitted ETH-AIS frame                                                                      |
| Eth-Ais Rx Interv*  | Indicates the interval of a received ETH-AIS frame                                                                              |
| Eth-Ais Tx Interva* | Displays the interval of a transmitted ETH-AIS frame                                                                            |
| Eth-Ais Tx Counte*  | Displays the number of ETH-AIS frames that have been sent                                                                       |
| Eth-Ais Tx Levels   | Indicates the MD level of transmitted ETH-AIS frames                                                                            |
| Eth-Tst             | Indicates the status of the ETH-Test (enabled or disabled)                                                                      |
| LbRxReply           | Displays the number of received loopback (LB) replies                                                                           |
| LbRxBadOrder        | Displays the number of LB replies that have been received in the wrong order                                                    |
| LbRxBadMsdu         | Displays the number of LB replies that have been received with the wrong destination MAC address (MSDU = MAC Service Data Unit) |
| LbTxReply           | Displays the number of LBRs (loopback replies) transmitted out this MEP                                                         |

**Table 40: Service-ID SAP Output Fields (Continued)**

| Label                                    | Description                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LbNextSequence                           | Displays the sequence number of the next LB transmission                                                                                                                                                                                                                                                                                                                                                              |
| LtNextSequence                           | Displays the sequence number of the next Linktrace (LT) message transmitted                                                                                                                                                                                                                                                                                                                                           |
| LtRxUnexplained                          | Displays the number of the unexplained Linktrace (LT) messages                                                                                                                                                                                                                                                                                                                                                        |
| <b>ATM SAP Configuration Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ingress TD Profile                       | The profile ID of the traffic descriptor applied to the ingress SAP                                                                                                                                                                                                                                                                                                                                                   |
| Egress TD Profile                        | The profile ID of the traffic descriptor applied to the egress SAP                                                                                                                                                                                                                                                                                                                                                    |
| Alarm Cell Handling                      | Indicates that OAM cells are being processed                                                                                                                                                                                                                                                                                                                                                                          |
| OAM Termination                          | Indicates whether this SAP is an OAM termination point                                                                                                                                                                                                                                                                                                                                                                |
| <b>CEM SAP Configuration Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Endpoint Type                            | Specifies the type of endpoint                                                                                                                                                                                                                                                                                                                                                                                        |
| Bit-rate                                 | Specifies the number of DS0s or timeslots in the channel group                                                                                                                                                                                                                                                                                                                                                        |
| Payload Size                             | Specifies the number of octets contained in the payload of a TDM PW packet when the packet is transmitted                                                                                                                                                                                                                                                                                                             |
| Jitter Buffer                            | Specifies the size of the receive jitter buffer, expressed in milliseconds                                                                                                                                                                                                                                                                                                                                            |
| Use RTP Header                           | Specifies whether RTP headers are used in CES packets (Yes or No)                                                                                                                                                                                                                                                                                                                                                     |
| CAS Framing                              | Specifies the type of CAS framing                                                                                                                                                                                                                                                                                                                                                                                     |
| Effective PVDT                           | Displays the peak-to-peak packet delay variation (PDV) used by the circuit emulation service.<br>Since the operating system may adjust the jitter buffer setting in order to ensure no packet loss, the configured jitter buffer value may not be the value used by the system. The effective PVDT provides an indication that the PVD has been adjusted by the operating system (see <a href="#">Jitter Buffer</a> ) |
| Cfg Alarm                                | Specifies the alarms that have alarm reporting enabled                                                                                                                                                                                                                                                                                                                                                                |
| Alarm Status                             | Indicates the current alarm state (for example, stray, malformed, packet loss, overrun, underrun, remote packet loss, remote fault, or remote RDI)                                                                                                                                                                                                                                                                    |

**Table 40: Service-ID SAP Output Fields (Continued)**

| <b>Label</b>              | <b>Description</b>                                                                                     |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| <b>CEM SAP Statistics</b> |                                                                                                        |
| Packets                   | (Column heading) Displays the number of packets counted for the statistic since the last counter reset |
| Seconds                   | (Column heading) Displays the number of seconds elapsed for the statistic since the last counter reset |
| Events                    | (Column heading) Displays the number of events counted for the statistic since the last counter reset  |
| Egress Stats              | Indicates that the following statistics are egress statistics                                          |
| Forwarded                 | Displays the number of forwarded packets                                                               |
| Missing                   | Displays the number of missing packets                                                                 |
| Reordered and Forwarded   | Displays the number of packets that have been reordered and forwarded                                  |
| Underrun                  | Displays the accumulated number of underrun packets for the number of underrun events                  |
| Overrun                   | Displays the accumulated number of overrun packets for the number of overrun events                    |
| Misordered Dropped        | Displays the number of misordered packets that have been dropped                                       |
| Malformed Dropped         | Displays the number of malformed packets that have been dropped                                        |
| Error                     | Displays the accumulated number of seconds that have passed while any error has occurred               |
| Severely Error            | Displays the accumulated number of seconds that have passed while severe errors has occurred           |
| Unavailable               | Displays the accumulated number of seconds that have passed while the Cpipe is unavailable             |
| Failure Count             | Displays the accumulated number of failed events                                                       |
| Ingress Stats             | Indicates that the following statistics are ingress statistics                                         |
| Forwarded                 | Displays the number of forwarded packets                                                               |
| Dropped                   | Displays the number of dropped packets                                                                 |

**Sample Output (Epipe)**

```
*A:csasim2>show>service>id# sap 1/3/1 detail
```

```
=====
Service Access Points (SAP)
=====
Service Id : 3
SAP : 1/3/1
Admin State : Up
LLF Admin State : Up
Flags : ServiceAdminDown
Multi Svc Site : None
Last Status Change : 04/30/2008 13:55:04
Last Mgmt Change : 05/07/2008 16:54:57
Sub Type : regular
Dot1Q Ethertype : 0x8100
QinQ Ethertype : 0x8100

Admin MTU : 1518
Ingr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a
Ingr IPv6 Fltr-Id : n/a
tod-suite : None
Egr Agg Rate Limit : max
Endpoint : N/A
Q Frame-Based Acct : Disabled
Vlan-translation : None

Acct. Pol : None
Collect Stats : Disabled

QOS

Ingress qos-policy : 1
Shared Q plcy : n/a
Egress qos-policy : 1
Multipoint shared : Disabled

Sap Statistics

Last Cleared Time : 05/07/2008 21:32:32

Packets Octets
Forwarding Engine Stats
Dropped : 0
Off. HiPrio : 2655264
Off. LowPrio : 2655264

Queueing Stats(Ingress QoS Policy 1)
Dro. HiPrio : 0
Dro. LowPrio : 0
For. InProf : 3982896
For. OutProf : 1327632

Queueing Stats(Egress QoS Policy 1)
Dro. InProf : 0
Dro. OutProf : 0
For. InProf : 2655264
For. OutProf : 2655264

Sap per Queue stats
```

```

 Packets Octets
Ingress Queue 1 (Unicast) (Priority)
Off. HiPrio : 0 0
Off. LoPrio : 0 0
Dro. HiPrio : 0 0
Dro. LoPrio : 0 0
For. InProf : 0 0
For. OutProf : 0 0

Egress Queue 1
For. InProf : 0 0
For. OutProf : 0 0
Dro. InProf : 0 0
Dro. OutProf : 0 0

Eth-Cfm Configuration Information

Md-index : 2 Direction : Down
Ma-index : 2 Admin : Disabled
MepId : 2 CCM-Enable : Enabled
LowestDefectPri : macRemErrXcon HighestDefect : none
Defect Flags : None
Mac Address : 00:00:00:00:00:00
CcmTx : 0 CcmSequenceErr : 0
DmrRepliesTx : 0
LmrRepliesTx : 0
Dual-Loss Test : Enabled Dual-Loss Thresh : 0.25%
Eth-Ais: : Enabled Eth-Ais Rx Ais: : No
Eth-Ais Tx Priorit*: 7 Eth-Ais Rx Interv*: 1
Eth-Ais Tx Interva*: 1 Eth-Ais Tx Counte*: 0
Eth-Ais Tx Levels :
Eth-Tst: : Disabled
LbRxReply : 0 LbRxBadOrder : 0
LbRxBadMsdu : 0 LbTxReply : 0
LbNextSequence : 1 LtNextSequence : 1
LtRxUnexplained : 0

Md-index : 1 Direction : Down
Ma-index : 1 Admin : Disabled
MepId : 1 CCM-Enable : Enabled
LowestDefectPri : macRemErrXcon HighestDefect : none
Defect Flags : None
Mac Address : 00:00:00:00:00:00
CcmTx : 0 CcmSequenceErr : 0
DmrRepliesTx : 0
LmrRepliesTx : 0
Dual-Loss Test : Disabled Dual-Loss Thresh : 0.25%
Eth-Ais: : Disabled Eth-Ais Rx Ais: : No
Eth-Ais Tx Priorit*: 7 Eth-Ais Rx Interv*: 1
Eth-Ais Tx Interva*: 1 Eth-Ais Tx Counte*: 0
Eth-Ais Tx Levels :
Eth-Tst: : Disabled
LbRxReply : 0 LbRxBadOrder : 0
LbRxBadMsdu : 0 LbTxReply : 0
LbNextSequence : 1 LtNextSequence : 1
LtRxUnexplained : 0
=====
*A:csasim2>show>service>id#

```

**Sample Output (Ipipe)**

```
*A:ALU-12# show service id 1301 sap 1/2/8:11 detail
```

```
=====
Service Access Points (SAP)
=====
Service Id : 1301
SAP : 1/2/8:11 Encap : q-tag
Description : Default sap description for service id 1301
Admin State : Up Oper State : Up
Flags : None
Multi Svc Site : None
Last Status Change : 01/20/2009 16:44:14
Last Mgmt Change : 01/21/2009 16:31:04
Sub Type : regular
Dot1Q Ethertype : 0x8100 QinQ Ethertype : 0x8100

Admin MTU : 1572 Oper MTU : 1572
Ingr IP Fltr-Id : n/a Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max
Endpoint : N/A
Q Frame-Based Acct : Disabled

Acct. Pol : Default Collect Stats : Enabled
Ce IP Address : 88.1.10.3
SAP MAC Address : 00:1a:f0:bd:ab:b0 Mac Refresh Inter*: 14400

Ipipe SAP ARP Entry Info

88.1.10.3 00:00:15:b9:6b:73 dynamic 03h50m24s

QOS

Ingress qos-policy : 13 Egress qos-policy : 13
Shared Q plcy : n/a Multipoint shared : Disabled

Sap Statistics

Last Cleared Time : 01/21/2009 14:19:23

Packets Octets
Forwarding Engine Stats
Dropped : 0 0
Off. HiPrio : 20683584 1613319552
Off. LowPrio : 1840167 143533026

Queueing Stats(Ingress QoS Policy 13)
Dro. HiPrio : 0 0
Dro. LowPrio : 0 0
For. InProf : 11271525 879178950
For. OutProf : 11252226 877673628

Queueing Stats(Egress QoS Policy 13)
```

|                                      |           |           |
|--------------------------------------|-----------|-----------|
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 600     | 46800     |
| -----                                |           |           |
| Sap per Queue stats                  |           |           |
| -----                                |           |           |
|                                      | Packets   | Octets    |
| Ingress Queue 1 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 2 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 3 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 0       | 0         |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Ingress Queue 4 (Unicast) (Priority) |           |           |
| Off. HiPrio                          | : 7304519 | 569752482 |
| Off. LoPrio                          | : 0       | 0         |
| Dro. HiPrio                          | : 0       | 0         |
| Dro. LoPrio                          | : 0       | 0         |
| For. InProf                          | : 5473927 | 426966306 |
| For. OutProf                         | : 1830592 | 142786176 |
| Egress Queue 1                       |           |           |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 0       | 0         |
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |
| Egress Queue 2                       |           |           |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 200     | 15600     |
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |
| Egress Queue 3                       |           |           |
| For. InProf                          | : 0       | 0         |
| For. OutProf                         | : 200     | 15600     |
| Dro. InProf                          | : 0       | 0         |
| Dro. OutProf                         | : 0       | 0         |

```

Egress Queue 4
For. InProf : 0 0
For. OutProf : 200 15600
Dro. InProf : 0 0
Dro. OutProf : 0 0
=====
* indicates that the corresponding row element may have been truncated.

*A:ALU-12#

```

## sap-using

- Syntax** **sap-using** [**sap** *sap-id*]  
**sap-using** [**ingress** | **egress**] **atm-td-profile** *td-profile-id*  
**sap-using** [**ingress** | **egress**] **qos-policy** *qos-policy-id*
- Context** show>service
- Description** This command displays SAP information.
- If no optional parameters are specified, the command displays a summary of all defined SAPs.
- The optional parameters restrict output to only SAPs matching the specified properties.
- Parameters** **ingress** — specifies matching an ingress policy  
**egress** — specifies matching an egress policy  
*qos-policy-id* — identifies the ingress or egress QoS Policy for which to display matching SAPs
- Values** 1 to 65535
- td-profile-id* — displays SAPs using this traffic description
- sap-id* — specifies the physical port identifier portion of the SAP definition
- |               |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Values</b> | <i>sap-id</i> : | null            [ <i>port-id</i>   <i>bundle-id</i> ]<br>dot1q           [ <i>port-id</i>   <i>bundle-id</i> ]: <i>qtag1</i><br>atm             [ <i>port-id</i>   <i>bundle-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-type-slot/mda.bundle-num<br>bundle       keyword<br>type         ima, ppp<br>bundle-num 1 to 10<br>qtag1           0 to 4094<br>vpi             NNI           0 to 4095<br>UNI           0 to 255<br>vci             1, 2, 5 to 65535 |
|---------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
- Output** The following output is an example of service SAP-using information, and [Table 41](#) describes the fields.



**Sample Output**

```
*A:ALU-48# show service sap-using
```

```
=====
```

Service Access Points

```
=====
```

| PortId        | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|---------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/2/7:1       | 103   | 1           | none         | 1           | none         | Up  | Up   |
| 1/2/7:2       | 104   | 1           | none         | 1           | none         | Up  | Up   |
| 1/2/7:3       | 105   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.1       | 303   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.2       | 304   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.3       | 305   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/9.1:10/50 | 701   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:20    | 702   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/51 | 703   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:30    | 704   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/52 | 705   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:40    | 706   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:11/50 | 805   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:21    | 806   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:12/52 | 807   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:41    | 808   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/1.9       | 903   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.10      | 904   | 1           | none         | 1           | none         | Up  | Up   |

```

```

Number of SAPs : 18

```

```

```
=====
```

\*A:ALU-48#

```
*A:ALU-48# show service sap-using sap 1/1/21:0
```

```
=====
```

Service Access Points Using Port 1/1/21:0

```
=====
```

| PortId   | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|----------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/1/21:0 | 1     | 1           | none         | 1           | none         | Up  | Down |

```

```

Number of SAPs : 1

```

```

```
=====
```

\*A:ALU-48#

```
*A:ALU-48# show service sap-using egress atm-td-profile 1
```

```
=====
```

Service Access Point Using ATM Traffic Profile 1

```
=====
```

| PortId        | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|---------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/1/9.1:10/50 | 701   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:20    | 702   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/51 | 703   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:30    | 704   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/52 | 705   | 1           | none         | 1           | none         | Up  | Down |

```

1/1/9.1:40 706 1 none 1 none Up Down
1/1/9.1:11/50 805 1 none 1 none Up Down
1/1/9.1:21 806 1 none 1 none Up Down
1/1/9.1:12/52 807 1 none 1 none Up Down
1/1/9.1:41 808 1 none 1 none Up Down

```

```

Saps : 10
=====

```

```

*A:ALU-12#

```

**Table 41: Show Service SAP-Using Output Fields**

| Label   | Description                                                             |
|---------|-------------------------------------------------------------------------|
| PortID  | Displays the ID of the access port where the SAP is defined             |
| SvcID   | Identifies the service                                                  |
| Ing.QoS | Displays the SAP ingress QoS policy number specified on the ingress SAP |
| Egr.QoS | Displays the SAP egress QoS policy number specified on the egress SAP   |
| Adm     | Specifies the desired state of the SAP                                  |
| Opr     | Indicates the actual state of the SAP                                   |

## sdp

|                    |                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sdp</b> [ <i>sdp-id</i>   <b>far-end</b> <i>ip-address</i> ] [ <b>detail</b> ]                                                                                                                                                                                                          |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                            |
| <b>Description</b> | This command displays information for the SDPs associated with the service.<br><br>If no optional parameters are specified, a summary of all associated SDPs is displayed.                                                                                                                 |
| <b>Parameters</b>  | <i>sdp-id</i> — displays only information for the specified SDP ID<br><b>Values</b> 1 — 17407<br><i>ip-address</i> — displays only SDPs matching the specified far-end IP address<br><b>Default</b> SDPs with any far-end IP address.<br><b>detail</b> — displays detailed SDP information |
| <b>Output</b>      | The following output is an example of service-id SDP information, and <a href="#">Table 42</a> describes the fields.                                                                                                                                                                       |

**Sample Output (Cpipe)**

```
*A:csasim2>show>service>id# sdp 1 detail

=====
Service Destination Point (Sdp Id : 1) Details
=====

Sdp Id 1:1 -(10.10.10.100)

```

|                    |                           |                  |            |
|--------------------|---------------------------|------------------|------------|
| SDP Id             | : 1:1                     | Type             | : Spoke    |
| VC Type            | : CESoPSN                 | VC Tag           | : 0        |
| Admin Path MTU     | : 0                       | Oper Path MTU    | : 0        |
| Far End            | : 10.10.10.100            | Delivery         | : LDP      |
| Admin State        | : Up                      | Oper State       | : Down     |
| Acct. Pol          | : None                    | Collect Stats    | : Disabled |
| Ingress Label      | : 0                       | Egress Label     | : 0        |
| Ing mac Fltr       | : n/a                     | Egr mac Fltr     | : n/a      |
| Ing ip Fltr        | : n/a                     | Egr ip Fltr      | : n/a      |
| Admin ControlWord  | : Preferred               | Oper ControlWord | : True     |
| Admin BW(Kbps)     | : 0                       | Oper BW(Kbps)    | : 0        |
| Last Status Change | : 04/30/2008 13:55:10     | Signaling        | : TLDP     |
| Last Mgmt Change   | : 05/02/2008 21:37:14     |                  |            |
| Endpoint           | : N/A                     | Precedence       | : 4        |
| Class Fwding State | : Down                    |                  |            |
| Flags              | : SdpOperDown             |                  |            |
|                    | NoIngVCLabel NoEgrVCLabel |                  |            |
|                    | PathMTUTooSmall           |                  |            |
| Mac Move           | : Ukwn                    | Blockable Level  | : Unknown  |
| Peer Pw Bits       | : None                    |                  |            |
| Peer Fault Ip      | : None                    |                  |            |
| Peer Vccv CV Bits  | : None                    |                  |            |
| Peer Vccv CC Bits  | : None                    |                  |            |

```

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

```

```

Statistics :
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octs. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0

```

-----  
CPIPE Service Destination Point specifics  
-----

```

Local Bit-rate : 1 Peer Bit-rate : n/a
Local Payload Size : 64 Peer Payload Size : n/a
Local Sig Pkts : No Sig. Peer Sig Pkts : No Sig.
Local CAS Framing : No CAS Peer CAS Framing : No CAS
Local RTP Header : No Peer RTP Header : No
Local Differential : No Peer Differential : No
Local Timestamp : 0 Peer Timestamp : 0
=====

```

```
*A:csasim2>show>service>id#
```

**Table 42: SDP Output Fields**

| Label                                    | Description                                                                                                                                                                |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Destination Points (SDPs)</b> |                                                                                                                                                                            |
| Description                              | Displays generic information about the SDP                                                                                                                                 |
| SDP Id                                   | Identifies the SDP                                                                                                                                                         |
| Type                                     | Identifies the service SDP binding type (for example, spoke)                                                                                                               |
| VC Type                                  | Displays the VC type for the SDP (for example, CESoPSN)                                                                                                                    |
| VC Tag                                   | The explicit dot1Q value used when encapsulating to the SDP far end                                                                                                        |
| Admin Path MTU                           | Specifies the desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |
| Oper Path MTU                            | Specifies the actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented  |
| Far End                                  | Displays the IP address of the far end of the MPLS or GRE tunnel defined by this SDP                                                                                       |
| Delivery                                 | Specifies the type of delivery used by the SDP (MPLS or GRE)                                                                                                               |
| Admin State                              | Specifies the administrative state of this SDP                                                                                                                             |

**Table 42: SDP Output Fields (Continued)**

| <b>Label</b>                 | <b>Description</b>                                                                                                                                                        |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper State                   | Specifies the operational state of this SDP                                                                                                                               |
| Acct. Pol                    | The accounting policy ID assigned to the SAP                                                                                                                              |
| Collect Stats                | Specifies whether collect stats is enabled                                                                                                                                |
| Ingress Label                | Displays the label used by the far-end device to send packets to this device in this service by this SDP                                                                  |
| Egress Label                 | Displays the label used by this device to send packets to the far-end device in this service by this SDP                                                                  |
| Admin ControlWord            | Specifies the administrative state of the control word: Preferred (control word enabled) or Not Preferred (control word disabled)                                         |
| Oper ControlWord             | Specifies the operational state of the control word: True (control word enabled) or False (control word disabled)                                                         |
| Last Status Change           | Specifies the time of the most recent operating status change to this spoke SDP                                                                                           |
| Signaling                    | Specifies the signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on this SDP                                         |
| Last Mgmt Change             | Specifies the time of the most recent management-initiated change to this spoke SDP                                                                                       |
| Flags                        | Displays the conditions that affect the operating status of this spoke SDP. Display output includes PathMTUtooSmall, SdpOperDown, NoIngVCLLabel, NoEgrVCLLabel, and so on |
| Mac Move                     | Indicates the administrative state of the MAC movement feature associated with the service                                                                                |
| Peer Pw Bits                 | Displays the setting of the pseudowire peer bits. Display output includes pwNotforwarding, psnIngressFault, psnEgressFault, lacIngressFault, lacEgressFault               |
| Peer Fault Ip                | N/A                                                                                                                                                                       |
| Peer Vccv CV Bits            | Displays the setting of the pseudowire peer VCCV control verification bits (lspPing)                                                                                      |
| Peer Vccv CC Bits            | Displays the setting of the pseudowire peer VCCV control channel bits (pwe3ControlWord and/or mplsRouterAlertLabel)                                                       |
| <b>Keepalive Information</b> |                                                                                                                                                                           |
| Admin State                  | Specifies the administrative state of the keepalive protocol                                                                                                              |
| Oper State                   | Specifies the operational state of the keepalive protocol                                                                                                                 |

**Table 42: SDP Output Fields (Continued)**

| <b>Label</b>                             | <b>Description</b>                                                                                                                             |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Hello Time                               | Specifies how often the SDP Echo Request messages are transmitted on this SDP                                                                  |
| Hello Msg Len                            | Specifies the length of the SDP Echo Request messages transmitted on this SDP                                                                  |
| Max Drop Count                           | Specifies the maximum number of consecutive SDP Echo Request messages that can be unacknowledged before the keepalive protocol reports a fault |
| Hold Down Time                           | Specifies the amount of time to wait before the keepalive operating status is eligible to enter the alive state                                |
| <b>Statistics</b>                        |                                                                                                                                                |
| I. Fwd. Pkts.                            | Specifies the number of forwarded ingress packets                                                                                              |
| I. Dro. Pkts.                            | Specifies the number of dropped ingress packets                                                                                                |
| I. Fwd. Octs.                            | Specifies the number of forwarded ingress octets                                                                                               |
| I. Dro. Octs.                            | Specifies the number of dropped ingress octets                                                                                                 |
| E. Fwd. Pkts.                            | Specifies the number of forwarded egress packets                                                                                               |
| E. Fwd. Octets                           | Specifies the number of forwarded egress octets                                                                                                |
| <b>Eth-Cfm Configuration Information</b> |                                                                                                                                                |
| Md-index                                 | Displays the value of the MD index                                                                                                             |
| Direction                                | Displays the direction of the MEP                                                                                                              |
| Ma-index                                 | Displays the value of the MA index                                                                                                             |
| Admin                                    | Displays the administrative state of the MEP (enabled or disabled)                                                                             |
| MepId                                    | Displays the MEP-ID                                                                                                                            |
| CCM-Enable                               | Displays the status of the Continuity Check Message (CCM)                                                                                      |
| LowestDefectPri                          | Displays a configured value that defects are evaluated against                                                                                 |
| HighestDefect                            | Displays the highest defect                                                                                                                    |
| Defect Flags                             | Indicates the defect flags                                                                                                                     |
| Mac Address                              | Displays the MAC address (the MAC address for a spoke SDP is the system MAC address; for a SAP, it is the port MAC address)                    |
| CcmLtmPriority                           | Displays the priority of the CCM Linktrace Message (LTM)                                                                                       |
| CcmTx                                    | Displays the number of CCM transmissions                                                                                                       |

**Table 42: SDP Output Fields (Continued)**

| <b>Label</b>                                     | <b>Description</b>                                                                                                                           |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| CcmSequenceErr                                   | Displays the number of CCM sequence errors                                                                                                   |
| LbRxReply                                        | Displays the number of received loopback (LB) replies                                                                                        |
| LbRxBadOrder                                     | Displays the number of LB replies that have been received in the wrong order                                                                 |
| LbRxBadMsdu                                      | Displays the number of LB replies that have been received with the wrong destination MAC address (MSDU = MAC Service Data Unit)              |
| LbTxReply                                        | Displays the number of LBRs (loopback replies) transmitted out this MEP                                                                      |
| LbNextSequence                                   | Displays the sequence number of the next LB transmission                                                                                     |
| LtNextSequence                                   | Displays the sequence number of the next Linktrace (LT) message transmitted                                                                  |
| LtRxUnexplained                                  | Displays the number of the unexplained Linktrace (LT) messages                                                                               |
| <b>Associated LSP LIST</b>                       |                                                                                                                                              |
| Lsp Name                                         | Specifies the name of the static LSP                                                                                                         |
| Admin State                                      | Specifies the administrative state of the associated LSP                                                                                     |
| Oper State                                       | Specifies the operational state of the associated LSP                                                                                        |
| Time Since Last Tr*                              | Specifies the time that the associated static LSP has been in service                                                                        |
| <b>APIPE Service Destination Point specifics</b> |                                                                                                                                              |
| Admin Concat Limit                               | Specifies the administrative (configured) value for the maximum number of cells for cell concatenation, as defined via the max-cells command |
| Oper Concat Limit                                | Specifies the operational value for the maximum number of cells for cell concatenation                                                       |
| Peer Concat Limit                                | Specifies the far-end value for the maximum number of cells for cell concatenation                                                           |
| Max Concat Delay                                 | Specifies the amount of time to wait while cell concatenation is occurring, as defined via the max-delay command                             |
| <b>CPIPE Service Destination Point specifics</b> |                                                                                                                                              |
| Local Bit-rate                                   | Specifies the number of DS0s used by the local SDP                                                                                           |
| Peer Bit-rate                                    | Specifies the number of DS0s used by the far-end SDP                                                                                         |

**Table 42: SDP Output Fields (Continued)**

| <b>Label</b>       | <b>Description</b>                                                 |
|--------------------|--------------------------------------------------------------------|
| Local Payload Size | Specifies the local payload size, in bytes, used by the local SDP  |
| Peer Payload Size  | Specifies the peer payload size, in bytes, used by the far-end SDP |
| Local Sig Pkts     | Specifies the type of signaling packets used by the local SDP      |
| Peer Sig Pkts      | Specifies the type of signaling packets used by the far-end SDP    |
| Local CAS Framing  | Specifies the type of CAS framing used by the local SDP            |
| Peer CAS Framing   | Specifies the type of CAS framing used by the far-end SDP          |
| Local RTP Header   | Specifies whether the local router inserts the RTP header          |
| Peer RTP Header    | Specifies whether the peer router inserts the RTP header           |
| Number of SDPs     | Specifies the number of SDPs bound to the service                  |



---

## Clear Commands

### counters

|                    |                                                                                |
|--------------------|--------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>counters</b>                                                                |
| <b>Context</b>     | clear>service>statistics>id                                                    |
| <b>Description</b> | This command clears all traffic queue counters associated with the service ID. |

### id

|                    |                                                      |
|--------------------|------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                          |
| <b>Context</b>     | clear>service<br>clear>service>statistics            |
| <b>Description</b> | This command clears commands for a specific service. |
| <b>Parameters</b>  | <i>service-id</i> — uniquely identifies a service    |

### sap

|                    |                                                                                      |                                        |                                                                                          |
|--------------------|--------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | sap <i>sap-id</i> {all   cem   counters}                                             |                                        |                                                                                          |
| <b>Context</b>     | clear>service>statistics                                                             |                                        |                                                                                          |
| <b>Description</b> | This command clears SAP statistics for a SAP.                                        |                                        |                                                                                          |
| <b>Parameters</b>  | <i>sap-id</i> — specifies the physical port identifier portion of the SAP definition |                                        |                                                                                          |
| <b>Values</b>      | <i>sap-id</i> :                                                                      | null                                   | [ <i>port-id</i>   <i>bundle-id</i> ]                                                    |
|                    |                                                                                      | dot1q                                  | [ <i>port-id</i>   <i>bundle-id</i> ]: <i>qtag1</i>                                      |
|                    |                                                                                      | atm                                    | [ <i>port-id</i>   <i>bundle-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |
|                    |                                                                                      | <i>port-id</i>                         | <i>slot/mda/port</i> [. <i>channel</i> ]                                                 |
|                    |                                                                                      | <i>bundle-type-slot/mda.bundle-num</i> |                                                                                          |
|                    |                                                                                      | <i>bundle</i>                          | keyword                                                                                  |
|                    |                                                                                      | <i>type</i>                            | ima, ppp                                                                                 |
|                    |                                                                                      | <i>bundle-num</i>                      | 1 to 10                                                                                  |
|                    |                                                                                      | <i>qtag1</i>                           | 0 to 4094                                                                                |
|                    |                                                                                      | <i>vpi</i>                             | NNI 0 to 4095                                                                            |
|                    |                                                                                      |                                        | UNI 0 to 255                                                                             |
|                    |                                                                                      | <i>vci</i>                             | 1, 2, 5 to 65535                                                                         |

- all** — clears all SAP queue statistics and STP statistics
- cem** — clears all queue statistics associated with a acem SAP
- counters** — clears all queue statistics associated with the SAP

## sdp

|                    |                                                                            |
|--------------------|----------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sdp <i>sdp-id</i> keep-alive</b>                                        |
| <b>Context</b>     | clear>service>statistics                                                   |
| <b>Description</b> | This command clears keepalive statistics associated with the SDP ID.       |
| <b>Parameters</b>  | <i>sdp-id</i> — identifies the SDP for which to clear keepalive statistics |
| <b>Values</b>      | 1 to 17407                                                                 |

## arp

|                    |                                                            |
|--------------------|------------------------------------------------------------|
| <b>Syntax</b>      | <b>arp</b>                                                 |
| <b>Context</b>     | clear>service>id                                           |
| <b>Description</b> | This command clears the ARP entries from an Ipipe service. |

## spoke-sdp

|                    |                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp <i>sdp-id:vc-id</i> ingress-vc-label</b><br><b>spoke-sdp <i>sdp-id:vc-id</i> {all   counters}</b> |
| <b>Context</b>     | clear>service>id<br>clear>service>statistics>id                                                                |
| <b>Description</b> | This command clears and resets the spoke SDP bindings for the service.                                         |
| <b>Parameters</b>  | <i>sdp-id</i> — the spoke SDP ID to be reset                                                                   |
| <b>Values</b>      | 1 to 17407                                                                                                     |
|                    | <i>vc-id</i> — the virtual circuit ID on the SDP ID to be reset                                                |
| <b>Values</b>      | 1 to 4294967295                                                                                                |
|                    | <b>all</b> — clears all queue statistics and STP statistics associated with the SDP                            |
|                    | <b>counters</b> — clears all queue statistics associated with the SDP                                          |
|                    | <b>ingress-vc-label</b> — clears the VC ingress value associated with the specified connection                 |

---

## In This Chapter

This chapter provides an overview of Virtual Private LAN Service (VPLS) on the 7705 SAR. Topics in this chapter include:

- [VPLS Overview on page 341](#)
  - [VPLS Packet Walkthrough on page 343](#)
  - [Bridged Mobile Backhaul on page 348](#)
  - [Multi-Tenant Unit \(MTU\) Termination on page 350](#)
- [VPLS Features on page 352](#)
  - [VPLS Enhancements on page 352](#)
  - [Fabric Mode on page 353](#)
  - [Subscriber VLAN on page 354](#)
  - [ATM Encapsulated Residential SAP on page 354](#)
  - [VPLS over MPLS on page 355](#)
  - [VPLS MAC Learning and Packet Forwarding on page 356](#)
  - [Pseudowire Control Word on page 356](#)
  - [Agent Circuit ID Insertion on page 356](#)
  - [MAC Filters on page 358](#)
  - [FDB Table Management on page 359](#)
  - [VPLS and Rate Limiting Via QoS Policy on page 361](#)
  - [MAC Move on page 361](#)
  - [Split Horizon Groups \(SAP and Spoke SDP\) on page 362](#)
- [VPLS Service Considerations on page 364](#)
  - [SAP Encapsulations on page 364](#)
  - [VLAN Processing on page 364](#)
  - [Ingress VLAN Swapping on page 365](#)
  - [Ingress VLAN Translation on page 366](#)

- [Configuration Notes on page 367](#)
- [Configuring a VPLS Service with CLI on page 369](#)
- [VPLS Command Reference on page 387](#)

## VPLS Overview

Virtual Private LAN Service (VPLS), as described in RFC 4762, *Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling*, is a type of virtual private network service that allows the connection of multiple sites in a single bridged domain over a provider-managed IP/MPLS network or a Layer 2 Ethernet bridged network. The customer sites in a VPLS instance appear to be on the same LAN, regardless of their location. VPLS uses a native Ethernet SAP or a bridged PDU encapsulated SAP on the customer-facing (access) side, which simplifies the LAN/WAN boundary and allows for rapid and flexible service provisioning.

VPLS offers a balance between point-to-point pseudowire service (Epipe, Ipipe, etc.) and outsourced routed services (VPRN). Unlike VPRN service, VPLS enables each customer to maintain control of their own routing strategies. All customer routers in the VPLS service are part of the same subnet (LAN), which simplifies the IP addressing plan, especially when compared to a mesh architecture constructed from many separate point-to-point connections. The VPLS service management is simplified since the service is not aware of, nor participates in, the IP addressing and routing.

A VPLS service provides connectivity between two or more SAPs on one (local service) or more (distributed service) service routers. The connection appears to be a bridged domain to the customer sites so that protocols, including routing protocols, can traverse the VPLS service.

Other VPLS advantages include:

- VPLS is a transparent, protocol-independent bridged service
- no Layer 2 protocol conversion between LAN and WAN technologies
- no need to design, manage, configure, and maintain separate WAN access equipment, thereby eliminating the need to train personnel on WAN technologies such as ATM, IP over ATM, IP over PPP, and so on.

VPLS is supported on the 8-port Ethernet Adapter card and the 4-port OC3/STM1 Clear Channel Adapter card. A VPLS SAP can reside on the following ports:

- any Ethernet port (null or tagged) in access mode
  - on an 8-port Ethernet Adapter card with CLI identifier `a8-eth` and `a8-ethv2` installed on a 7705 SAR-8 or 7705 SAR-18
  - on a 7705 SAR-F Ethernet port with CLI identifier `i8-eth`
- any port using ATM encapsulation on a 4-port OC3/STM1 Clear Channel Adapter card (`a4-oc3`) installed on a 7705 SAR-8 or 7705 SAR-18

The transport of VPLS service is supported by LDP, GRE, and RSVP-TE tunnels, as well as static LSPs and dot1q or null encapsulated Ethernet SAPs at uplink.

### **VPLS Redundancy**

Redundancy for a VPLS instance is provided using the endpoint concept to define primary and secondary spoke SDPs. This type of redundancy functions in a similar manner to PW redundancy. Refer to [Pseudowire Redundancy](#) for more information.

### **Access Control and Traffic Management**

Access Control to and within VPLS is controlled via IP and MAC filter policies for ingress SAPs and SDPs (spoke and mesh), and IP filter policies for egress Ethernet SAPs. Traffic Management (TM) support at ingress and egress for unicast traffic is almost the same as TM support for an Ethernet PW SAP. The TM implementation is extended to support:

- at SAP ingress, queue selection for unicast and for broadcast, multicast, and unknown (BMU) traffic
- at network ingress, separate unicast and BMU queues
- at access ingress, ATM traffic (unicast and BMU) mapped to a single queue

### **Split Horizon**

Within the context of VPLS services, a loop-free topology within a fully meshed VPLS core is achieved by applying a split-horizon forwarding concept whereby packets received from a mesh SDP are never forwarded to other mesh SDPs within the same service. The advantage of this approach is that no protocol is required to detect loops within the VPLS core network.

The 7705 SAR supports split horizon groups (SHGs) and residential SHGs, making it possible to control how traffic is propagated via configuring and applying forwarding directions to the received traffic.

Split horizon groups (SHGs) prevent multicast traffic from flowing within the same group, thereby preventing any loops.

In applications such as DSL aggregation, it is useful to extend the split-horizon concept to groups made up of SAPs and spoke SDPs. This extension is referred to as a split horizon group or residential bridging.

Traffic arriving on a SAP or a spoke SDP within a split horizon group is not copied to other SAPs and spoke SDPs in the same split horizon group; however it is copied to SAPs and spoke SDPs in other split horizon groups, if these exist within the same VPLS.

In Release 4.0, residential SHGs are only supported by ATM encapsulated SAPs. Residential (ATM) SAPs do not forward broadcast or unknown traffic; they only process known unicast traffic. Residential SAPs allow one queue per direction (ingress and egress) for all traffic types (unicast and BMU). In addition, OAM processing is allowed on residential (ATM) SAPs.

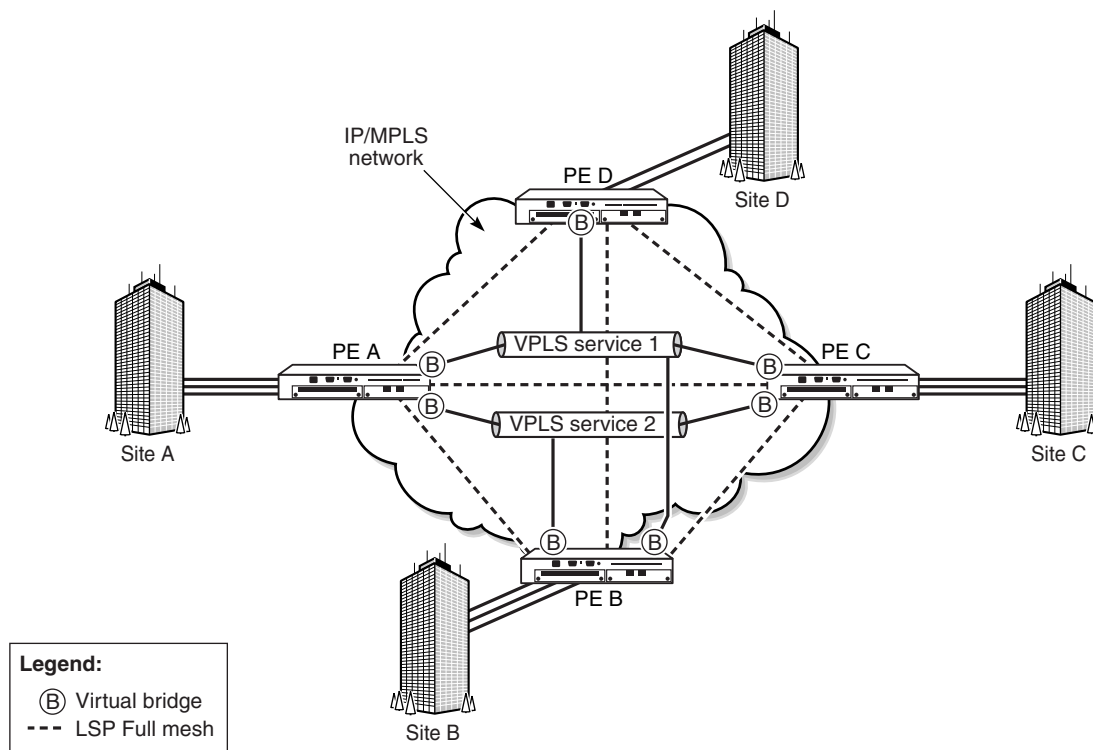
OAM support includes support for VPLS mac-ping, mac-trace, and cpe-ping.

Additional 7705 SAR support for VPLS service includes capabilities such as DHCP relay (on Ethernet SAPs), static host configuration, and anti-spoofing.

## VPLS Packet Walkthrough

This section describes an example of VPLS processing based on the network shown in [Figure 40](#).

**Figure 40: VPLS Service Architecture**

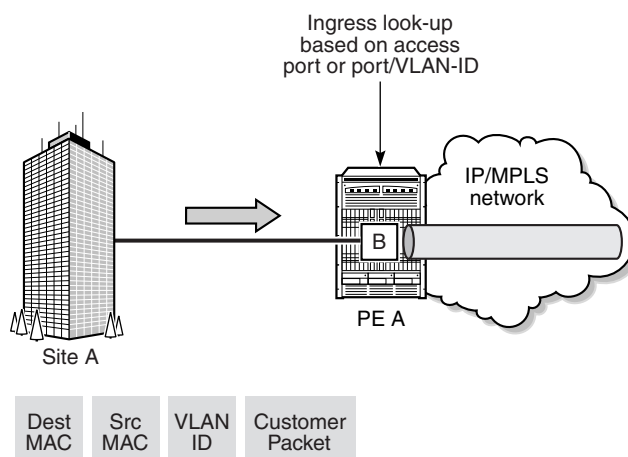


21559

### 1. PE Router A (Figure 41)

- a. Service packets arriving at PE A are associated with a VPLS service instance (VPLS service 2) based on the combination of the physical port and the IEEE 802.1Q tag (VLAN-ID) in the packet, if applicable.
- b. PE A learns the source MAC address in the packet and creates an entry in the Forwarding Database (FDB) table that associates the MAC address with the service access point (SAP) on which it was received.
- c. The destination MAC address in the packet is looked up in the FDB table for the VPLS instance. There are two possibilities: either the destination MAC address has already been learned (known MAC address) or the destination MAC address is not yet learned (unknown MAC address).

**Figure 41: Access Port Ingress Packet Format and Lookup**



17230

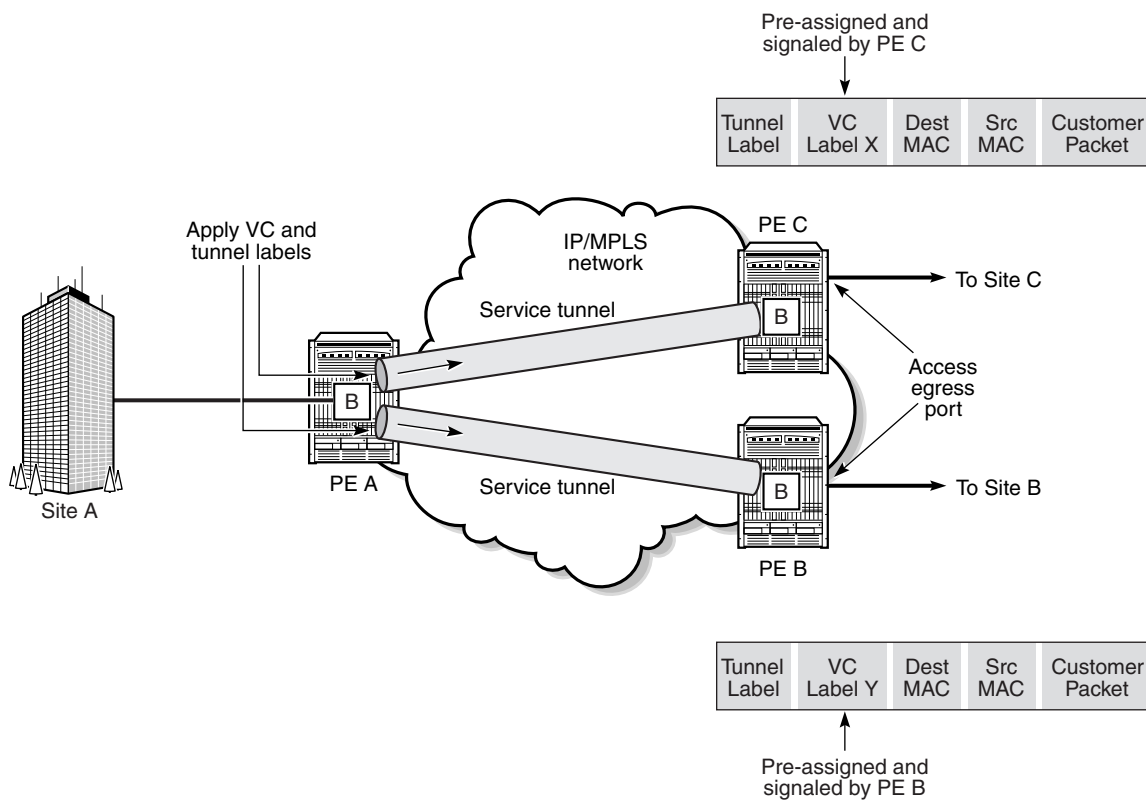
### For a Known MAC Address (Figure 42):

- d. If the destination MAC address has already been learned by PE A, an existing entry in the FDB table identifies the far-end PE router and the service VC label (inner label) to be used before sending the packet to far-end PE C.
- e. PE A chooses a transport LSP to send the customer packets to PE C. The customer packet is sent on this LSP once the IEEE 802.1Q tag is stripped and the service VC label (inner label) and the transport label (outer label) are added to the packet.



**For an Unknown MAC Address (Figure 42):**

- f. If the destination MAC address has not been learned, PE A will flood the packet to both PE B and PE C that are participating in the service by using the VC labels that each PE router previously signaled for the VPLS instance. The packet is not sent to PE D since this VPLS service does not exist on that PE router.

**Figure 42: Network Port Egress Packet Format and Flooding**

21560

### 2. Core Router Switching

- a. All the core routers (P routers in IETF nomenclature) between PE A and routers PE B and PE C are Label Switch Routers (LSRs) that switch the packet based on the transport (outer) label of the packet until the packet arrives at the far-end PE router. All core routers are unaware of the content of the LSP payload (that is, the core router do not know that this traffic is associated with a VPLS service).

### 3. PE Router C

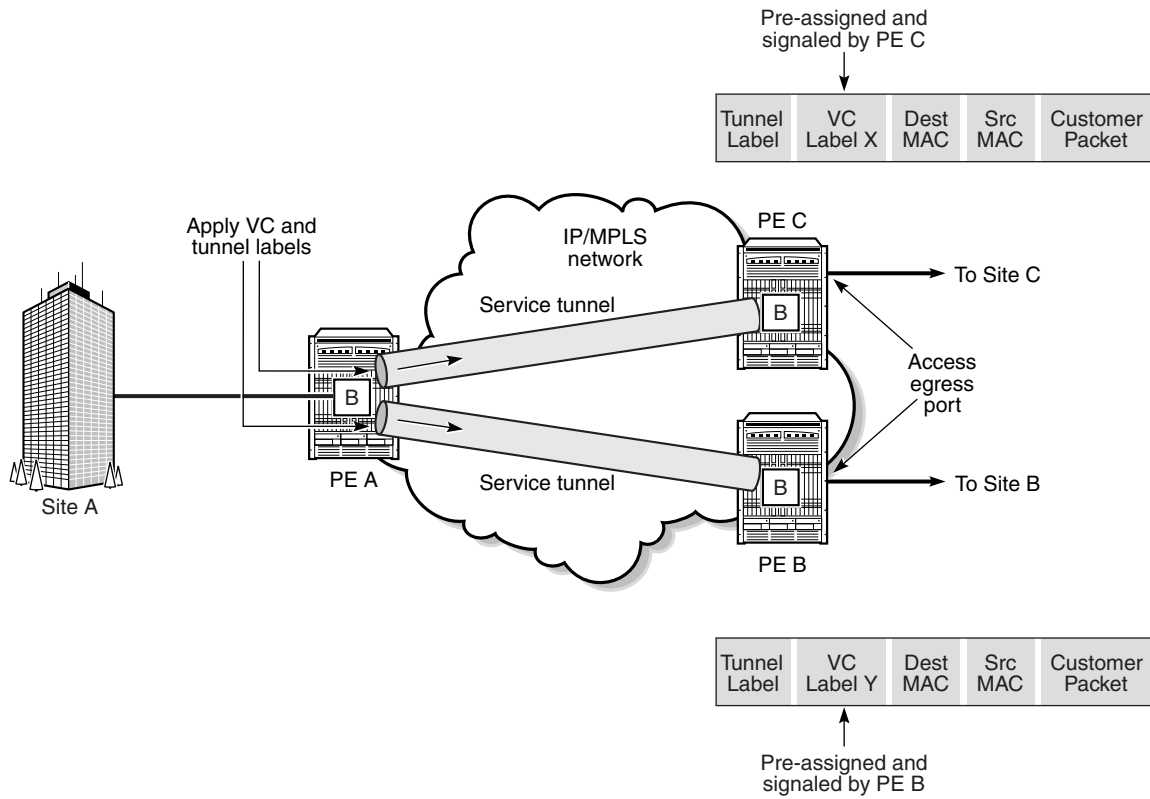
- a. PE C strips the transport label of the received packet to reveal the inner VC label. The VC label identifies the VPLS service instance to which the packet belongs.
- b. PE C learns the source MAC address in the packet and creates an entry in the FDB table that associates the MAC address to PE A and the VC label that PE A signaled for the VPLS service.
- c. The destination MAC address in the packet is looked up in the FDB table for the VPLS instance. Again, there are two possibilities: either the destination MAC address has already been learned (known MAC address) or it has not been learned on the access side of PE C (unknown MAC address).

#### **For a Known MAC Address (Figure 43)**

- d. If the destination MAC address has been learned by PE C, an existing entry in the FDB table identifies the local access port and the IEEE 802.1Q tag to be added before sending the packet to customer Location-C. The egress Q tag may be different from the ingress Q tag.

#### **For an Unknown MAC Address (Figure 43)**

- e. PE C will flood packets, as applicable.

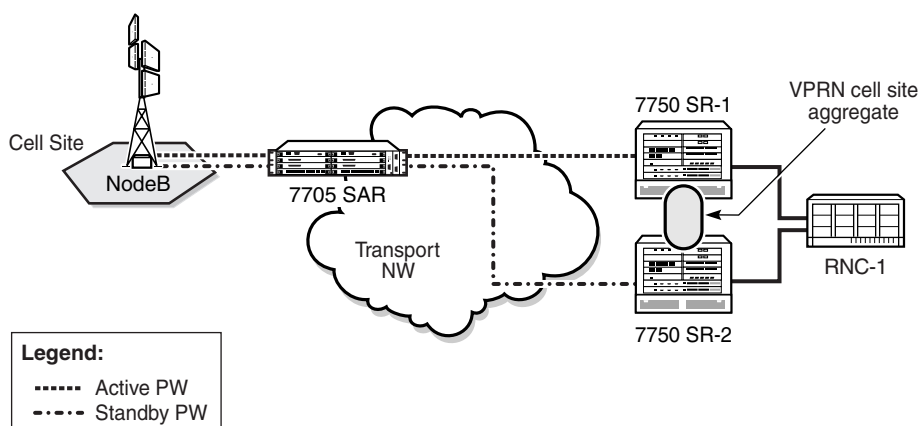
**Figure 43: Access Port Egress Packet Format and Lookup**

21560

## Bridged Mobile Backhaul

Figure 44 shows a PW-based backhaul option for mobile operators, where 7705 SAR-initiated Ethernet PWs terminate at 7750 SR nodes. In most cases, the 7705 SAR-initiated PWs terminate into a VPRN or IES service for routing purposes, or into a VPLS service for MAC forwarding purposes. PW termination into VPLS prevents unwanted exposure of IP addresses and eliminates concerns about the effect of IP addresses that change, thereby avoiding reconfiguration of the VPRN or IES access interfaces and routing entries.

**Figure 44: Typical Pseudowire-based Mobile Backhaul**



21553

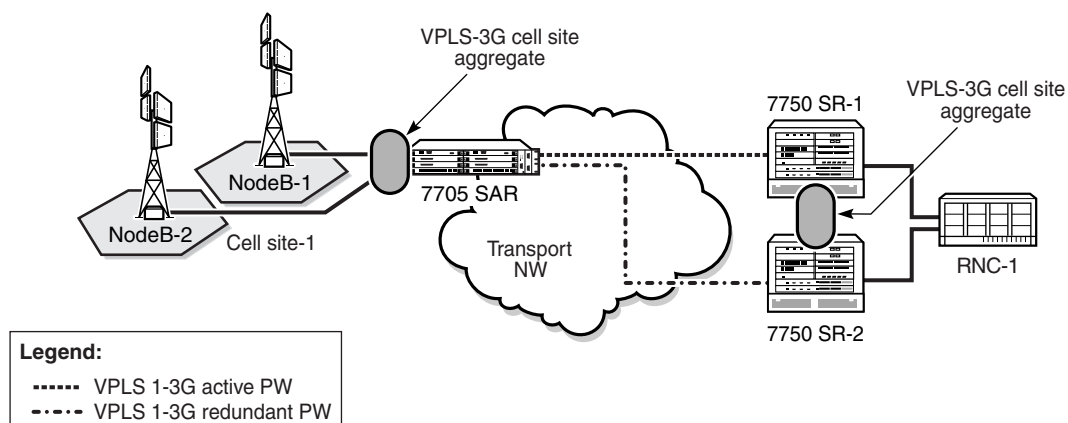
In addition, capacity changes in a radio network could make mobile operators shuffle their transmission links. A simple Layer 2-based backhaul could avoid this complication because the IP addresses are not required to be configured on SAPs (that is, the interfaces facing the base stations or similar equipment), meaning that the 7705 SAR and the backhaul network would not be impacted by mobile layer IP changes. Alternatively, the 7705 SAR implements VPLS to provide any-to-any connectivity at the Layer 2 level and an IP-agnostic network build-out option.

As is the case with VPRN, VPLS also supports multiple virtual forwarding instances. For example, in Figure 45, the 7705 SAR access SAPs facing NodeB-1 and NodeB-2 are bound to VPLS-3G. Another VPLS instance can be configured on the same 7705 SAR for handling eNB 4G traffic. In such a scenario, MAC addresses learned via these two different VPLS instances are stored in separate FDBs ensuring virtualization, which is similar to multiple IP-VPN instances.

Returning to VPLS-3G example in [Figure 45](#), upon receiving an Ethernet frame from a SAP, the 7705 SAR learns the MAC address and records it together with information from that SAP. If the destination MAC address is known, then the 7705 SAR switches the received Ethernet frame to its destination. If the destination MAC address is not known, then the 7705 SAR floods the frame to all possible destinations that are part of the same VPLS instance (that is, all the SAPs and the network site links).

On the network side, the 7705 SAR supports spoke SDPs to transport customer MAC frames. At ingress, the 7705 SAR strips off the dot1q header associated with the SAP and switches the Ethernet frame to its destination over the Ethernet PW. Loops can be avoided by using PW redundancy with standby signaling for spoke SDPs and mesh SDPs to ensure proper propagation of broadcast, multicast, and unknown (BMU) frames. Using standby signaling for spoke SDPs, the 7705 SAR ensures that only one spoke is active in the redundant PW deployment model. As a consequence, the 7705 SR disables the spoke SDP binding to VPLS for the standby PWs in order to ensure loop-free operation.

**Figure 45: Local VPLS on 7705 SAR in Mobile Backhaul**



21554

In the case where the 7705 SAR receives an Ethernet frame from a SAP bound to a VPLS and the destination MAC address is not known, it replicates the frame to all other SAPs that are part of the same VPLS and switches a copy of the frame over all the active Ethernet spoke and mesh SDPs. In [Figure 45](#), the 7705 SAR would switch the incoming frame over an Ethernet PW to 7750 SR-1 after stripping off the incoming dot1q header.

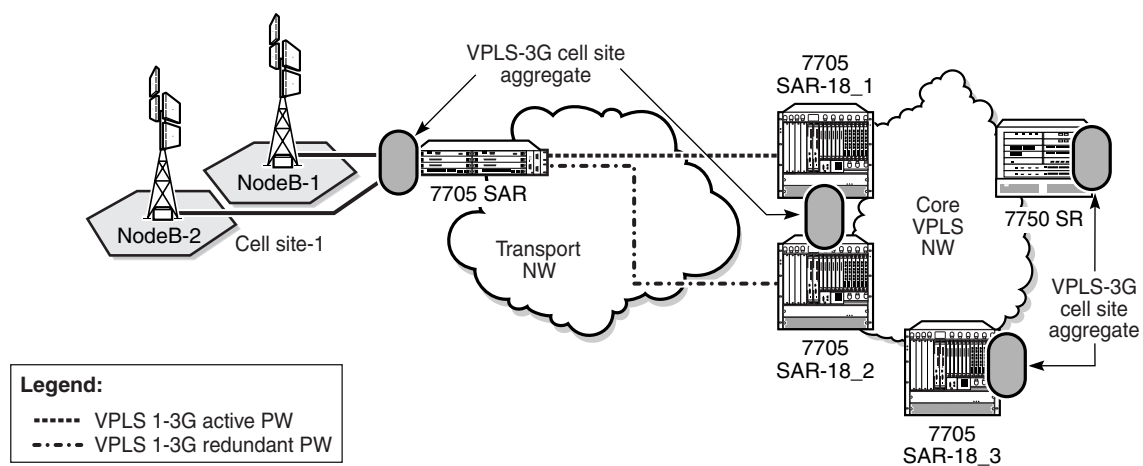
In terms of label activity, the inner label (the Ethernet PW label for VPLS) identifies the VPLS instance to which the frame belongs, and the outer label identifies the far-end LER node. Using a two-label model means that the traffic from multiple VPLS instances can be transported over a single tunnel between two LER nodes with unique PW labels on a per-VPLS-instance basis. Upon receiving a VPLS packet, an LER uses the inner label to locate the correct forwarding database (FDB) from which to perform MAC lookups. The associated FDB is checked against known and learned MAC addresses. If the lookup is successful, the frame is forwarded to the identified SAP with the appropriate dot1q header. If the lookup fails, the LER floods the frame to all SAPs that are member of the VPLS instance (that is, the VPLS instance designated by the inner PW label).

## Multi-Tenant Unit (MTU) Termination

[Figure 45](#) can also be used to show how the 7705 SAR can serve as a multi-tenant unit (MTU) as described in RFC 4762, section 10.2, to help the scalability of a VPLS core mesh architecture. To function as an MTU, the 7705 SAR is spoke SDP-terminated to a VPLS node (7750 SR node in [Figure 45](#)), eliminating the necessity to have a full mesh architecture for all VPLS-enabled nodes. Thus, the mesh requirement is “pushed” to the core nodes only (that is, to the 7750 SR nodes).

The 7750 SR nodes in [Figure 45](#) can be replaced by 7705 SAR nodes running Release 4.0 of the 7705 SAR OS. [Figure 46](#) illustrates this scenario, where a 7705 SAR MTU is spoke SDP-terminated to two 7705 SAR-18 nodes (7705 SAR-18\_1 and 7705 SAR-18\_2).

Using spoke SDP termination means that it is important that the PW-signaling master node is a 7705 SAR (in [Figure 46](#), the node that initiates the redundant PWs is the cell site 7705 SAR). Thus, only the 7705 SAR-18 that hosts the active spoke SDP will forward the Ethernet traffic to the 7705 SAR and the other 7705 SAR-18 will keep its spoke SDP in the operationally down state. If any failure of the active spoke SDP occurs (that is, if the PW activity switch takes place and the active endpoint of the PW moves from one 7705 SAR-18 to the other one), a mac-flush message is sent, which improves convergence times. In addition, the 7705 SAR-18 nodes can be configured to ignore standby signaling, which improves reconvergence times around failures for services that can tolerate dual-stream reception, such as broadcast TV.

**Figure 46: Spoke SDP Termination to VPLS using 7705 SAR-18 Routers**

21555

## VPLS Features

This section features:

- [VPLS Enhancements](#)
- [Fabric Mode](#)
- [Subscriber VLAN](#)
- [ATM Encapsulated Residential SAP](#)
- [VPLS over MPLS](#)
- [VPLS MAC Learning and Packet Forwarding](#)
- [Pseudowire Control Word](#)
- [Agent Circuit ID Insertion](#)
- [MAC Filters](#)
- [FDB Table Management](#)
- [VPLS and Rate Limiting Via QoS Policy](#)
- [MAC Move](#)
- [Split Horizon Groups \(SAP and Spoke SDP\)](#)

## VPLS Enhancements

The Alcatel-Lucent VPLS implementation includes several enhancements to basic VPN connectivity. The following VPLS features can be configured individually for each VPLS:

- MAC and IP filter support (up to Layer 4). MAC and IP filters can be applied on a per-SAP ingress and per-SDP ingress (mesh and spoke) basis. IP filters can also be applied on a per-SAP egress basis (Ethernet SAPs only).
- forwarding database (FDB) management features on a per-service level, including:
  - configurable FDB size limit
  - FDB size alarms
  - MAC learning disable
  - discard unknown
  - separate aging timers for locally and remotely learned MAC addresses
- ingress rate limiting for broadcast, multicast, and (destination) unknown (BMU) flooding on a per-SAP basis
- split horizon group (SHG) on a per-SAP and per-spoke SDP basis
- DHCP snooping on a per-SAP basis
- anti-spoofing on a per-SAP basis

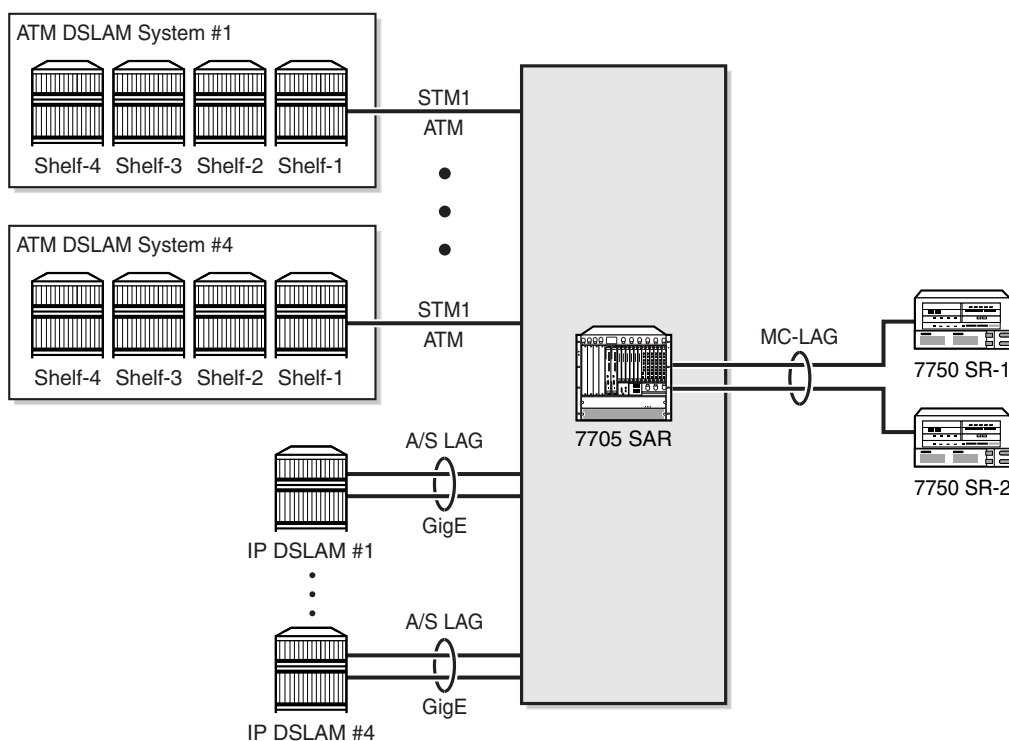


- optional spoke SDP redundancy to protect against node failure

Figure 47 illustrates VPLS enhancements using an example of ATM DSLAM backhaul, where the 7705 SAR might not be used solely for DSLAM backhaul purposes or not all the services might be bound to VPLS. In Figure 47, co-located IP DSLAM (iSAM) traffic can also be transported by the 7705 SAR.

**Figure 47: ATM and IP DSLAM Backhaul**

Ingress



21599

## Fabric Mode

Similar to IES and VPRN services, to configure a VPLS instance, the fabric mode must be set to aggregate mode (not per-destination mode). Thus, VPLS service is only supported by aggregate-mode fabric profiles. The CLI blocks the creation of a VPLS instance when the fabric mode is set to per-destination. Conversely, when a VPLS instance is configured, attempting to change the fabric mode to per-destination is blocked.

## Subscriber VLAN

The subscriber VLAN feature can be enabled for ATM SAPs bound to a VPLS instance. In Release 4.0, subscriber VLAN supports only residential ATM SAPs.

The subscriber VLAN pushes a VLAN tag onto the received bridged PDU on a per-subscriber basis, which helps to uniquely identify subscribers throughout the entire network. After ATM-layer VC termination—where each subscriber has a unique identifier (*port:vpi/vci*)—all the subscribers would be sharing the same uplink. This might present problems to CO IP nodes (such as a BRAS) that want to offer per-subscriber services and identify the subscribers based on dot1q and vlan tags, which is compatible with the model offered in a native Ethernet model. In order to maintain the uniqueness of a subscriber, a subscriber VLAN tag can be pushed as per the configuration settings (commonly referred to as customer-tag, or c-tag).

A subscriber VLAN has the following characteristics.

- When subscriber VLAN is enabled, a VLAN tag (c-tag) is pushed at ATM ingress and removed at ATM egress. In other words, a symmetrical push/pop operation is supported and cannot be enabled/disabled on a per-direction basis. The exception to this occurs when the Ethernet frame received from the network side does not have any additional VLAN tags; in this case, the received frame is forwarded over the ATM SAP “as is”. That is, there is no pop operation or error message generated.
- The ATM port is always considered to be “NULL”, which means that when a frame is received at ATM egress from a dot1q port (Ethernet SAP to ATM SAP) or from a VLAN vc-type (network), the outer-most VLAN tag is removed (the subscriber tag, or s-tag). If subscriber VLAN is also enabled, the first two outer-most VLAN tags are removed (that is, the s-tag and the c-tag).

Since the ATM port is considered to be “NULL”, when a frame is received at ATM ingress and is going out on a dot1q Ethernet SAP (SAP-to-SAP) or VLAN vc-type (network), a new VLAN tag is pushed (s-tag). If the subscriber VLAN is also enabled, a c-tag and an s-tag are pushed. In short, Ethernet frames at ATM ingress or egress are manipulated in the same way as a null encapsulated Ethernet port.

## ATM Encapsulated Residential SAP

For ATM encapsulated residential SAPs:

- the 7705 SAR always transmits the bridge PDU (BPDU) without FCS (PID = 0x00-07)
- the 7705 SAR supports reception of a BPDU both with FCS (PID = 0x00-01) and without FCS (PID = 0x00-07)

## VPLS over MPLS

The VPLS architecture proposed in RFC-4664, Framework for Layer 2 Virtual Private Networks (L2VPNs) and RFC-4665, Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks, specifies the use of provider equipment (PE) that is capable of learning, bridging, and replicating on a per-VPLS basis. The PE routers that participate in the service are connected using MPLS LSP tunnels in a full mesh composed of mesh SDPs or based on an LSP hierarchy composed of mesh SDPs at the core and spoke SDPs as the access points.

Multiple VPLS instances can be offered over the same set of LSP tunnels. Signaling specified in RFC-4905, Encapsulation Methods for Transport of Layer 2 Frames over MPLS Networks, is used to negotiate a set of ingress and egress VC labels on a per-service basis. The VC labels are used by the PE routers for de-multiplexing traffic arriving from different VPLS services over the same set of LSP tunnels.

VPLS is provided over MPLS by:

- connecting bridging-capable PE routers with a full mesh of MPLS LSP tunnels
- negotiating per-service VC labels using draft-Martini encapsulation
- replicating unknown and broadcast traffic in a service domain
- enabling MAC learning over tunnel and access ports (see [VPLS MAC Learning and Packet Forwarding](#))
- using a separate forwarding database (FDB) per VPLS service

## VPLS MAC Learning and Packet Forwarding

The 7705 SAR edge devices perform the packet replication required for broadcast and multicast traffic across the bridged domain. MAC address learning is performed by the 7705 SAR to reduce the amount of unknown destination MAC address flooding.

7705 SAR routers learn the source MAC addresses of the traffic arriving on their access and network ports. Each 7705 SAR maintains an FDB for each VPLS service instance, and learned MAC addresses are populated in the FDB table of the service. All traffic is switched based on MAC addresses and forwarded between all participating 7705 SAR routers using the LSP tunnels. Unknown destination packets (for example, the destination MAC address has not been learned) are forwarded on all LSPs to the participating 7705 SAR routers for that service until the target station responds and the MAC address is learned by the 7705 SAR associated with that service.

## Pseudowire Control Word

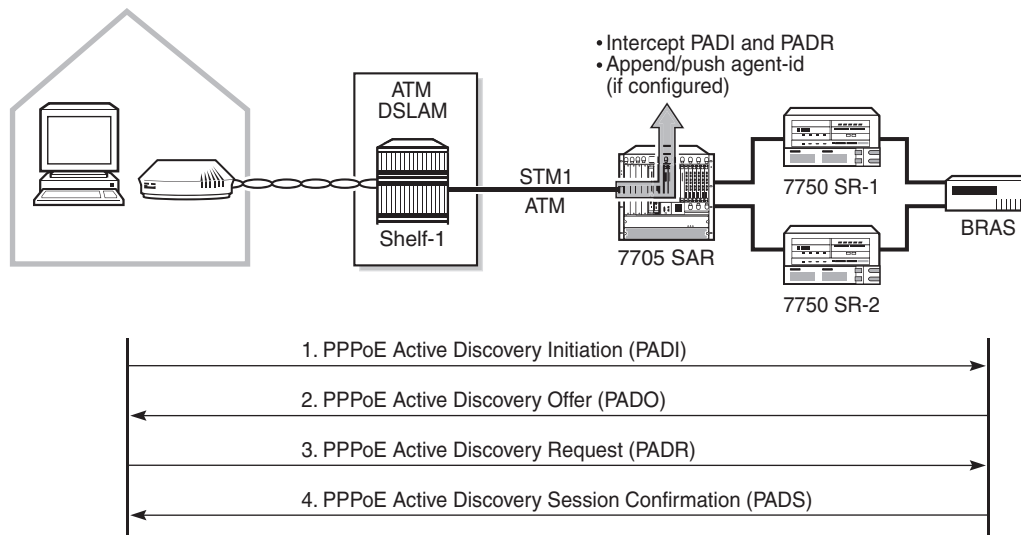
The `control-word` command enables the use of the control word individually on each mesh SDP or spoke SDP. By default, the control word is disabled. When the control word is enabled, all VPLS packets are encapsulated along with the control word. The T-LDP control word signaling behavior is the same as that for the control word for VLL services. The configuration at the two endpoints of the VPLS service must match.

## Agent Circuit ID Insertion

One of the main applications for VPLS is ATM DSLAM backhaul. DSL operators typically make use of PPPoE over ATM DSL lines for subscriber authentication, authorization, and accounting. When an ATM DSLAM is connected to VPLS service on a 7705 SAR such that the 7705 SAR offers an interworking function for ATM traffic to Ethernet traffic, the 7705 SAR can append the agent-circuit ID to the PPPoE frames received from the ATM DSLAM.

In accordance with RFC 4679, section 3.3.1: Agent-Circuit-ID, agent-circuit ID information can be appended to PPPoE Active Discovery Initiation (PADI) and PPPoE Active Discovery Request (PADR) frames on bridged llc-snap encapsulated SAPs bound to an ATM VPLS instance. [Figure 48](#) illustrates the signaling.

**Figure 48: PPPoE Initialization and Agent-Id Push Function**

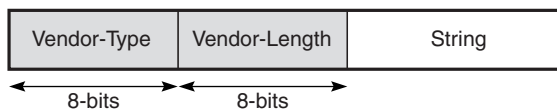


21598

Figure 49 illustrates the agent circuit ID information, where the following definitions apply:

- vendor-type — is always the value 1
- vendor-length — is less than or equal to 65 bits
- string — is the access-node identifier (`atm card/slot/port:vpi.vci`), which is automatically assigned by the 7705 SAR to be the system-name (hostname)

**Figure 49: Agent Circuit ID Information**



21381

Appending the agent circuit ID to a PADI or PADR frame is enabled and disabled via the `pppoe-circuit-id` command, which can be issued at the VPLS service and VPLS residential SAP levels. At the service level, the command sets the default value for all SAPs in the VPLS instance. At the SAP level, the command overrides the service level default. If there is a mix of enabled and disabled `pppoe-circuit-id` settings, reissuing the command at the service level will reset all SAPs to the new service level value.

As per the DSL Forum TR-101 April'06 specification, section 3.9.3, any PPPoE vendor-specific tag that may already be present in the received frame is replaced by the 7705 SAR client-id tag.

## MAC Filters

MAC filters offer the ability to transport Ethernet frames that match certain criteria over the service to which the frames are bound. In Release 4.0, the 7705 SAR supports MAC filters at a VPLS ingress SAP and ingress SDP (spoke and mesh). MAC filters can be set to accept or reject the transport of filtered Ethernet frames over the VPLS. Via MAC filters, it is possible to filter traffic received from a defined source or destined for a certain host. MAC filters are the equivalent of IP ACLs, but apply to the Layer 2 MAC layer.

MAC filters support the following fields:

- source MAC address
- destination MAC address
- Ethertype

Any single item or combination of items can be used to define a MAC filter entry. For information on configuring MAC filters, see the “Filter Policies” chapter in the 7705 SAR OS Router Configuration Guide.

## FDB Table Management

The following sections describe VPLS features related to management of the FDB, including:

- FDB size
- FDB size alarms
- local and remote aging timers
- Unknown MAC discard

### FDB Size

The following MAC table management features are required for each instance of a SAP or spoke SDP within a particular VPLS instance:

- MAC FDB size limits — allows users to specify the maximum number of MAC FDB entries that are learned locally for a SAP or a spoke SDP. If the configured limit is reached, then no new addresses will be learned from the SAP until at least one FDB entry is aged out or cleared.
  - When the limit is reached on a SAP, packets with unknown source MAC addresses are still forwarded (this default behavior can be changed via configuration). By default, if the destination MAC address is known, it is forwarded based on the FDB, and if the destination MAC address is unknown, it is flooded. Alternatively, if discard unknown is enabled at the VPLS service level, any packets from unknown source MAC addresses are discarded at the SAP.
  - The log event “SAP MAC limit reached” is generated when the limit is reached. When the condition is cleared, the log event “SAP MAC Limit Reached Condition Cleared” is generated.
  - `disable-learning` allows users to disable the dynamic learning function on a SAP or a spoke SDP of a VPLS instance
  - `disable-aging` allows users to turn off aging for learned MAC addresses on a SAP or a spoke SDP of a VPLS instance

### FDB Size Alarms

The size of the VPLS FDB can be configured with a low watermark and a high watermark, expressed as a percentage of the total FDB size limit. If the actual FDB size grows above the configured high watermark percentage, an alarm is generated. If the FDB size falls below the configured low watermark percentage, the alarm is cleared by the system.

### Local and Remote Aging Timers

Similar to a Layer 2 switch, learned MACs within a VPLS instance can be aged out if no packets are sourced from the MAC address for a specified period of time (the aging time). In each VPLS instance, there are independent aging timers for locally learned MAC and remotely learned MAC entries in the FDB.

A local MAC address is a MAC address associated with a SAP because it ingresses on a SAP. A remote MAC address is a MAC address received via an SDP from another 7705 SAR router for the VPLS instance. The local-age timer for the VPLS instance specifies the aging time for locally learned MAC addresses, and the remote-age timer specifies the aging time for remotely learned MAC addresses.

In general, the remote-age timer is set to a longer period than the local-age timer to reduce the amount of flooding required for destination unknown MAC addresses. The aging mechanism is considered a low-priority process. In most situations, the aging out of MAC addresses can happen in within tens of seconds beyond the age time. To minimize overhead, local MAC addresses and remote MAC addresses, in some circumstances, can take up to two times their respective age timers to be aged out.

### Disable MAC Aging

The MAC aging timers can be disabled, which will prevent any learned MAC entries from being aged out of the FDB. When aging is disabled, it is still possible to manually delete or flush learned MAC entries. Aging can be disabled for learned MAC addresses on a SAP or a spoke SDP of a VPLS instance.

### Disable MAC Learning

When MAC learning is disabled for a service, new source MAC addresses are not entered in the VPLS FDB, whether the MAC address is local or remote. MAC learning can be disabled for individual SAPs or spoke SDPs.

### Unknown MAC Discard

Unknown MAC discard is a feature that discards all packets that ingress the service whose destination MAC address is not in the FDB. The normal behavior is to flood these packets to all endpoints in the service.

Unknown MAC discard can be used with the disable MAC learning and disable MAC aging options to create a fixed set of MAC addresses allowed to ingress and traverse the service.



## VPLS and Rate Limiting Via QoS Policy

Traffic that is normally flooded throughout the VPLS can be rate-limited on SAP ingress through the use of service ingress QoS policies. In a service ingress QoS policy, individual queues can be defined per forwarding class to provide shaping of broadcast traffic, MAC multicast traffic and unknown destination MAC traffic.

For more information on QoS policies for broadcast, multicast, and unknown (BMU) traffic, see the “Filter Policies” chapter in the 7705 SAR OS Quality of Service Guide.

## MAC Move

The MAC move feature is useful to protect against undetected loops in a VPLS topology when STP is not used. It also protects against the presence of duplicate MACs in a VPLS service.

A sustained high relearn rate can be a sign of a loop somewhere in the VPLS topology. Typically, STP detects loops in the topology, but for those networks that do not run STP, the MAC move feature is an alternative way to protect your network against loops.

When enabled in a VPLS, MAC-move monitors the relearn rate of each MAC. If the rate exceeds the configured maximum allowed limit, MAC move disables the SAP where the source MAC was last seen. The SAP can be disabled permanently (until a `shutdown/no shutdown` command is executed) or for a length of time that grows linearly with the number of times the given SAP was disabled. A SAP can be optionally blocked as non-blockable, meaning that when the relearn rate has exceeded the limit, another (blockable) SAP will be disabled instead.

The `mac-move` command enables the feature at the service level for SAPs and spoke SDPs. The operation of this feature is the same on the SAP and spoke SDP. For example, if a MAC moves from SAP to SAP, SAP to spoke SDP, or between spoke SDPs, it will block one of them to prevent thrashing. The relearn rate is computed as the number of times a MAC moves in a 5-s interval. Therefore, the fastest a loop can be detected and broken is 5 s.

If two clients in the VPLS have the same MAC address, the VPLS will experience a high relearn rate for the MAC. When MAC move is enabled, the 7705 SAR will shut down the SAP or spoke SDP and create an alarm event when the threshold is exceeded.

MAC move allows sequential order port blocking. By configuration, some VPLS ports can be configured as “non-blockable”, which allows a simple level of control over which ports are being blocked during loop occurrence. There are two control mechanisms that allow blocking of ports in a sequential order:

- configuration capabilities to group VPLS ports and to define the order in which they should be blocked
- criteria defining when individual groups should be blocked

For the first mechanism, the configuration CLI is extended by definition of “primary” and “secondary” ports. As the default, all VPLS ports are considered “tertiary” ports unless they are explicitly declared primary or secondary. The order of blocking will always follow a strict order, starting from tertiary, to secondary and then to primary.

The criterion for the second control mechanism is the number of periods during which the given relearn rate has been exceeded. The mechanism is based on the “cumulative” factor for every group of ports. Tertiary VPLS ports are blocked if the relearn rate exceeds the configured threshold during one period, while secondary ports are blocked only when relearn rates are exceeded during two consecutive periods, and so forth. The retry timeout period must be larger than the period before blocking the highest-priority port so it sufficiently spans across the period required to block all ports in sequence. The period before blocking the highest-priority port is the cumulative factor of the highest configured port multiplied by 5 s (the retry timeout can be configured through the CLI).

## Split Horizon Groups (SAP and Spoke SDP)

Within the context of VPLS services, a loop-free topology within a fully meshed VPLS core is achieved by applying a split horizon forwarding concept whereby packets received from a mesh SDP are never forwarded to other mesh SDPs within the same service. The advantage of this approach is that no protocol is required to detect loops within the VPLS core network.

In applications such as DSL aggregation, it is useful to extend the split horizon concept to groups of SAPs and/or spoke SDPs. This extension is referred to as a split horizon SAP group or residential bridging.

Traffic arriving on a SAP or a spoke SDP within a split horizon group will not be copied to other SAPs and spoke SDPs in the same split horizon group (but will be copied to SAPs or spoke SDPs in other split horizon groups if these exist within the same VPLS).

A split horizon group must be created before SAPs and spoke SDPs can be assigned to the group.

The split horizon group is defined within the context of a single VPLS. The same group name can be reused in different VPLS instances. Up to 30 split horizon groups can be defined per VPLS instance. A split horizon group can contain a combination of spoke SDPs and SAPs.

A SAP or spoke SDP can only be added to a split horizon group during its creation. Similarly, a SAP or spoke SDP can be removed from a split horizon group only by its deletion. A split horizon group can be deleted only after all its members have been deleted.

## **Residential Split Horizon Groups**

Residential split horizon groups are supported on ATM SAPs connected to VPLS on 4-port OC3/STM1 Clear Channel Adapter cards. While split horizon groups prevent multicast traffic from flowing within the same group, residential ATM SAPs do not forward broadcast or unknown traffic; they only process known unicast traffic. Residential split horizon groups allow one queue per direction (ingress and egress) for all traffic types (unicast and BMU). OAM processing is also allowed on residential ATM SAPs.

---

## VPLS Service Considerations

This section describes general 7705 SAR service features and any special capabilities or considerations as they relate to VPLS services:

- [SAP Encapsulations](#)
- [VLAN Processing](#)
- [Ingress VLAN Swapping](#)
- [Ingress VLAN Translation](#)

## SAP Encapsulations

VPLS services are designed to carry Ethernet frame payloads; therefore, VPLS can provide connectivity between any SAPs and SDPs that pass Ethernet frames. The following SAP encapsulations are supported on the 7705 SAR VPLS service:

- Ethernet null
- Ethernet dot1q
- ATM VC with RFC 2684 llc-snap bridged encapsulation (See [ATM PVC Access and Termination on a VPLS Service](#).)

## VLAN Processing

The SAP encapsulation definition on Ethernet ingress ports defines which VLAN tags are used to determine the service that the packet belongs to:

- **null** encapsulation defined at ingress — any VLAN tags are ignored and the packet goes to a default service for the SAP
- **dot1q** encapsulation defined at ingress — only the first label is considered

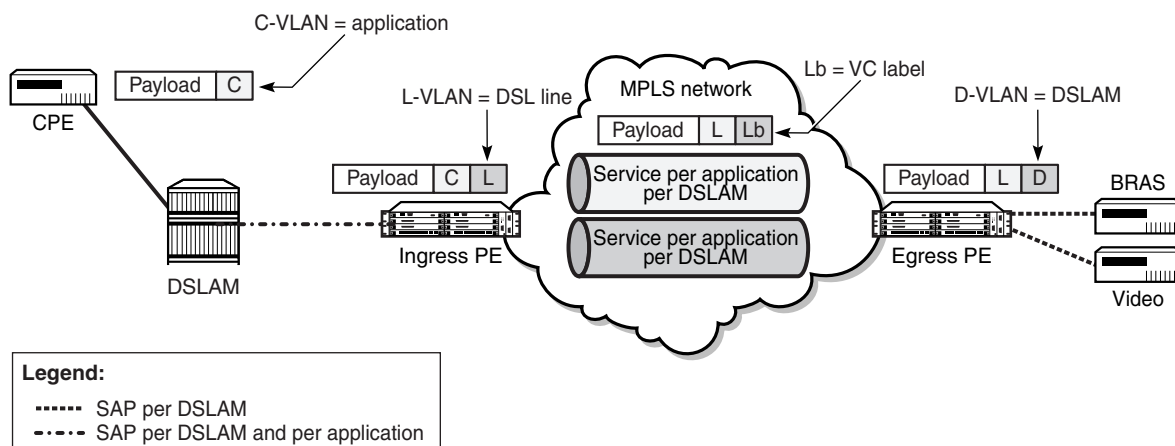
For dot1q encapsulation, traffic encapsulated with tags for which there is no definition are discarded.

## Ingress VLAN Swapping

This feature is supported on VPLS and VLL services, where the end-to-end solution is built using two nodes and requires SDP connections between the nodes.

In VLAN swapping, only the VLAN ID value will be copied to the inner VLAN position. The Ethertype of the inner tag will be preserved and all consecutive nodes will work with that value. Conversely, the dot1p bits value of the outer tag will not be preserved.

**Figure 50: Ingress VLAN Swapping**



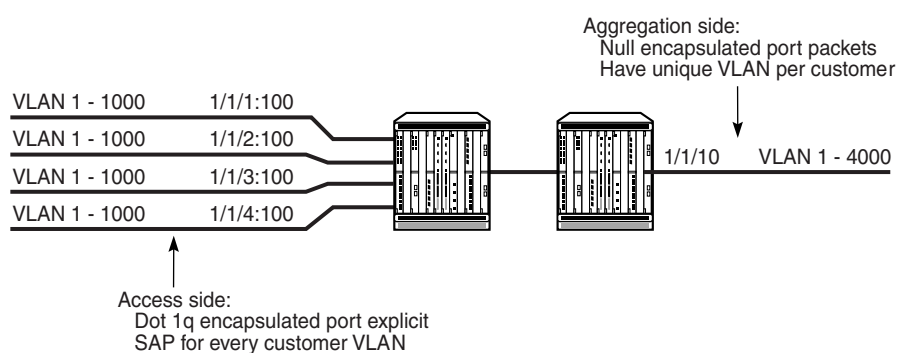
21556

The network diagram in [Figure 50](#) shows a network where, on the user access side (DSLAM-facing SAPs), every subscriber is represented by several SAPs with inner-tag encoding service and outer-tag encoding subscriber (DSL line). The aggregation side (PE-facing SAPs) is represented by the DSL line number (inner VLAN tag) and DSLAM (outer VLAN tag). The effective operation on the VLAN tag is to drop the inner tag at the access side and push another tag at the aggregation side.

## Ingress VLAN Translation

Figure 51 shows an application where different circuits are aggregated in the VPLS-based network. The access side is represented by an explicit dot1q encapsulated SAP. Since the VLAN ID is port-specific, those circuits connected to different ports might have the same VLAN. On the aggregation side, where the traffic is aggregated onto the same port, a unique VLAN ID is required.

**Figure 51: Ingress VLAN Translation**



21557

## Configuration Notes

The following caveats apply to the implementation of VPLS:

- fabric mode must be set to aggregate mode (not per-destination mode)
- associating a service with a filter policy other than the default policy is optional

## Reference Sources

For information on supported IETF drafts and standards, as well as standard and proprietary MIBs, refer to [Standards and Protocol Support](#).

---





## Configuring a VPLS Service with CLI

This section provides information to configure VPLS services using the command line interface.

Topics in this section include:

- [Basic Configuration on page 370](#)
- [Common Configuration Tasks on page 372](#)
- [Configuring VPLS Components on page 372](#)
  - [Creating a VPLS Service on page 373](#)
  - [Creating a Split Horizon Group on page 373](#)
  - [Enabling MAC Move on page 374](#)
- [Configuring a VPLS SAP on page 375](#)
  - [Local VPLS SAPs on page 375](#)
  - [Distributed VPLS SAPs on page 376](#)
  - [Configuring VPLS SAPs with Split Horizon on page 377](#)
- [Configuring SDP Bindings on page 378](#)
  - [Configuring Mesh SDP Bindings on page 380](#)
  - [Configuring Spoke SDP Bindings on page 380](#)
  - [Configuring VPLS Spoke SDPs with Split Horizon on page 382](#)
  - [Configuring Selective MAC Flush on page 382](#)
- [ATM PVC Access and Termination on a VPLS Service on page 383](#)
- [Service Management Tasks on page 384](#)
  - [Modifying VPLS Service Parameters on page 384](#)
  - [Deleting a VPLS Service on page 385](#)
  - [Disabling a VPLS Service on page 385](#)
  - [Re-enabling a VPLS Service on page 386](#)

### Basic Configuration

The following fields require specific input (there are no defaults) to configure a basic VPLS service:

- customer ID (refer to [Configuring Customer Accounts](#))
- for a local service, configure two SAPs, specifying local access ports and encapsulation values
- for a distributed service, configure a SAP and an SDP for each far-end node

The following example displays a configuration of a local VPLS service on ALU-1.

```
*A:ALU-1>config>service>vpls# info

...
 vpls 9001 customer 6 create
 description "Local VPLS"
 sap 1/2/2:0 create
 description "SAP for local service"
 exit
 sap 1/1/5:0 create
 description "SAP for local service"
 exit
 no shutdown

*A:ALU-1>config>service>vpls#
```

The following example displays a configuration of a distributed VPLS service between ALU-1, ALU-2, and ALU-3. The *vc-id* for all mesh SDPs must match the *service-id*.

```
*A:ALU-1>config>service# info

...
 vpls 9000 customer 6 create
 shutdown
 description "This is a distributed VPLS."
 sap 1/1/5:16 create
 description "VPLS SAP"
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 7:9000 create
 exit
 exit
...

*A:ALU-1>config>service#
```

```

*A:ALU-2>config>service# info

...
 vpls 9000 customer 6 create
 description "This is a distributed VPLS."
 sap 1/1/5:16 create
 description "VPLS SAP"
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 8:9000 create
 exit
 no shutdown
 exit
...

*A:ALU-2>config>service#

*A:ALU-3>config>service# info

...
 vpls 9000 customer 6 create
 description "This is a distributed VPLS."
 sap 1/1/3:33 create
 description "VPLS SAP"
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 8:9000 create
 exit
 no shutdown
 exit
...

*A:ALU-3>config>service#

```

### Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure both local and distributed VPLS services and provides the CLI commands.

For VPLS services:

1. Associate a VPLS service with a customer ID
2. Define SAPs:
  - a. Select node(s) and port(s)
  - b. (optional) Select QoS policies other than the default (configured in `config>qos` context)
  - c. (optional) Select filter policies (configured in `config>filter` context)
  - d. (optional) Select accounting policy (configured in `config>log` context)
3. Associate SDPs (for distributed services)
4. Enable the service

### Configuring VPLS Components

Use the CLI syntax shown in the following sections to configure the following entities:

- [Creating a VPLS Service](#)
- [Creating a Split Horizon Group](#)
- [Enabling MAC Move](#)
- [Local VPLS SAPs](#)
- [Distributed VPLS SAPs](#)
- [Configuring VPLS SAPs with Split Horizon](#)
- [Configuring Mesh SDP Bindings](#)
- [Configuring Spoke SDP Bindings](#)
- [Configuring VPLS Spoke SDPs with Split Horizon](#)
- [Configuring Selective MAC Flush](#)

## Creating a VPLS Service

Use the following CLI syntax to create a VPLS service:

**CLI Syntax:** `config>service#  
vpls service-id [customer customer-id] [vpn vpn-id]  
[create]  
description description-string  
no shutdown`

The following example displays a VPLS configuration:

```
*A:ALU-1>config>service>vpls# info

...
vpls 9000 customer 6 create
description "This is a distributed VPLS."
shutdown
exit
exit
...

*A:ALU-1>config>service>vpls#
```

## Creating a Split Horizon Group

Use the following CLI syntax to create a split horizon group for a VPLS instance. Including the `residential-group` parameter creates a residential split horizon group.

**CLI Syntax:** `config>service>vpls#  
split-horizon-group <group-name> [residential-group]  
[create]`

The following example displays a VPLS configuration:

```
*A:ALU-1>config>service>vpls# info

...
vpls 9000 customer 6 create
description "VPLS with split horizon"
split-horizon-group "SHG-group1" residential-group create
description "Residential Split horizon group"
exit
no shutdown
exit
...

*A:ALU-1>config>service>vpls#
```

## Enabling MAC Move

The MAC move feature is useful to protect against undetected loops in the VPLS topology as well as the presence of duplicate MACs in a VPLS service. For example, if two clients in the VPLS have the same MAC address, the VPLS will experience a high re-learn rate for the MAC and will shut down the SAP or spoke SDP when the threshold is exceeded.

Use the following CLI syntax to configure MAC move parameters:

**CLI Syntax:**

```
config>service
vpls service-id [customer customer-id] [vpn vpn-id]
[create]
 mac-move
 primary-ports
 spoke-sdp spoke-id
 cumulative-factor cumulative-factor
 exit
 secondary-ports
 spoke-sdp spoke-id
 sap sap-id
 exit
 move-frequency frequency
 retry-timeout timeout
 no shutdown
```

The following example displays a MAC move configuration:

```
*A:ALU-2009>config>service>vpls>mac-move# show service id 500 mac-move
=====
Service Mac Move Information
=====
Service Id : 500 Mac Move : Enabled
Primary Factor : 4 Secondary Factor : 2
Mac Move Rate : 2 Mac Move Timeout : 10
Mac Move Retries : 3

SAP Mac Move Information: 1/1/3:501

Admin State : Up Oper State : Down
Flags : RelearnLimitExceeded
Time to come up : 1 seconds Retries Left : 1
Mac Move : Blockable Blockable Level : Tertiary

SAP Mac Move Information: 1/1/3:502

Admin State : Up Oper State : Up
Flags : None
Time to RetryReset : 267 seconds Retries Left : none
Mac Move : Blockable Blockable Level : Tertiary

SDP Mac Move Information: 21:501

Admin State : Up Oper State : Up
```

```

Flags : None
Time to RetryReset : never Retries Left : 3
Mac Move : Blockable Blockable Level : Secondary

SDP Mac Move Information: 21:502

Admin State : Up Oper State : Down
Flags : RelearnLimitExceeded
Time to come up : never Retries Left : none
Mac Move : Blockable Blockable Level : Tertiary
=====
*A:*A:ALU-2009>config>service>vpls>mac-move#

```

## Configuring a VPLS SAP

A default QoS policy is applied to each ingress and egress SAP. Additional QoS policies can be configured in the `config>qos` context. There are no default filter policies. Filter policies are configured in the `config>filter` context and must be explicitly applied to a SAP.

Use the following CLI syntax to create:

- [Local VPLS SAPs](#)
- [Distributed VPLS SAPs](#)
- [Configuring VPLS SAPs with Split Horizon](#)
- [Configuring Mesh SDP Bindings](#)
- [Configuring Spoke SDP Bindings](#)
- [Configuring VPLS Spoke SDPs with Split Horizon](#)
- [Configuring Selective MAC Flush](#)

## Local VPLS SAPs

To configure a local VPLS service, enter the **sap** *sap-id* command twice with different port IDs in the same service configuration.

All supported service types and corresponding uplink SAPs are specified in the following examples.

The following example displays a local VPLS configuration:

```
*A:ALU-1>config>service# info

...
 vpls 9000 customer 6 create
 description "Local VPLS"
 sap 1/2/2:0 create
 description "SAP for local service"
 exit
 sap 1/1/5:0 create
 description "SAP for local service"
 exit
 no shutdown
 exit

*A:ALU-1>config>service#
```

### Distributed VPLS SAPs

To configure a distributed VPLS service, you must configure service entities on originating and far-end nodes. You must use the same service ID on all ends (for example, create a VPLS service ID 9000 on ALU-1, ALU-2, and ALU-3). A distributed VPLS consists of a SAP on each participating node and an SDP bound to each participating node.

For SDP configuration information, see [Configuring an SDP](#). For SDP binding information, see [Configuring SDP Bindings](#).

The following example displays a configuration of VPLS SAPs configured for ALU-1, ALU-2, and ALU-3:

```
*A:ALU-1>config>service# info

...
 vpls 9000 customer 6 vpn 750 create
 description "Distributed VPLS services."
 shutdown
 exit
 sap 1/2/5:0 create
 description "VPLS SAP"
 exit
 ...

*A:ALU-1>config>service#
*A:ALU-2>config>service# info

...
 vpls 9000 customer 6 vpn 750 create
 description "Distributed VPLS services."
 shutdown
 exit
 sap 1/1/2:22 create
 description "VPLS SAP"
```



```

 exit
 ...

*A:ALU-2>config>service#
*A:ALU-3>config>service# info

...
 vpls 9000 customer 6 vpn 750 create
 description "Distributed VPLS services."
 shutdown
 exit
 sap 1/1/3:33 create
 description "VPLS SAP"
 exit
 ...

*A:ALU-3>config>service#

```

## Configuring VPLS SAPs with Split Horizon

To configure a VPLS service with a split horizon group, add the `split-horizon-group` parameter when creating the SAP. Traffic arriving on a SAP within a split horizon group will not be copied to other SAPs in the same split horizon group.

The following example displays a VPLS configuration with split horizon enabled:

```

*A:ALU-1>config>service# info

...
 vpls 800 customer 6001 vpn 700 create
 description "VPLS with split horizon for DSL"
 sap 1/1/3:1/100 split-horizon-group "DSL-group1" create
 description "SAP for residential bridging"
 exit
 sap 1/1/3:1/200 split-horizon-group "DSL-group1" create
 description "SAP for residential bridging"
 exit
 split-horizon-group "DSL-group1" residential-group create
 description "Split horizon group for DSL"
 exit
 no shutdown
 exit
 ...

*A:ALU-1>config>service#

```

## Configuring SDP Bindings

VPLS provides scaling and operational advantages. A hierarchical configuration eliminates the need for a full mesh of VCs between participating devices. Hierarchy is achieved by enhancing the base VPLS core mesh of VCs with access VCs (spoke) to form two tiers. Spoke SDPs are generally created between Layer 2 switches and placed at the Multi-Tenant Unit (MTU). The PE routers are placed at the service provider's Point of Presence (POP). Signaling and replication overhead on all devices is considerably reduced.

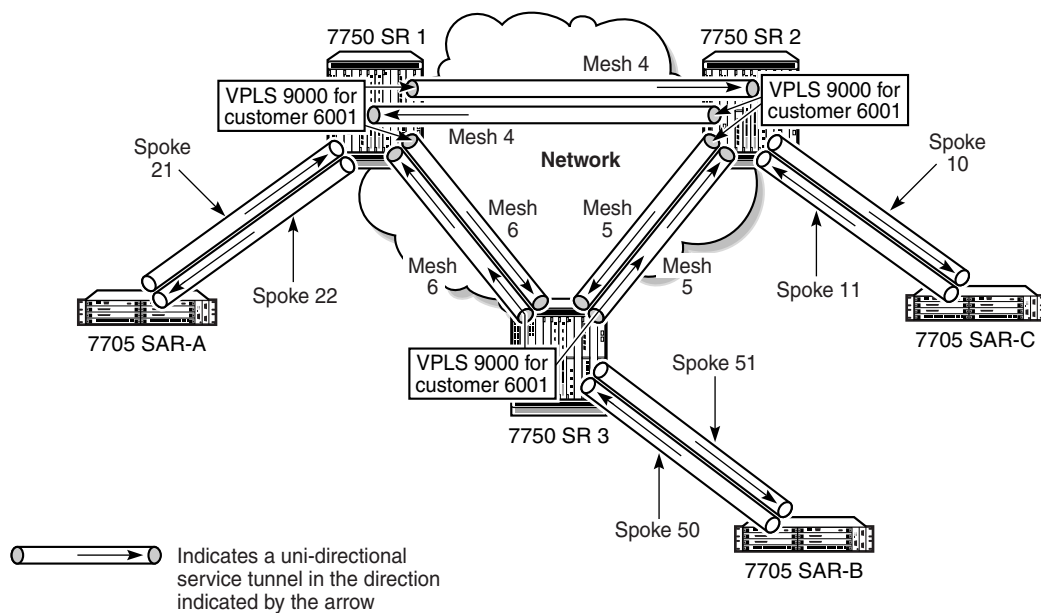
A spoke SDP is treated like the equivalent of a traditional bridge port, where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke and mesh SDPs or SAPs) and not transmitted on the port it was received on (unless a split horizon group was defined on the spoke SDP; see [Configuring VPLS Spoke SDPs with Split Horizon](#)).

A spoke SDP connects a VPLS service between two sites and, in its simplest form, could be a single tunnel LSP. A set of ingress and egress VC labels are exchanged for each VPLS service instance to be transported over this LSP. The PE routers at each end treat this as a virtual spoke connection for the VPLS service in the same way as the PE-MTU connections. This architecture minimizes the signaling overhead and avoids a full mesh of VCs and LSPs between the two metro networks.

A mesh SDP bound to a service is logically treated like a single bridge “port” for flooded traffic, where flooded traffic received on any mesh SDP on the service is replicated to other “ports” (spoke SDPs and SAPs) and not transmitted on any mesh SDPs.

A VC-ID can be specified with the SDP-ID. The VC-ID is used instead of a label to identify a virtual circuit. The VC-ID is significant between peer 7705 SAR routers on the same hierarchical level. The value of a VC-ID is conceptually independent from the value of the label or any other datalink-specific information of the VC.

[Figure 52](#) displays an example of a distributed VPLS service configuration of spoke and mesh SDPs (unidirectional tunnels) between 7750 SR routers and 7705 SAR MTUs.

**Figure 52: SDPs — Unidirectional Tunnels**

21561

Use the following CLI syntax for:

- [Configuring Mesh SDP Bindings](#)
- [Configuring Spoke SDP Bindings](#)
- [Configuring VPLS Spoke SDPs with Split Horizon](#)
- [Configuring Selective MAC Flush](#)

## Configuring Mesh SDP Bindings

Use the following CLI syntax to create a mesh SDP binding with a distributed VPLS service. SDPs must be configured prior to binding. Refer to [Configuring an SDP](#) for information about creating SDPs.

Use the following CLI syntax to configure mesh SDP bindings:

**CLI Syntax:**

```
config>service# vpls service-id
mesh-sdp sdp-id[:vc-id] [vc-type {ether | vlan}]
egress
 filter {ip ip-filter-id|mac mac-filter-id}
 vc-label egress-vc-label
ingress
 filter {ip ip-filter-id|mac mac-filter-id}
 vc-label ingress-vc-label
no shutdown
static-mac ieee-address
vlan-vc-tag 0..4094
```

## Configuring Spoke SDP Bindings

Use the following CLI syntax to create a spoke SDP binding with a distributed VPLS service. SDPs must be configured prior to binding. Refer to [Configuring an SDP](#) for information about creating SDPs.

Use the following CLI syntax to configure spoke SDP bindings:

**CLI Syntax:**

```
config>service# vpls service-id
spoke-sdp sdp-id:vc-id [vc-type {ether | vlan}]
[split-horizon-group group-name]
egress
 filter {ip ip-filter-id | mac mac-filter-id}
 vc-label egress-vc-label
ingress
 filter {ip ip-filter-id | mac mac-filter-id}
 vc-label ingress-vc-label
limit-mac-move [non-blockable]
vlan-vc-tag 0..4094
no shutdown
static-mac ieee-address
vlan-vc-tag [0..4094]
```

The following displays SDP binding configurations for ALU-1, ALU-2, and ALU-3 for VPLS service ID 9000 for customer 6:

```
*A:ALU-1>config>service# info

...
 vpls 9000 customer 6 create
 description "This is a distributed VPLS."
 sap 1/2/5:0 create
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 5:9000 create
 exit
 mesh-sdp 7:9000 create
 exit
 no shutdown
 exit

*A:ALU-1>config>service#

*A:ALU-2>config>service# info

...
 vpls 9000 customer 6 create
 description "This is a distributed VPLS."
 sap 1/1/2:22 create
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 5:9000 create
 exit
 mesh-sdp 7:9000 create
 exit
 no shutdown
 exit

*A:ALU-3>config>service# info

...
 vpls 9000 customer 6 create
 description "This is a distributed VPLS."
 sap 1/1/3:33 create
 exit
 spoke-sdp 2:22 create
 exit
 mesh-sdp 5:9000 create
 exit
 mesh-sdp 7:9000 create
 exit
 no shutdown
 exit

*A:ALU-3>config>service#
```

### Configuring VPLS Spoke SDPs with Split Horizon

To configure spoke SDPs with a split horizon group, add the `split-horizon-group` parameter when creating the spoke SDP. Traffic arriving on a SAP or spoke SDP within a split horizon group will not be copied to other SAPs or spoke SDPs in the same split horizon group.

The following example displays a VPLS configuration with split horizon enabled:

```
*A:ALU-1>config>service# info

...
 vpls 800 customer 6001 vpn 700 create
 description "VPLS with split horizon for DSL"
 spoke-sdp 51:15 split-horizon-group "DSL-group1" create
 exit
 split-horizon-group "DSL-group1"
 description "Split horizon group for DSL"
 exit
 no shutdown
 exit
...

*A:ALU-1>config>service#
```

### Configuring Selective MAC Flush

Use the following CLI syntax to enable selective MAC flush in a VPLS instance:

**CLI Syntax:** `config>service# vpls service-id  
send-flush-on-failure`

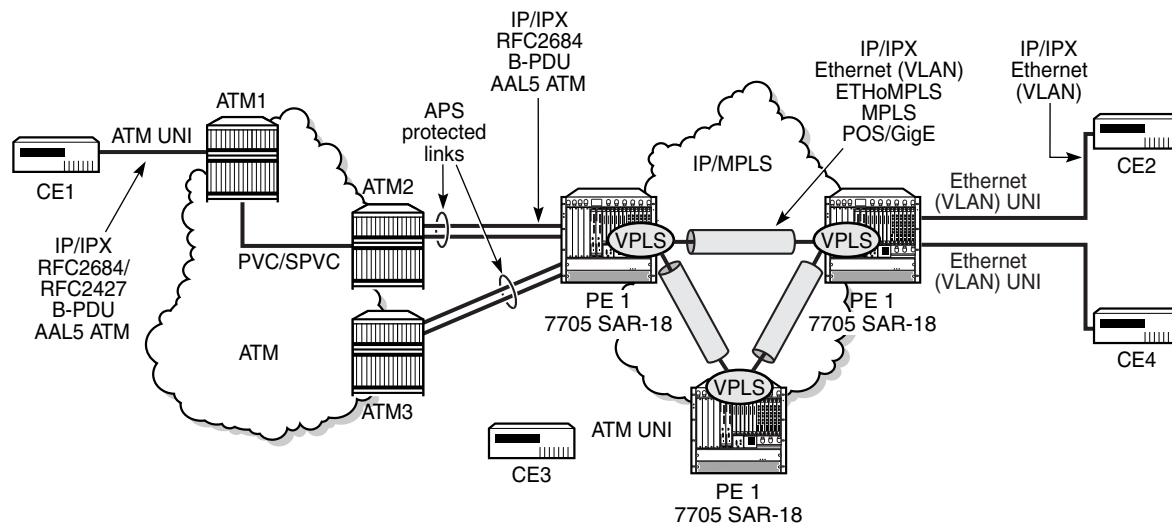
Use the following CLI syntax to disable selective MAC flush in a VPLS instance:

**CLI Syntax:** `config>service# vpls service-id  
no send-flush-on-failure`

## ATM PVC Access and Termination on a VPLS Service

The application is shown in [Figure 53](#) provides access to a VPLS service for ATM users connected either directly or through an ATM access network to a 7705 SAR PE node. The 7705 SAR supports an ATM VC-delimited SAP terminating on a VPLS service.

**Figure 53: Example of ATM PVC Access and Termination on a VPLS**



21558

RFC 2427-encapsulated or RFC 2684-encapsulated untagged Ethernet/802.3 frames (with or without Frame Check Sequence (FCS)) or BPDUs from a customer's bridge device are received on a given SAP over an ATM interface on the 7705 SAR. The ATM-related encapsulation is stripped, and the frames (without FCS) are forwarded towards destination SAPs either locally or using SDPs associated with the VPLS service (as dictated by destination MAC address VPLS processing). In the egress direction, the received untagged frames are encapsulated into RFC 2427 or RFC 2684 (no Q-tags are added, no FCS in the forwarded frame) and sent over the ATM VC towards the customer CPE.

When AAL5 RFC 2427/2684 encapsulated tagged frames are received from the customer's bridge on an ATM SAP, the tags are transparent and the frames are processed as described above, with the exception that the frames forwarded towards the destination(s) will have the received tags preserved. Similarly, in the egress direction, the received tagged Ethernet frames are encapsulated as is (Q-tags are again transparent and preserved) into RFC 2427/2684 and sent over the ATM PVC towards the customer CPE.

Since the tagging is transparent, the 7705 SAR performs unqualified MAC learning (for example, MAC addresses are learned without reference to the VLANs they are associated with). Hence, MAC addresses used must be unique across all the VLANs used by the customer for a given VPLS service instance. If a customer wants a per-VLAN separation, then the VLAN traffic that needs to be separated must travel on different VCs (different SAPs) associated with different VPLS service instances.

All VPLS functionality available on the 7705 SAR is applicable to ATM-delimited VPLS SAPs. For example, bridged PDUs received over an ATM SAP can be tunneled through or dropped, all Forwarding Database (FDB) functionality applies, packet-level QoS and MAC filtering applies. Also, split horizon groups are applicable to ATM SAPs terminating on VPLS. In other words, frame forwarding between ATM SAPs, also referred to as VCI-to-VCI forwarding, is disabled within the same group.

The Ethernet pseudowire is established using Targeted LDP (TLDP) signaling and uses the `ether`, `vlan`, or `vpls` VC type on the SDP. The SDP can be an MPLS or a GRE type.

## Service Management Tasks

This section discusses the following service management tasks:

- [Modifying VPLS Service Parameters](#)
- [Deleting a VPLS Service](#)
- [Disabling a VPLS Service](#)
- [Re-enabling a VPLS Service](#)

## Modifying VPLS Service Parameters

You can change existing service parameters. The changes are applied immediately.

To display a list of services, use the `show service service-using vpls` command. Enter the parameters such as description, SAP, SDP, and/or service-MTU command syntax, and then enter the new information.



The following displays a modified VPLS configuration:

```
*A:ALU-1>config>service>vpls# info

description "This is a different description."
disable-learning
disable-aging
discard-unknown
local-age 500
remote-age 1000
sap 1/1/5:22 create
 description "VPLS SAP"
exit
spoke-sdp 2:22 create
exit
no shutdown

*A:ALU-1>config>service>vpls#
```

## Deleting a VPLS Service

A VPLS service cannot be deleted until SAPs and SDPs are unbound (deleted), interfaces are shut down, and the service is shut down on the service level.

Use the following CLI syntax to delete a VPLS service:

**CLI Syntax:**

```
config>service
 [no] vpls service-id
 shutdown
 [no] mesh-sdp sdp-id
 shutdown
 sap sap-id [split-horizon-group group-name]
 no sap sap-id
 shutdown
```

## Disabling a VPLS Service

Use the following CLI syntax to shut down a VPLS service without deleting the service parameters:

**CLI Syntax:**

```
config>service> vpls service-id
 [no] shutdown
```

**Example:**

```
config>service# vpls 1
config>service>vpls# shutdown
config>service>vpls# exit
```

## Re-enabling a VPLS Service

To re-enable a VPLS service that was shut down:

**CLI Syntax:** `config>service> vpls service-id  
[no] shutdown`

**Example:** `config>service# vpls 1  
config>service>vpls# no shutdown  
config>service>vpls# exit`

---

---

## VPLS Command Reference

---

### Command Hierarchies

- [Global Commands](#)
- [SAP Commands](#)
- [Mesh SDP Commands](#)
- [Spoke SDP Commands](#)
- [Show Commands](#)
- [Clear Commands](#)
- [Debug Commands](#)

## VPLS Service Configuration Commands

### Global Commands

```

config
 — service
 — vpls service-id [customer customer-id] [vpn vpn-id] [create]
 — no vpls service-id
 — description description-string
 — no description
 — [no] disable-aging
 — [no] disable-learning
 — [no] discard-unknown
 — endpoint endpoint-name [create]
 — no endpoint
 — [no] block-on-mesh-failure
 — description description-string
 — no description
 — [no] ignore-standby-signaling
 — [no] mac-pinning
 — max-nbr-mac-addr table-size
 — no max-nbr-mac-addr
 — revert-time revert-time | infinite
 — no revert-time
 — static-mac ieee-address [create]
 — no static-mac
 — [no] suppress-standby-signaling
 — [no] fdb-table-high-wmark high-water-mark
 — [no] fdb-table-low-wmark low-water-mark
 — fdb-table-size table-size
 — no fdb-table-size [table-size]
 — local-age aging-timer
 — no local-age
 — [no] mac-move
 — move-frequency frequency
 — no move-frequency
 — number-retries number-retries
 — no number-retries
 — primary-ports
 — cumulative-factor cumulative-factor
 — no cumulative-factor
 — [no] sap sap-id
 — [no] spoke-sdp spoke-id
 — retry-timeout timeout
 — no retry-timeout
 — secondary-ports
 — cumulative-factor cumulative-factor
 — no cumulative-factor
 — [no] sap sap-id
 — [no] spoke-sdp spoke-id
 — [no] shutdown
 — mac-subnet-length subnet-length

```

- **no mac-subnet-length**
- **[no] pppoe-circuit-id**
- **[no] propagate-mac-flush**
- **remote-age** *aging-timer*
- **no remote-age**
- **[no] send-flush-on-failure**
- **service-mtu** *octets*
- **no service-mtu**
- **[no] shutdown**
- **[no] split-horizon-group** *group-name* [**residential-group**]
  - **description** *description-string*
  - **no description**

## SAP Commands

- config
  - service
    - **vpls** *service-id* [**customer** *customer-id*] [**vpn** *vpn-id*] [**create**]
    - **no vpls** *service-id*
      - **sap** *sap-id* [**split-horizon-group** *group-name*] [**create**]
      - **no sap** *sap-id*
        - **accounting-policy** *acct-policy-id*
        - **no accounting-policy**
        - **anti-spoof** {**ip** | **mac** | **ip-mac**}
        - **no anti-spoof**
        - **atm**
          - **egress**
            - **traffic-desc** *traffic-desc-profile-id*
            - **no traffic-desc**
          - **encapsulation** *atm-encap-type*
          - **oam**
            - **[no] alarm-cells**
          - **subscriber-vlan** [*vlan-id*]
          - **no subscriber-vlan**
      - **[no] collect-stats**
      - **description** *description-string*
      - **no description**
      - **dhcp**
        - **description** *description-string*
        - **no description**
        - **[no] option**
          - **action** [*dhcp-action*]
          - **no action**
          - **circuit-id** [*ascii-tuple* | *vlan-ascii-tuple*] | **no circuit-id**
          - **[no] remote-id** [*mac* | *string string*]
          - **[no] vendor-specific-option**
            - **[no] client-mac-address**
            - **[no] sap-id**
            - **[no] service-id**
            - **string** *text*
            - **no string**

- [no] **system-id**
- [no] **shutdown**
- [no] **snoop**
- [no] **disable-aging**
- [no] **disable-learning**
- [no] **discard-unknown-source**
- **egress**
  - **filter ip** *ip-filter-id*
  - **filter**
  - **no filter** [*ip ip-filter-id*]
  - **qos** *policy-id*
  - **no qos**
- [no] **force-c-vlan-forwarding**
- **ingress**
  - **filter ip** *ip-filter-id*
  - **filter mac** *mac-filter-id*
  - **no filter** [*ip ip-filter-id*] [*mac mac-filter-id*]
  - **qos** *policy-id*
  - **no qos**
- **limit-mac-move** [*blockable* | *non-blockable*]
- **no limit-mac-move**
- [no] **mac-pinning**
- **max-nbr-mac-addr** *table-size*
- **no max-nbr-mac-addr**
- [no] **pppoe-circuit-id**
- [no] **shutdown**
- **static-host ip** *ip-address* [*mac ieee-address*] [*create*]
- **static-host mac** *ieee-address* [*create*]
- **no static-host** [*ip ip-address*] *mac ieee-address*
- **no static-host all** [*force*]
- [no] **static-mac** *ieee-address* [*create*]

## Mesh SDP Commands

```

config
 — service
 — [no] vpls service-id [customer customer-id] [vpn vpn-id] [create]
 — mesh-sdp sdp-id[:vc-id] [vc-type {ether | vlan}]
 — no mesh-sdp sdp-id[:vc-id]
 — [no] control-word
 — egress
 — vc-label egress-vc-label
 — no vc-label [egress-vc-label]
 — ingress
 — filter ip ip-filter-id
 — filter mac mac-filter-id
 — no filter [ip ip-filter-id] [mac mac-filter-id]
 — vc-label ingress-vc-label
 — no vc-label [ingress-vc-label]
 — [no] mac-pinning
 — [no] shutdown
 — [no] static-mac ieee-address

```

- **vlan-vc-tag** *0..4094*
- **no vlan-vc-tag** [*0..4094*]

## Spoke SDP Commands

- ```

config
— service
— [no] vpls service-id [customer customer-id] [vpn vpn-id] [create]
— spoke-sdp sdp-id[:vc-id] [vc-type {ether | vlan}] [split-horizon-group group-name] [create] [no-endpoint]
— spoke-sdp sdp-id[:vc-id] [vc-type {ether | vlan}] [split-horizon-group group-name] [create] endpoint endpoint-name
— no spoke-sdp sdp-id[:vc-id]
— [no] block-on-mesh-failure
— [no] control-word
— [no] disable-aging
— [no] disable-learning
— [no] discard-unknown-source
— egress
— vc-label egress-vc-label
— no vc-label [egress-vc-label]
— [no] ignore-standby-signaling
— ingress
— filter ip ip-filter-id
— filter mac mac-filter-id
— no filter [ip ip-filter-id] [mac mac-filter-id]
— vc-label ingress-vc-label
— no vc-label [ingress-vc-label]
— limit-mac-move [blockable | non-blockable]
— no limit-mac-move
— [no] mac-pinning
— max-nbr-mac-addr table-size
— no max-nbr-mac-addr
— precedence [precedence-value | primary]
— no precedence
— [no] shutdown
— [no] static-mac ieee-address
— vlan-vc-tag 0..4094
— no vlan-vc-tag [0..4094]

```

Show Commands

- ```

show
— service
— egress-label start-label [end-label]
— fdb-info
— fdb-mac ieee-address [expiry]
— id service-id
— all
— base
— dhcp

```

- **statistics** [sap *sap-id*] | [sdp *sdp-id:vc-id*]
- **statistics** [interface *interface-name* | *ip-address*]
- **summary**
- **endpoint**
- **fdb** [sap *sap-id* | sdp *sdp-id* | mac *ieee-address* | endpoint *endpoint* | detail ] [expiry]
- **labels**
- **mac-move**
- **sap**
  - **pppoe-circuit-id** statistics
- **sap** *sap-id* [atm | base | detail | qos | sap-stats | stats]
- **sdp**
- **sdp** {*sdp-id[:vc-id]* | far-end *ip-address*} [detail]
- **split-horizon-group** [*group-name*]
- **static-host** [sap *sap-id*] [wholesaler *service-id*] [port *port-id*] [inter-dest-id *intermediate-destination-id*] [detail] [mac *ieee-address*] [ip-address *ip-address*]
- **static-host** [sap *sap-id*] [wholesaler *service-id*] [port *port-id*] no-inter-dest-id [detail]
- **static-host** summary
- **ingress-label** *start-label* [*end-label*]
- **sap-using** [sap *sap-id*]
- **sap-using** interface [*ip-address* | *ip-int-name*]
- **sap-using** [ingress | egress] atm-td-profile *td-profile-id*
- **sap-using** [ingress | egress] filter *filter-id*
- **sap-using** authentication-policy *auth-plcy-name*
- **sap-using** [ingress | egress] qos-policy *qos-policy-id*

## Clear Commands

```
clear
 — service
 — id service-id
 — dhcp
 — statistics [sap sap-id | sdp sdp-id[:vc-id]] | interface [ip-address | ip-int-name]]
 — fdb {all | mac ieee-address | sap sap-id | mesh-sdp sdp-id[:vc-id] | spoke-sdp sdp-id:vc-id}
 — mesh-sdp sdp-id[:vc-id] ingress-vc-label
 — sap
 — pppoe-circuit-id statistics
 — spoke-sdp sdp-id:vc-id ingress-vc-label

clear
 — service
 — statistics
 — id service-id
 — cem
 — counters
 — spoke-sdp sdp-id:vc-id {all | counters | l2pt | mrp}
 — sap sap-id {all | cem | counters | l2pt | mrp}
 — sdp sdp-id keep-alive
```



```
clear
 — router
 — dhcp
 — statistics [interface ip-int-name | ip-address]
```

## Debug Commands

```
debug
 — service
 — id service-id
 — [no] event-type {config-change | svc-oper-status-change | sap-oper-status-
 change | sdpbind-oper-status-change}
 — [no] sap sap-id
```

Refer to the 7705 SAR OS OAM and Diagnostics Guide for information about CLI commands and syntax for OAM and diagnostics commands.

---

## Command Descriptions

- [VPLS Service Configuration Commands on page 395](#)
- [VPLS Show Commands on page 437](#)
- [VPLS Clear Commands on page 490](#)
- [VPLS Debug Commands on page 496](#)

---

## **VPLS Service Configuration Commands**

- [Generic Commands on page 396](#)
- [VPLS Service Commands on page 398](#)
- [VPLS SAP Commands on page 413](#)
- [VPLS SAP ATM Commands on page 418](#)
- [VPLS Filter and QoS Policy Commands on page 421](#)
- [Service Billing Commands on page 424](#)
- [VPLS SAP DHCP Commands on page 425](#)
- [VPLS SAP Anti-Spoofing Command on page 430](#)
- [VPLS SDP Commands on page 431](#)

---

## Generic Commands

### shutdown

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>        | <b>[no] shutdown</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>       | config>service>vpls<br>config>service>vpls>mac-move<br>config>service>vpls>split-horizon-group<br>config>service>vpls>sap<br>config>service>vpls>sap>dhcp<br>config>service>vpls>mesh-sdp<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>   | <p>This command administratively disables an entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.</p> <p>The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they can be deleted.</p> <p>Services are created in the administratively down (<b>shutdown</b>) state. When a <b>no shutdown</b> command is entered, the service becomes administratively up and then tries to enter the operationally up state. Default administrative states for services and service entities are described below in Special Cases.</p> <p>The <b>no</b> form of this command places the entity into an administratively enabled state.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Special Cases</b> | <p><b>Service Admin State</b> — Bindings to an SDP within the service will be put into the out-of-service state when the service is shut down. While the service is shut down, all customer packets are dropped and counted as discards for billing and debugging purposes.</p> <p><b>Service Operational State</b> — A service is regarded as operational providing that two SAPs or one SDP are operational.</p> <p><b>SDP (global)</b> — When an SDP is shut down at the global service level, all bindings to that SDP are put into the out-of-service state and the SDP itself is put into the administratively and operationally down states. Packets that would normally be transmitted using this SDP binding will be discarded and counted as dropped packets.</p> <p><b>SDP (service level)</b> — Shutting down an SDP within a service only affects traffic on that service from entering or being received from the SDP. The SDP itself may still be operationally up for other services.</p> <p><b>SDP Keepalives</b> — Enables SDP connectivity monitoring keepalive messages for the SDP ID. The default state is disabled (shutdown), in which case the operational state of the SDP-ID is not affected by the keepalive message state.</p> <p><b>VPLS SAPs and SDPs</b> — SAPs are created in a VPLS and SDPs are bound to a VPLS in the administratively up default state. The created SAP will attempt to enter the operationally up state. An SDP will attempt to go into the in-service state once bound to the VPLS.</p> |

## description

|                    |                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>description</b> <i>description-string</i><br><b>no description</b>                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls<br>config>service>vpls>endpoint<br>config>service>vpls>sap<br>config>service>vpls>sap>dhcp<br>config>service>vpls>split-horizon-group                                                                                                                                                                                             |
| <b>Description</b> | <p>This command creates a text description stored in the configuration file for a configuration context.</p> <p>The <b>description</b> command associates a text string with a configuration context to help identify the content in the configuration file.</p> <p>The <b>no</b> form of this command removes the string from the configuration.</p> |
| <b>Default</b>     | n/a                                                                                                                                                                                                                                                                                                                                                   |
| <b>Parameters</b>  | <p><i>description-string</i> — the description character string.</p> <p><b>Values</b> any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p>                                                |

---

## VPLS Service Commands

### vpls

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vpls</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ] [ <b>vpn</b> <i>vpn-id</i> ] [ <b>create</b> ]<br><b>no vpls</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | <p>This command creates or edits a Virtual Private LAN Services (VPLS) instance. If the <i>service-id</i> does not exist, a context for the service is created. If the <i>service-id</i> exists, the context for editing the service is entered.</p> <p>A VPLS service connects multiple customer sites together acting like a zero-hop, Layer 2 switched domain. A VPLS is always a logical full mesh.</p> <p>When a service is created, the <b>create</b> keyword and the <b>customer</b> keyword and <i>customer-id</i> must be specified in order to associate the service with a customer. The <i>customer-id</i> must already exist (created using the <b>customer</b> command in the service context). Once a service has been created with a customer association, it is not possible to edit the customer association. To edit the customer association, the service must be deleted and recreated with a new customer association.</p> <p>Once a service is created, the use of the <b>customer</b> <i>customer-id</i> is optional for navigating into the service configuration context. Attempting to edit a service with the incorrect <i>customer-id</i> specified will result in an error.</p> <p>More than one VPLS service may be created for a single customer ID.</p> <p>By default, no VPLS instances exist until they are explicitly created.</p> <p>The <b>no</b> form of this command deletes the VPLS service instance with the specified <i>service-id</i>. The service cannot be deleted until all SAPs and SDPs defined within the service ID have been shut down and deleted, and the service has been shut down.</p> |
| <b>Parameters</b>  | <p><i>service-id</i> — the unique service identification number identifying the service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR, 7750 SR, 7450 ESS, and 7710 SR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>customer</b> <i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>vpn</b> <i>vpn-id</i> — specifies the VPN ID number that allows you to identify virtual private networks (VPNs) by a VPN identification number</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**create** — this keyword is mandatory when creating a VPLS service

## block-on-mesh-failure

|                    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] block-on-mesh-failure</b>                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls>spoke-sdp<br>config>service>vpls>endpoint                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | This command enables blocking (brings the entity to an operationally down state) after all configured SDPs or endpoints are in operationally down state. This event is signaled to a corresponding T-LDP peer by withdrawing the service label (status-bit-signaling non-capable peer) or by setting the “PW not forwarding” status bit in the T-LDP message (status-bit-signaling capable peer). |
| <b>Default</b>     | <b>disabled</b>                                                                                                                                                                                                                                                                                                                                                                                   |

## disable-aging

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] disable-aging</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>vpls<br>config>service>vpls>sap<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command disables MAC address aging across a VPLS service or on a VPLS service SAP or spoke SDP.</p> <p>As is the case for a Layer 2 switch, learned MACs can be aged out if no packets are sourced from the MAC address for a period of time (the aging time). In each VPLS service instance, there are independent aging timers for local learned MAC and remote learned MAC entries in the VPLS forwarding database (FDB). The <b>disable-aging</b> command turns off aging for local and remote learned MAC addresses.</p> <p>When <b>no disable-aging</b> is specified for a VPLS, it is possible to disable aging for specific SAPs and/or spoke SDPs by entering the <b>disable-aging</b> command at the appropriate level.</p> <p>When the <b>disable-aging</b> command is entered at the VPLS level, the <b>disable-aging</b> state of individual SAPs or SDPs will be ignored.</p> <p>The <b>no</b> form of this command enables aging on the VPLS service.</p> |
| <b>Default</b>     | <b>no disable-aging</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### disable-learning

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] disable-learning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>vpls<br>config>service>vpls>sap<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command disables learning of new MAC addresses in the VPLS forwarding database (FDB) for the service instance, SAP instance, or spoke SDP instance.</p> <p>When <b>disable-learning</b> is enabled, new source MAC addresses will not be entered in the VPLS service forwarding database. This is true for both local and remote MAC addresses.</p> <p>When <b>disable-learning</b> is disabled, new source MAC addresses will be learned and entered into the VPLS forwarding database.</p> <p>This parameter is mainly used in conjunction with the <b>discard-unknown</b> command.</p> <p>The <b>no</b> form of this command enables learning of MAC addresses.</p> |
| <b>Default</b>     | <b>no disable-learning (Normal MAC learning is enabled)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

### discard-unknown

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] discard-unknown</b>                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>By default, packets with unknown destination MAC addresses are flooded. If <b>discard-unknown</b> is enabled at the VPLS level, packets with an unknown destination MAC address will be dropped instead of being flooded (even when configured FDB size limits for VPLS or SAPs are not yet reached).</p> <p>The <b>no</b> form of this command allows flooding of packets with unknown destination MAC addresses in the VPLS.</p> |
| <b>Default</b>     | <b>no discard-unknown — packets with unknown destination MAC addresses are flooded</b>                                                                                                                                                                                                                                                                                                                                                |

### endpoint

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| <b>Syntax</b>      | <b>endpoint <i>endpoint-name</i> [create]</b><br><b>no endpoint</b> |
| <b>Context</b>     | config>service>vpls                                                 |
| <b>Description</b> | This command configures a service endpoint.                         |



|                   |                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>endpoint-name</i> — specifies an endpoint name                                                                                                        |
| <b>Values</b>     | any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”). |
| <b>create</b>     | — this keyword is mandatory when creating a service endpoint                                                                                             |

## ignore-standby-signaling

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] ignore-standby-signaling</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vpls>endpoint<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>When this command is enabled, the node will ignore the standby bit received from T-LDP peers for the given spoke SDP and performs internal tasks without taking the standby bit into account — traffic can egress out to the spoke SDP.</p> <p>This command is present at the endpoint level as well as at the spoke SDP level. If the spoke SDP is part of the explicit endpoint, it is not possible to change this setting at the spoke SDP level. The existing spoke SDP will become part of the explicit endpoint only if the setting is not conflicting. The newly created spoke SDP that is a part of the given explicit endpoint will inherit this setting from the endpoint configuration.</p> |
| <b>Default</b>     | <b>enabled</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## revert-time

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>revert-time <i>revert-time</i>   infinite</b><br><b>no revert-time</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vpls>endpoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command configures the time to wait before reverting to the primary spoke SDP.</p> <p>For a regular endpoint, the <i>revert-time</i> setting affects only the pseudowire defined as “primary” (precedence 0). If the primary pseudowire fails and is then restored, the revert timer is started. After the revert timer expires, the primary pseudowire takes the active role in the endpoint. This behavior does not apply if both pseudowires are defined as “secondary”. For example, if the active secondary pseudowire fails and is restored, it will stay in standby until a configuration change or a force command occurs.</p> |
| <b>Parameters</b>  | <i>revert-time</i> — specifies the time to wait, in seconds, before reverting back to the primary spoke SDP defined on this service endpoint, after having failed to move over to a backup spoke SDP                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Values</b>      | 0 to 600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>infinite</b>    | — specifying this keyword makes the endpoint non-revertive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## static-mac

|                    |                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>static-mac</b> <i>ieee-address</i> [ <b>create</b> ]<br><b>no static-mac</b>                                                             |
| <b>Context</b>     | config>service>vpls>endpoint                                                                                                                |
| <b>Description</b> | This command assigns a static MAC address to the endpoint. In the FDB, the static MAC address is then associated with the active spoke SDP. |
| <b>Default</b>     | n/a                                                                                                                                         |
| <b>Parameters</b>  | <i>ieee-address</i> — specifies the static MAC address assigned to the endpoint                                                             |
|                    | <b>Values</b> 6-byte MAC address (xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx) - cannot be all zeros                                             |
|                    | <b>create</b> — this keyword is mandatory when creating a static MAC address                                                                |

## suppress-standby-signaling

|                    |                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] suppress-standby-signaling</b>                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vpls>endpoint                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | When this command is enabled, the pseudowire standby bit (value 0x00000020) will not be sent to the T-LDP peer when the given spoke SDP is selected as a standby. This allows faster switchover because the traffic will be sent over this SDP and discarded at the blocking side of the connection. This is particularly applicable to multicast traffic. |
| <b>Default</b>     | enabled                                                                                                                                                                                                                                                                                                                                                    |

## pppoe-circuit-id

|                    |                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] pppoe-circuit-id</b>                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>vpls<br>config>service>vpls>sap                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | When enabled, this command appends Agent-Circuit-Id information to PADI and PADR packets received from an ATM SAP (the subscriber) that is bound to a VPLS instance. The Agent-Circuit-Id information is compliant with RFC 4679 section-3.3.1; Agent-Circuit-Id. The ATM SAP must be configured for bridged llc-snap encapsulation. |

The **pppoe-circuit-id** command can be enabled or disabled for a VPLS instance or an individual ATM SAP. When applied to a VPLS instance, **pppoe-circuit-id** appends the Agent-Circuit-Id to all ATM SAPs bound to that VPLS instance. Furthermore, **pppoe-circuit-id** can be applied to individual SAPs bound to that VPLS instance in order to override the VPLS setting. If there is a mix of enabled and disabled SAPs bound to the VPLS instance, applying the command to the VPLS will override the mix, enabling (or disabling) **pppoe-circuit-id** on all the SAPs.

In addition, any newly created SAPs bound to the VPLS will default to match the VPLS setting.

As per the DSL Forum TR-101 April'06 specification, section 3.9.2, any PPPoE vendor-specific tag that may already be present in the received frame is replaced by the 7705 SAR client-id tag.

The **no** version of this command disables appending the Agent-Circuit-Id information.

**Default**      **disabled**

## propagate-mac-flush

**Syntax**      **[no] propagate-mac-flush**

**Context**      config>service>vpls

**Description**      This command enables the propagation of mac-flush messages received from the given T-LDP on all spoke and mesh SDPs within the context of the VPLS service. The propagation conforms to split-horizon principles and any datapath blocking in order to avoid looping of these messages.

**Default**      **disabled**

## fdb-table-high-wmark

**Syntax**      **[no] fdb-table-high-wmark *high-water-mark***

**Context**      config>service>vpls

**Description**      This command specifies the upper threshold value for FDB entries. The *high-water-mark* is configured as a percentage of the FDB. When the number of FDB entries exceeds the *high-water-mark*, the system raises a log event.

**Parameters**      *high-water-mark* — specifies the upper threshold for FDB entries, which when exceeded, causes the system to raise a log event

**Values**      1 to 100

**Default**      95%

## fdb-table-low-wmark

|                    |                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] fdb-table-low-wmark</b> <i>low-water-mark</i>                                                                                                                                                                                       |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                         |
| <b>Description</b> | This command specifies the lower threshold value for FDB entries. The <i>low-water-mark</i> is configured as a percentage of the FDB. When the number of FDB entries drops below the <i>low-water-mark</i> , the system raises a log event. |
| <b>Parameters</b>  | <i>low-water-mark</i> — specifies the lower threshold for FDB entries, which when dropped below, causes the system to raise a log event                                                                                                     |
| <b>Values</b>      | 1 to 100                                                                                                                                                                                                                                    |
| <b>Default</b>     | 90%                                                                                                                                                                                                                                         |

## fdb-table-size

|                    |                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>fdb-table-size</b> <i>table-size</i><br><b>no fdb-table-size</b> [ <i>table-size</i> ]                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | This command specifies the maximum number of MAC entries in the FDB for the VPLS instance on this node.<br><br>The <b>fdb-table-size</b> specifies the maximum number of FDB entries for both learned and static MAC addresses for the VPLS instance.<br><br>The <b>no</b> form of this command returns the maximum FDB table size to the default. |
| <b>Default</b>     | 250                                                                                                                                                                                                                                                                                                                                                |
| <b>Values</b>      | 1 to 16383                                                                                                                                                                                                                                                                                                                                         |

## local-age

|                    |                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>local-age</b> <i>aging-timer</i><br><b>no local-age</b>                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                    |
| <b>Description</b> | This command specifies the aging time for locally learned MAC addresses in the FDB for the VPLS instance. In a VPLS service, MAC addresses are associated with a SAP or SDP. MACs associated with a SAP are classified as local MACs, and MACs associated with an SDP are remote MACs. |

As is the case for a Layer 2 switch, learned MACs can be aged out if no packets are sourced from the MAC address for a period of time (the aging time). In each VPLS service instance, there are independent aging timers for locally learned MAC and remotely learned MAC entries in the FDB. The **local-age** timer specifies the aging time for locally learned MAC addresses.

The **no** form of this command returns the local aging timer to the default value.

|                   |                                                                         |
|-------------------|-------------------------------------------------------------------------|
| <b>Default</b>    | <b>300</b>                                                              |
| <b>Parameters</b> | <i>aging-timer</i> — the aging time for local MACs expressed in seconds |
| <b>Values</b>     | 60 to 86400                                                             |

## mac-move

|                    |                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mac-move</b>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command enables the context to configure MAC move attributes. A sustained, high relearn rate can be a sign of a loop somewhere in the VPLS topology. Typically, the spanning tree protocol (STP) detects loops in the topology, but for those networks that do not run STP, the <b>mac-move</b> feature is an alternative way to protect the network against loops. |

When enabled in a VPLS, **mac-move** monitors the relearn rate of each MAC. If the rate exceeds the configured maximum allowed limit, it disables the SAP where the source MAC was last seen. The SAP can be disabled permanently (until a **shutdown/no shutdown** command is executed) or for a length of time that increases linearly with the number of times the given SAP was disabled. A SAP can be marked as non-blockable in the **config>service>vpls>sap>limit-mac-move** or **config>service>vpls>spoke-sdp>limit-mac-move** contexts. This means that when the relearn rate has exceeded the limit, another (blockable) SAP will be disabled instead.

The **mac-move** command enables the feature at the service level for SAPs and spoke SDPs, as only those objects can be blocked by this feature. Mesh SDPs are never blocked, but their relearn rates (SAP-to-mesh/spoke-to-mesh or vice versa) are still measured.

The operation of this feature is the same on the SAP and spoke SDP. For example, if a MAC address moves from SAP to SAP, from SAP to spoke SDP, or between spoke SDPs, one will be blocked to prevent thrashing. If the MAC address moves between a SAP and mesh SDP or spoke SDP and mesh SDP combinations, the respective SAP or spoke SDP will be blocked.

The **mac-move** command will disable a VPLS port when the number of relearns detected has reached the number of relearns needed to reach the move frequency in the 5-s interval. For example, when the move frequency is configured to 1 (1 relearn per second), **mac-move** will disable one of the VPLS ports when 5 relearns were detected during the 5-s interval because the average move frequency of 1 relearn per second has been reached. This can also occur in the first second if the relearn rate is 5 relearns per second or higher.

The **no** form of this command disables MAC move.

## mac-subnet-length

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mac-subnet-length</b> <i>subnet-length</i><br><b>no mac-subnet-length</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | This command specifies the number of bits to be considered when performing MAC learning (MAC source) and MAC switching (MAC destination). Specifically, this value identifies how many bits are used, starting from the beginning of the MAC address. For example, if the mask value of 28 is used, MAC learning will only do a lookup for the first 28 bits of the source MAC address when comparing it with existing FDB entries. Then, it will install the first 28 bits in the FDB while zeroing out the last 20 bits of the MAC address. When performing switching in the reverse direction, only the first 28 bits of the destination MAC address will be used to perform an FDB lookup to determine the next hop.<br><br>The <b>no</b> form of this command switches back to full MAC lookup. |
| <b>Parameters</b>  | <i>subnet-length</i> — specifies the number of bits to be considered when performing MAC learning or MAC switching<br><br><b>Values</b> 24 to 48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## move-frequency

|                    |                                                                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>move-frequency</b> <i>frequency</i><br><b>no move-frequency</b>                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vpls>mac-move                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | This command indicates the maximum rate at which MACs can be relearned in the VPLS service before the SAP where the moving MAC was last seen is automatically disabled in order to protect the system against undetected loops or duplicate MACs.<br><br>The <b>no</b> form of the command reverts to the default value |
| <b>Default</b>     | <b>2 (when mac-move is enabled); for example, 10 relearns in a 5-s period.</b>                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <i>frequency</i> — specifies the rate, in 5-s intervals, for the maximum number of relearns<br><br><b>Values</b> 1 to 100                                                                                                                                                                                               |

## number-retries

|                    |                                                                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>number-retries</b> <i>number-retries</i><br><b>no number-retries</b>                                                                         |
| <b>Context</b>     | config>service>vpls>mac-move                                                                                                                    |
| <b>Description</b> | This command configures the number of times that retries are performed for re-enabling the SAP or SDP bindings.                                 |
| <b>Parameters</b>  | <i>number-retries</i> — specifies the number of retries for re-enabling the SAP/SDP. A zero (0) value indicates an unlimited number of retries. |
| <b>Values</b>      | 0 to 255                                                                                                                                        |

## primary-ports

|                    |                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>primary-ports</b>                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls>mac-move                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | This command enables the context to define primary VPLS ports. VPLS ports that were declared as secondary prior to the execution of this command will be moved from secondary port level to primary port level. Changing a port to the tertiary level (default) can only be done by first removing it from the secondary port level. |

## cumulative-factor

|                    |                                                                                                                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>cumulative-factor</b> <i>cumulative-factor</i><br><b>no cumulative-factor</b>                                                                                                                                                                                                                                     |
| <b>Context</b>     | configure>service>vpls>mac-move>primary-ports<br>configure>service>vpls>mac-move>secondary-ports                                                                                                                                                                                                                     |
| <b>Description</b> | This command configures a factor for the primary or secondary ports that defines how many MAC relearn periods should be used to measure the MAC relearn rate. The rate must be exceeded during consecutive periods before the corresponding ports (SAP and/or spoke SDP) are blocked by the <b>mac-move</b> feature. |
| <b>Parameters</b>  | <i>cumulative-factor</i> — specifies a MAC relearn period to be used for the MAC relearn rate                                                                                                                                                                                                                        |
| <b>Values</b>      | 3 to 10                                                                                                                                                                                                                                                                                                              |

## sap

|                    |                                                                                            |   |                                                                                       |
|--------------------|--------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap <i>sap-id</i></b>                                                              |   |                                                                                       |
| <b>Context</b>     | config>service>vpls>mac-move>primary-ports<br>config>service>vpls>mac-move>secondary-ports |   |                                                                                       |
| <b>Description</b> | This command configures the specified SAP to be a primary or secondary VPLS port.          |   |                                                                                       |
| <b>Parameters</b>  | <i>sap-id</i> — specifies the physical port identifier portion of the SAP definition       |   |                                                                                       |
| <b>Values</b>      | null                                                                                       | : | <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>                                     |
|                    | dot1q                                                                                      | : | [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i>                   |
|                    | atm                                                                                        | : | [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |
|                    | cem                                                                                        | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ipcp                                                                                       | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ima-grp                                                                                    | : | <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]                  |
|                    | port-id                                                                                    | : | <i>slot/mda/port</i> [. <i>channel</i> ]                                              |
|                    | bundle-id                                                                                  | : | <b>bundle-type</b> - <i>slot/mda.bundle-num</i>                                       |
|                    | <b>bundle</b>                                                                              | : | keyword                                                                               |
|                    | <i>type</i>                                                                                | : | ima   ppp                                                                             |
|                    | <i>bundle-num</i>                                                                          | : | [1 to 32]                                                                             |
|                    | <i>aps-id</i>                                                                              | : | <b>aps-group-id</b> [. <i>channel</i> ]                                               |
|                    | <b>aps</b>                                                                                 | : | keyword                                                                               |
|                    | <i>group-id</i>                                                                            | : | 1 to 8                                                                                |
|                    | qtag1                                                                                      | : | 0 to 4094                                                                             |
|                    | vpi                                                                                        | : | 0 to 4095 (NNI)                                                                       |
|                    |                                                                                            | : | 0 to 255 (UNI)                                                                        |
|                    | vci                                                                                        | : | 1   2   5 to 65535                                                                    |

## spoke-sdp

|                    |                                                                                            |   |                     |
|--------------------|--------------------------------------------------------------------------------------------|---|---------------------|
| <b>Syntax</b>      | <b>[no] spoke-sdp <i>spoke-id</i></b>                                                      |   |                     |
| <b>Context</b>     | config>service>vpls>mac-move>primary-ports<br>config>service>vpls>mac-move>secondary-ports |   |                     |
| <b>Description</b> | This command configures the specified spoke SDP to be a primary or secondary VPLS port.    |   |                     |
| <b>Parameters</b>  | <i>spoke-id</i> — specifies the spoke SDP to be used as the primary or secondary VPLS port |   |                     |
| <b>Values</b>      | <i>spoke-id</i>                                                                            | : | <i>sdp-id:vc-id</i> |
|                    | <i>sdp-id</i>                                                                              | : | 1 to 17407          |
|                    | <i>vc-id</i>                                                                               | : | 1 to 4294967295     |



## secondary-ports

|                    |                                                                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>secondary-ports</b>                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vpls>mac-move                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | This command enables the context to define secondary VPLS ports. VPLS ports that were declared as primary prior to the execution of this command will be moved from the primary port level to the secondary port level. Changing a port to the tertiary level (default) can only be done by first removing it from the primary port level. |

## retry-timeout

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>retry-timeout</b> <i>timeout</i><br><b>no retry-timeout</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vpls>mac-move                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command indicates the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled.</p> <p>It is recommended that the <i>timeout</i> value be equal to or larger than <math>5 \text{ s} \times \text{cumulative factor of the highest-priority port}</math> so that the sequential order of port blocking will not be disturbed by reinitializing lower-priority ports.</p> <p>A zero value indicates that the SAP will not automatically be re-enabled after being disabled. If, after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing.</p> <p>The <b>no</b> form of the command reverts to the default value.</p> |
| <b>Default</b>     | <b>10 (when mac-move is enabled)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Parameters</b>  | <i>timeout</i> — specifies the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Values</b>      | 0 to 120                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## remote-age

|                    |                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>remote-age</b> <i>aging-timer</i><br><b>no remote-age</b>                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                        |
| <b>Description</b> | This command specifies the aging time for remotely learned MAC addresses in the FDB for the VPLS instance. In a VPLS service, MAC addresses are associated with a SAP or an SDP. MACs associated with a SAP are classified as local MACs, and MACs associated with an SDP are remote MACs. |

As is the case for a Layer 2 switch, learned MACs can be aged out if no packets are sourced from the MAC address for a period of time (the aging time). In each VPLS service instance, there are independent aging timers for locally learned MAC and remotely learned MAC entries in the FDB. The **remote-age** timer specifies the aging time for remotely learned MAC addresses. To reduce the amount of signaling required between switches, configure this timer to be larger than the **local-age** timer.

The **no** form of this command returns the remote aging timer to the default value.

|                   |                                                                      |
|-------------------|----------------------------------------------------------------------|
| <b>Default</b>    | <b>900</b>                                                           |
| <b>Parameters</b> | <i>seconds</i> — the aging time for remote MACs expressed in seconds |
| <b>Values</b>     | 60 to 86400                                                          |

### send-flush-on-failure

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] send-flush-on-failure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | This command enables sending out “flush-all-from-ME” messages to all LDP peers included in the affected VPLS, in the event of physical port failures or “oper-down” events of individual SAPs. This feature provides an LDP-based mechanism for recovering a physical link failure in a dual-homed connection to a VPLS service. This method provides an alternative to Rapid Spanning Tree Protocol (RSTP) solutions where dual homing redundancy and recovery, in the case of link failure, is resolved by RSTP running between a PE router and CE devices. If the endpoint is configured within the VPLS and <b>send-flush-on-failure</b> is enabled, “flush-all-from-ME” messages will be sent out only when all spoke SDPs associated with the endpoint go down. |
| <b>Default</b>     | <b>no send-flush-on-failure</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

### service-mtu

|                    |                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>service-mtu <i>octets</i></b><br><b>no service-mtu</b>                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>vpls                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | This command configures the service payload Maximum Transmission Unit (MTU), in bytes, for the service. This MTU value overrides the service-type default MTU. The <b>service-mtu</b> defines the payload capabilities of the service. It is used by the system to validate the SAP and SDP bindings’ operational state within the service. |

The service MTU and a SAP’s service delineation encapsulation overhead (that is, 4 bytes for a dot1q tag) are used to derive the required MTU of the physical port or channel on which the SAP was created. If the required payload is larger than the port or channel MTU, the SAP will be placed in an inoperative state. If the required MTU is equal to or less than the port or channel MTU, the SAP will be able to transition to the operative state.

When binding an SDP to a service, the service MTU is compared to the path MTU associated with the SDP. The path MTU can be administratively defined in the context of the SDP. The default or administrative path MTU can be dynamically reduced due to the MTU capabilities discovered by the tunneling mechanism of the SDP or the egress interface MTU capabilities based on the next hop in the tunnel path. If the service MTU is larger than the path MTU, the SDP binding for the service will be placed in an inoperative state. If the service MTU is equal to or less than the path MTU, then the SDP binding will be placed in an operational state.

If a service MTU, port or channel MTU, or path MTU is dynamically or administratively modified, then all associated SAP and SDP binding operational states are automatically re-evaluated.

The **no** form of this command returns the default **service-mtu** for the indicated service type to the default value.

**Default**     **VPLS: 1514**

Table 43 shows MTU values for specific VC types.

**Table 43: Show Service Service-MTU Output Fields**

| VC-Type Example                       | Service MTU | Advertised MTU |
|---------------------------------------|-------------|----------------|
| Ethernet                              | 1514        | 1500           |
| Ethernet (with preserved dot1q)       | 1518        | 1504           |
| VPLS                                  | 1514        | 1500           |
| VPLS (with preserved dot1q)           | 1518        | 1504           |
| VLAN (dot1p transparent to MTU value) | 1514        | 1500           |

**Parameters**     *octets* — the size of the MTU, in octets, expressed as a decimal integer

**Values**            1 to 9194

## split-horizon-group

**Syntax**            **[no] split-horizon-group** *group-name* [**residential-group**]

**Context**            config>service>vpls

**Description**       This command creates a new split horizon group (SHG) for the VPLS instance. Traffic arriving on a SAP or spoke SDP within this split horizon group will not be copied to other SAPs or spoke SDPs in the same split horizon group. If the **residential-group** keyword is included, the split horizon group is a residential SHG.

A split horizon group must be created before SAPs and spoke SDPs can be assigned to the group. The split horizon group is defined within the context of a single VPLS. The same *group-name* can be reused in different VPLS instances.

An ATM SAP must be in a residential SHGs. If an Ethernet SAP is in a SHG, then that SHG cannot be a residential SHG.

Up to 30 split horizon groups can be defined per VPLS instance.

The **no** form of the command removes the group name from the configuration.

**Parameters** *group-name* — specifies the name of the split horizon group to which the SAP or SDP belongs

**residential-group** — defines a split horizon group as a residential split horizon group (RSHG).

Doing so ensures that:

- SAPs that are members of this RSHG will have:
  - MAC pinning enabled per default (can be disabled)
  - broadcast and multicast packets are discarded at the SAP egress point, thus blocking unknown flooded traffic
- Spoke SDPs that are members of this RSHG will have:
  - broadcast and multicast packets are NOT discarded at the spoke SDP egress point, thus allowing the unknown flooded traffic
  - MAC pinning enabled per default (can be disabled)

**Default** By default, a split horizon group is not created as a residential group

---

## VPLS SAP Commands

### sap

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>        | <b>sap</b> <i>sap-id</i> [ <b>split-horizon-group</b> <i>group-name</i> ] [ <b>create</b> ]<br><b>no sap</b> <i>sap-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>       | config>service>vpls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>   | <p>This command creates a Service Access Point (SAP) within a service. A SAP is a combination of port and encapsulation parameters that identify the service access point on the interface and within the 7705 SAR. Each SAP must be unique. All SAPs must be explicitly created. If no SAPs are created within a service or on an IP interface, a SAP will not exist on that object.</p> <p>Enter an existing SAP without the <b>create</b> keyword to edit SAP parameters. The SAP is owned by the service in which it was created.</p> <p>A SAP can only be associated with a single service. A SAP can only be defined on a port that has been configured as an access port using the <b>config interface</b> <i>port-type</i> <i>port-id</i> <b>mode access</b> command. Channelized TDM ports are always access ports.</p> <p>If a port is shut down, all SAPs on that port become operationally down. When a service is shut down, SAPs for the service are not displayed as operationally down although all traffic traversing the service will be discarded. The operational state of a SAP is relative to the operational state of the port on which the SAP is defined.</p> <p>The <b>no</b> form of this command deletes the SAP with the specified port. When a SAP is deleted, all configuration parameters for the SAP will also be deleted. For Internet Enhanced Service (IES), the IP interface must be shut down before the SAP on that interface may be removed.</p> |
| <b>Default</b>       | n/a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Special Cases</b> | <b>VPLS SAP</b> — A VPLS SAP can be defined on Ethernet ports or SONET/SDH channels. Split horizon groups (SHGs) and residential SHGs can only be created in the scope of a VPLS service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Parameters**     *sap-id* — specifies the physical port identifier portion of the SAP definition

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [ <i>.channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [ <i>.channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**create** — keyword used to create a SAP instance. The **create** keyword requirement can be enabled or disabled in the **environment>create** context

*group-name* — specifies the name of the split horizon group to which the SAP belongs

## discard-unknown-source

**Syntax**     [no] **discard-unknown-source**

**Context**     config>service>vpls>sap  
               config>service>vpls>spoke-sdp

**Description**     This command specifies that packets received on a SAP or a spoke SDP with an unknown source MAC address will be dropped only if the maximum number of MAC addresses for that SAP or spoke SDP (see [max-nbr-mac-addr](#)) has been reached. If **max-nbr-mac-addr** has not been set for the SAP or spoke SDP, enabling **discard-unknown-source** has no effect.

When disabled, the packets are forwarded based on the destination MAC addresses.

The **no** form of this command causes packets with an unknown source MAC addresses to be forwarded by destination MAC addresses in VPLS.

**Default**     no **discard-unknown-source**

## limit-mac-move

|                    |                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>limit-mac-move</b> [ <b>blockable</b>   <b>non-blockable</b> ]<br><b>no limit-mac-move</b>                                                                                                                                                          |
| <b>Context</b>     | config>service>vpls>sap<br>config>service>vpls>spoke-sdp                                                                                                                                                                                               |
| <b>Description</b> | This command indicates whether or not the MAC move agent, when enabled using <b>config&gt;service&gt;vpls&gt;mac-move</b> , will limit the MAC relearn (move) rate on this SAP.                                                                        |
| <b>Default</b>     | <b>blockable</b>                                                                                                                                                                                                                                       |
| <b>Parameters</b>  | <b>blockable</b> — the agent will monitor the MAC relearn rate on the SAP, and the agent will block it when the relearn rate is exceeded<br><br><b>non-blockable</b> — this SAP will not be blocked, and another blockable SAP will be blocked instead |

## mac-pinning

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mac-pinning</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>vpls>endpoint<br>config>service>vpls>sap<br>config>service>vpls>mesh-sdp<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command disables relearning of MAC addresses on other SAPs or SDPs within the VPLS. The MAC address will remain attached to a given SAP or SDP for the duration of its age timer.</p> <p>The age of the MAC address entry in the FDB is set by the age timer. If <b>mac-aging</b> is disabled on a given VPLS service, any MAC address learned on a SAP or SDP with <b>mac-pinning</b> enabled will remain in the FDB on this SAP or SDP forever. Every event that would otherwise result in relearning will be logged (MAC address; original SAP; new SAP).</p> <p>MAC addresses learned during DHCP address assignment (DHCP snooping enabled) are not impacted by this command. MAC pinning for such addresses is implicit.</p> |
| <b>Default</b>     | <b>disabled, except enabled at the creation of the SAP or spoke SDP that is part of a residential split horizon group (RSHG)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## max-nbr-mac-addr

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>max-nbr-mac-addr</b> <i>table-size</i><br><b>no max-nbr-mac-addr</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>vpls>sap<br>config>service>vpls>spoke-sdp<br>config>service>vpls>endpoint                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command specifies the maximum number of FDB entries for both learned and static MAC addresses for this SAP, spoke SDP, or endpoint.</p> <p>When the configured limit has been reached, and <b>discard-unknown-source</b> has been enabled for this SAP or spoke SDP (see <a href="#">discard-unknown-source</a>), packets with unknown source MAC addresses will be discarded.</p> <p>The <b>no</b> form of the command restores the global MAC learning limitations for the SAP or spoke SDP.</p> |
| <b>Default</b>     | <b>no max-nbr-mac-addr</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <p><i>table-size</i> — specifies the maximum number of learned and static entries allowed in the FDB of this service</p> <p><b>Values</b>      1 to 16383</p>                                                                                                                                                                                                                                                                                                                                              |

## static-host

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>static-host ip</b> <i>ip-address</i> [ <b>mac</b> <i>ieee-address</i> ] [ <b>create</b> ]<br><b>static-host mac</b> <i>ieee-address</i> [ <b>create</b> ]<br><b>no static-host</b> [ <b>ip</b> <i>ip-address</i> ] <b>mac</b> <i>ieee-address</i><br><b>no static-host all</b> [ <b>force</b> ]                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | This command configures a static host on this SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <p><i>ip-address</i> — specifies the IPv4 unicast address</p> <p><i>ieee-address</i> — specifies the 48-bit MAC address for the static ARP in the form <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i> where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i> and <i>ff</i> are hexadecimal numbers (cannot be all zeros). Allowed values are any non-broadcast, non-multicast MAC and non-IEEE reserved MAC addresses.</p> <p><b>force</b> — specifies the forced removal of the static host addresses</p> <p><b>create</b> — this keyword is mandatory when configuring a static host</p> |



## static-mac

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] static-mac</b> <i>ieee-address</i> [ <b>create</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command creates a local static MAC entry in the VPLS FDB associated with the SAP.</p> <p>In a VPLS service, MAC addresses are associated with a SAP or an SDP. MACs associated with a SAP are classified as local MACs, and MACs associated with an SDP are remote MACs.</p> <p>Local static MAC entries create a permanent MAC address-to-SAP association in the FDB for the VPLS instance so that the MAC address will not be learned on the edge device.</p> <p>Static MAC definitions on one edge device are not propagated to other edge devices participating in the VPLS instance; that is, each edge device has an independent FDB for the VPLS.</p> <p>Only one static MAC entry (local or remote) can be defined per MAC address per VPLS instance.</p> <p>By default, no static MAC address entries are defined for the SAP.</p> <p>The <b>no</b> form of this command deletes the static MAC entry with the specified MAC address associated with the SAP from the VPLS FDB.</p> |
| <b>Parameters</b>  | <p><i>ieee-address</i> — specifies the 48-bit MAC address for the static ARP in the form <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i> where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i> and <i>ff</i> are hexadecimal numbers (cannot be all zeros). Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses.</p> <p><b>create</b> — this keyword is mandatory when specifying a static MAC address</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

---

## VPLS SAP ATM Commands

### atm

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>atm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables access to the context to configure ATM-related attributes. This command can only be used when a given context (for example, a channel or SAP) supports ATM functionality such as:</p> <ul style="list-style-type: none"><li>• configuring an ATM port or ATM port-related functionality on adapter cards supporting ATM functionality</li><li>• configuring ATM-related configuration for ATM-based SAPs that exist on adapter cards supporting ATM functionality</li></ul> |

If ATM functionality is not supported for a given context, the command returns an error.

### alarm-cells

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] alarm-cells</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vpls>sap>atm>oam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command configures AIS/RDI fault management on a PVCC. Fault management allows PVCC termination to monitor and report the status of its connection by propagating fault information through the network and by driving a PVCC's operational status.</p> <p>When <b>alarm-cells</b> functionality is enabled, a PVCC's operational status is affected when a PVCC goes into an AIS or RDI state because of AIS/RDI processing. This assumes that nothing else affects the PVCC's operational status; for example, the PVCC goes down, or enters a fault state and comes back up, or exits that fault state. RDI cells are generated when a PVCC is operationally down. No OAM-specific SNMP trap is raised whenever an endpoint enters or exits an AIS or RDI state; however, if an OAM state change results in a change to the operational status of the PVCC, then a trap is expected from an entity that the PVCC is associated with (for example, a SAP).</p> <p>The <b>no</b> form of the command disables <b>alarm-cells</b> functionality for a PVCC. When <b>alarm-cells</b> functionality is disabled, the PVCC's operational status is no longer affected by the PVCC's OAM state changes due to AIS/RDI processing. When <b>alarm-cells</b> is disabled, a PVCC will change operational status to up from down due to <b>alarm-cell</b> processing. RDI cells are not generated as result of PVCC going into an AIS or RDI state; however, the PVCC's OAM status will record OAM faults as described above.</p> |
| <b>Default</b>     | Enabled for PVCCs delimiting VPLS SAPs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## egress

|                    |                                                                                  |
|--------------------|----------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                    |
| <b>Context</b>     | config>service>vpls>sap>atm                                                      |
| <b>Description</b> | This command enables the context to configure egress ATM attributes for the SAP. |

## encapsulation

|                    |                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>encapsulation</b> <i>atm-encap-type</i>                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vpls>sap>atm                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command specifies the data encapsulation for an ATM PVCC-delimited SAP. The definition references RFC 2684, <i>Multiprotocol Encapsulation over ATM AAL5</i>, and the ATM Forum LAN Emulation specification.</p> <p>Ingress traffic that does not match the configured encapsulation will be dropped.</p>                       |
| <b>Default</b>     | <p><b>The encapsulation is driven by the service for which the SAP is configured</b></p> <p><b>For VPLS SAPs, the default is aal5snap-routed.</b></p>                                                                                                                                                                                   |
| <b>Parameters</b>  | <p><i>atm-encap-type</i> — specifies the encapsulation type</p> <p><b>Values</b></p> <p><b>aal5snap-routed:</b> routed encapsulation for LLC encapsulated circuit (LLC/ SNAP precedes protocol datagram) as defined in RFC 2684</p> <p><b>aal5mux-ip:</b> routed IP encapsulation for VC multiplexed circuit as defined in RFC 2684</p> |

## traffic-desc

|                    |                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>traffic-desc</b> <i>traffic-desc-profile-id</i><br><b>no traffic-desc</b>                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls>sap>atm>egress                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command assigns an ATM traffic descriptor profile to a given context (for example, a SAP).</p> <p>When configured under the egress context, the specified traffic descriptor profile defines the traffic contract in the backwards direction.</p> <p>The <b>no</b> form of the command reverts the traffic descriptor to the default traffic descriptor profile.</p> |
| <b>Default</b>     | <b>The default traffic descriptor (trafficDescProfileId. = 1) is associated with newly created PVCC-delimited SAPs</b>                                                                                                                                                                                                                                                       |

|                   |                                                                                                                                                                                                                                                            |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>traffic-desc-profile-id</i> — specifies a defined traffic descriptor profile (refer to “ATM QoS Traffic Descriptor Profiles” in the 7705 SAR OS Quality of Service Guide for information on the <b>atm-tid-profile traffic-desc-profile-id</b> command) |
| <b>Values</b>     | 1 to 1000                                                                                                                                                                                                                                                  |

### oam

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>oam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>vpls>sap>atm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command enables the context to configure OAM functionality for a PVCC delimiting a SAP. The ATM-capable adapter cards support the following F5 end-to-end OAM functionality (AIS, RDI, loopback):</p> <ul style="list-style-type: none"> <li>• ITU-T Recommendation I.610 - B-ISDN Operation and Maintenance Principles and Functions version 11/95</li> <li>• GR-1248-CORE - Generic Requirements for Operations of ATM Network Elements (NEs), Issue 3 June 1996</li> <li>• GR-1113-CORE - Bellcore, Asynchronous Transfer Mode (ATM) and ATM Adaptation Layer (AAL) Protocols Generic Requirements, Issue 1, July 1994</li> </ul> |

### subscriber-vlan

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>subscriber-vlan [vlan-id]</b><br><b>no subscriber-vlan</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vpls>sap>atm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command enables the push operation of a configured VLAN at ingress and a pop operation at egress on a per-ATM SAP basis. After AAL5 termination at ATM access ingress as per the configured encapsulation type, the configured VLAN-tag is pushed to the received subscriber frame. The type of Ethernet frame is set to 0x8100 in order to designate the existence of the VLAN header and the original Ethertype is shifted by 4 bytes, enlarging the resulting subscriber frame by 4 bytes.</p> <p>Using the <b>subscriber-vlan</b> command necessitates the use of the tagged (dot1q) uplink. In the uplink ingress direction (from the network to the 7705 SAR), the 7705 SAR is programmed to pop the VLAN tags. The first pop operation is mandatory, but if the frame is a single-tagged frame and there are no other VLAN tags, then the resulting untagged frame is forwarded to the subscriber interface without any errors.</p> |
| <b>Default</b>     | <b>no subscriber-vlan</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <i>vlan-id</i> — specifies the VLAN ID for the subscriber VLAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Values</b>      | 0 to 4094                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

---

## VPLS Filter and QoS Policy Commands

### egress

|                    |                                                                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables the context to configure egress SAP QoS policies and filter policies.</p> <p>If no sap-egress QoS policy is defined, the system default sap-egress QoS policy is used for egress processing. If no egress filter is defined, no filtering is performed.</p> |

### ingress

|                    |                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command enables the context to configure ingress SAP QoS policies and filter policies.</p> <p>If no sap-ingress QoS policy is defined, the system default sap-ingress QoS policy is used for ingress processing. If no ingress filter is defined, no filtering is performed.</p> |

### filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter</b><br><b>filter ip</b> <i>ip-filter-id</i><br><b>filter mac</b> <i>mac-filter-id</i><br><b>no filter</b> [ <b>ip</b> <i>ip-filter-id</i> ] [ <b>mac</b> <i>mac-filter-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>vpls>sap>egress<br>config>service>vpls>sap>ingress<br>config>service>vpls>mesh-sdp>ingress<br>config>service>vpls>spoke-sdp>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command associates a filter policy with a SAP, SDP (mesh or spoke), or IP interface.</p> <p>The <b>filter ip</b> command applies to all the contexts listed above (<b>sap&gt;ingress</b>, <b>mesh-sdp&gt;ingress</b>, <b>spoke-sdp&gt;ingress</b>, and <b>sap&gt;egress</b>). The <b>filter mac</b> command applies only to the <b>ingress</b> contexts.</p> <p>Filter policies control the forwarding and dropping of packets based on IP or MAC matching criteria. There are two types of filter policies: IP and MAC. Only one type may be applied at a time. The filter ID must be defined before the <b>filter</b> command is executed. If the filter policy does not exist, the operation will fail and an error message will be returned.</p> |

In general, filters applied to SAPs or SDPs apply to all packets on the SAP or SDP. One exception is that non-IP packets are not applied to IP match criteria, so the default action in the filter policy applies to these packets.

The **no** form of this command removes any configured filter ID association with the SAP, SDP, or IP interface. The filter ID itself is not removed from the system unless the **scope** of the created filter is set to **exclusive**. To avoid deletion of the filter ID and only break the association with the service object, use the **scope** command within the filter definition to set the **scope** to **template**. The default **scope** of a filter is **exclusive**.

|                   |                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <p><i>ip-filter-id</i> — specifies the IP filter policy. The filter ID must already exist within the created IP filters.</p> <p><b>Values</b> 1 to 65535</p> <p><i>mac-filter-id</i> — specifies the MAC filter policy. The specified filter ID must already exist within the created MAC filters.</p> <p><b>Values</b> 1 to 65535</p> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## qos

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <p><b>qos</b> <i>policy-id</i></p> <p><b>no qos</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | <p>config&gt;service&gt;vpls&gt;sap&gt;egress</p> <p>config&gt;service&gt;vpls&gt;sap&gt;ingress</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command associates a QoS policy with an ingress or egress SAP or IP interface.</p> <p>QoS ingress and egress policies are important for the enforcement of SLA agreements. The policy ID must be defined prior to associating the policy with a SAP or IP interface. If the <i>policy-id</i> does not exist, an error will be returned.</p> <p>The <b>qos</b> command is used to associate both ingress and egress QoS policies. The <b>qos</b> command only allows ingress policies to be associated with ingress SAP or IP interfaces, and egress policies with egress SAP or IP interfaces. Attempts to associate a QoS policy of the wrong type returns an error.</p> <p>Only one ingress and one egress QoS policy can be associated with a SAP or IP interface at one time. Attempts to associate a second QoS policy of a given type will return an error.</p> <p>When an ingress QoS policy is defined on an IES ingress IP interface that is bound to a VPLS, the policy becomes associated with every SAP on the VPLS and augments the QoS policy that is defined on each SAP. Packets that are bridged will be processed using the policy defined on the VPLS SAP; packets that are routed will be processed using the policy defined in the IES IP interface-binding context.</p> |

When an egress QoS policy is associated with an IES IP interface that has been bound to a VPLS, the policy becomes associated with every SAP on the VPLS and augments the egress QoS policy that is defined on each SAP. Packets that are bridged will be processed using the policy defined on the VPLS SAP; packets that are routed will be processed using the policy defined in the IES IP interface-binding context.

By default, if no specific QoS policy is associated with the SAP or IP interface for ingress or egress, then the default QoS policy is used.

The **no** form of this command removes the QoS policy association from the SAP or IP interface, and the QoS policy for the SAP or IP interface reverts to the default.

**Parameters** *policy-id* — the ingress/egress policy ID to associate with a SAP or IP interface on ingress/egress. The policy ID must already exist.

**Values** 1 to 65535

## force-c-vlan-forwarding

**Syntax** **[no] force-c-vlan-forwarding**

**Context** config>service>vpls>sap

**Description** This command preserves the VLAN tag at the ingress SAP. The default (disabled) behavior is to strip off the VLAN tag at the ingress SAP and push a new VLAN tag at the egress SAP.

If **force-c-vlan-forwarding** is only enabled at the ingress SAP, the VLAN tag is preserved at the ingress SAP and a new VLAN tag is pushed at the egress SAP. The net effect at the egress SAP is that the packet contains two VLAN tags where the inner tag is the preserved ingress tag.

If **force-c-vlan-forwarding** is only enabled at the egress SAP, a VLAN tag is not pushed at the egress SAP. The net effect at the egress SAP is that the VLAN tag received at the ingress SAP is stripped off.

If **force-c-vlan-forwarding** is enabled at ingress and egress, the VLAN tag is preserved at the ingress SAP and there is no tag pushed at the egress SAP. The net effect is that the packet transmitted at the egress SAP contains the same VLAN tag that was received at the ingress SAP. Dot1p re-marking may occur at the egress SAP.

The **force-c-vlan-forwarding** command is only available on VPLS dot1q SAPs.

The **no** version of this command sets the default behavior.

**Default** disabled

---

## Service Billing Commands

### accounting-policy

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>accounting-policy</b> <i>acct-policy-id</i><br><b>no accounting-policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command creates the accounting policy context that can be applied to a SAP.</p> <p>An accounting policy must be defined before it can be associated with a SAP. If the <i>acct-policy-id</i> does not exist, an error message is generated.</p> <p>A maximum of one accounting policy can be associated with a SAP at one time. Accounting policies are configured in the <b>config&gt;log</b> context.</p> <p>The <b>no</b> form of this command removes the accounting policy association from the SAP, and the accounting policy reverts to the default.</p> |
| <b>Default</b>     | <b>accounting-policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <i>acct-policy-id</i> — the accounting policy ID as configured in the <b>config&gt;log&gt;accounting-policy</b> context                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Values</b>      | 1 to 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

### collect-stats

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables accounting and statistical data collection for a SAP, a network port, or an IP interface. When applying accounting policies, the data (by default) is collected in the appropriate records and written to the designated billing file.</p> <p>When the <b>no collect-stats</b> command is issued, the statistics are still accumulated by the CSM. However, the CPU will not obtain the results and write them to the billing file. If a subsequent <b>collect-stats</b> command is issued, then the counters written to the billing file include all the traffic while the <b>no collect-stats</b> command was in effect.</p> |
| <b>Default</b>     | <b>collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



---

## VPLS SAP DHCP Commands

### dhcp

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                    |
| <b>Context</b>     | config>service>vpls>sap                                        |
| <b>Description</b> | This command enables the context to configure DHCP parameters. |

### option

|                    |                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] option</b>                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>vpls>sap>dhcp                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables DHCP Option 82 (Relay Agent Information Option) parameters processing and enters the context for configuring Option 82 suboptions.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>no option</b>                                                                                                                                                                                                                            |

### action

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>action [dhcp-action]</b><br><b>no action</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command configures the Relay Agent Information Option (Option 82) processing.</p> <p>The <b>no</b> form of this command returns the system to the default value.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Default</b>     | <b>keep</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Parameters</b>  | <p><i>dhcp-action</i> — specifies the DHCP option action (<b>replace</b>, <b>drop</b>, or <b>keep</b>), as follows:</p> <p><b>replace</b> — in the upstream direction (from the client), the Option 82 field from the router is inserted in the packet (overwriting any existing Option 82 field). In the downstream direction (towards the client), the Option 82 field is stripped (in accordance with RFC 3046).</p> <p><b>drop</b> — the DHCP packet is dropped if an Option 82 field is present, and the "Client Packets Dropped" counter is incremented</p> <p><b>keep</b> — the existing information is kept in the packet and the router does not add any additional information. In the downstream direction, the Option 82 field is not stripped and is sent on towards the client.</p> |

The behavior is slightly different in the case of Vendor Specific Options (VSOs). When the **keep** parameter is specified, the router will insert its own VSO into the Option 82 field (as per RFC 4243). This will only be done when the incoming message already has an Option 82 field. However, if adding the VSO causes the Option 82 field to exceed the maximum allowable length (255 octets), the packet is dropped.

If no Option 82 field is present, the router will not create the Option 82 field. In this in that case, no VSO will be added to the message.

### circuit-id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>circuit-id [ascii-tuple   vlan-ascii-tuple]   no circuit-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command causes the router to send an ASCII-encoded “tuple” in the <b>circuit-id</b> suboption of the DHCP packet. This ASCII-tuple consists of the access-node-identifier, service-id, and SAP-ID, separated by “ ”. If no keyword is configured, then the <b>circuit-id</b> suboption will not be part of the information option (Option 82).</p> <p>If disabled, the <b>circuit-id</b> suboption of the DHCP packet will be left empty.</p>                                             |
| <b>Default</b>     | <b>no circuit-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Parameters</b>  | <p><b>ascii-tuple</b> — specifies that the included ASCII-encoded concatenated “tuple” consists of the access-node-identifier, service-id, and interface-name</p> <p><b>vlan-ascii-tuple</b> — specifies that the format will include VLAN-id and dot1p bits in addition to the <b>ascii-tuple</b> information. The format is supported on dot1q encapsulated ports only. Thus, when the Option 82 bits are stripped, dot1p bits will be copied to the Ethernet header of an outgoing packet.</p> |

### remote-id

|                    |                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] remote-id [mac   string string]</b>                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option                                                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command specifies what information goes into the <b>remote-id</b> suboption in the DHCP Relay packet.</p> <p>If disabled, the <b>remote-id</b> suboption of the DHCP packet will be left empty.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>no remote-id</b>                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><b>mac</b> — specifies that the MAC address of the remote end is encoded in the suboption</p>                                                                                                                                                                                         |

*string* — specifies that *string* is encoded in the suboption

**Values** any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”).

## vendor-specific-option

**Syntax** [no] **vendor-specific-option**

**Context** config>service>vpls>sap>dhcp>option

**Description** This command configures the vendor-specific suboption within the Option 82 field of the DHCP relay packet.

## client-mac-address

**Syntax** [no] **client-mac-address**

**Context** config>service>vpls>sap>dhcp>option>vendor

**Description** This command enables the sending of the MAC address in the vendor-specific suboption of the DHCP relay packet.

The **no** form of the command disables the sending of the MAC address in the vendor-specific suboption of the DHCP relay packet.

## sap-id

**Syntax** [no] **sap-id**

**Context** config>service>vpls>sap>dhcp>option>vendor

**Description** This command enables the sending of the SAP ID in the vendor-specific suboption of the DHCP relay packet.

The **no** form of the command disables the sending of the SAP ID in the vendor-specific suboption of the DHCP relay packet.

### service-id

|                    |                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] service-id</b>                                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option>vendor                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command enables the sending of the service ID in the vendor specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command disables the sending of the service ID in the vendor specific suboption of the DHCP relay packet.</p> |

### string

|                    |                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>string text</b><br><b>no string</b>                                                                                                                                                   |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option>vendor                                                                                                                                               |
| <b>Description</b> | <p>This command specifies the string in the vendor specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command returns the default value.</p>                  |
| <b>Default</b>     | <b>no string</b>                                                                                                                                                                         |
| <b>Parameters</b>  | <i>text</i> — the string can be any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”). |

### system-id

|                    |                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] system-id</b>                                                                                  |
| <b>Context</b>     | config>service>vpls>sap>dhcp>option>vendor                                                             |
| <b>Description</b> | This command specifies whether the system ID is encoded in the vendor specific suboption of Option 82. |

## snoop

|                    |                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] snoop</b>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls>sap>dhcp                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command enables DHCP snooping of DHCP messages on the SAP. Enabling DHCP snooping on VPLS interfaces (SAPs) is required where vendor-specific information (as per RFC 4243) is to be inserted into the Option 82 field of the DHCP messages.</p> <p>Use the <b>no</b> form of the command to disable DHCP snooping on the specified VPLS SAP binding.</p> |
| <b>Default</b>     | <b>no snoop</b>                                                                                                                                                                                                                                                                                                                                                   |

---

## VPLS SAP Anti-Spoofing Command

### anti-spoof

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>anti-spoof {ip   mac   ip-mac}</b><br><b>no anti-spoof</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>vpls>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables anti-spoof filtering and optionally changes the anti-spoof matching type for the SAP.</p> <p>The type of anti-spoof filtering defines what information in the incoming packet is used to generate the criteria to look up an entry in the anti-spoof filter table. The type parameter (<b>ip</b>, <b>mac</b>, <b>ip-mac</b>) defines the anti-spoof filter type enforced by the SAP when anti-spoof filtering is enabled.</p> <p>The <b>no</b> form of the command disables anti-spoof filtering on the SAP.</p>                                                                                                                                                                                            |
| <b>Default</b>     | <b>no anti-spoof</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <p><b>ip</b> — configures SAP anti-spoof filtering to use only the source IP address in its lookup. If a static host exists on the SAP without an IP address specified, the <b>anti-spoof ip</b> command will fail.</p> <p><b>mac</b> — configures SAP anti-spoof filtering to use only the source MAC address in its lookup. If a static host exists on the SAP without a specified MAC address, the <b>anti-spoof mac</b> command will fail.</p> <p><b>ip-mac</b> — configures SAP anti-spoof filtering to use both the source IP address and the source MAC address in its lookup. If a static host exists on the SAP without both the IP address and MAC address specified, the <b>anti-spoof ip-mac</b> command will fail.</p> |

---

## VPLS SDP Commands

### mesh-sdp

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>        | <b>mesh-sdp</b> <i>sdp-id</i> [: <i>vc-id</i> ] [ <b>vc-type</b> { <b>ether</b>   <b>vlan</b> }]<br><b>no mesh-sdp</b> <i>sdp-id</i> [: <i>vc-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>       | config>service>vpls                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>   | <p>This command binds a VPLS service to an existing Service Distribution Point (SDP). Mesh SDPs bound to a service are logically treated like a single bridge “port” for flooded traffic, where flooded traffic received on any mesh SDP on the service is replicated to other “ports” (spoke SDPs and SAPs) and not transmitted on any mesh SDPs.</p> <p>This command creates a binding between a service and an SDP. The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service will be down.</p> <p>The SDP must already be defined in the <b>config&gt;service&gt;sdp</b> context in order to associate the SDP with a valid service. If the <b>sdp</b> <i>sdp-id</i> is not already configured, an error message is generated. If the <i>sdp-id</i> does exist, a binding between that <i>sdp-id</i> and the service is created.</p> <p>SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end 7705 SAR devices can participate in the service.</p> <p>The <b>no</b> form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to a service. Once removed, no packets are forwarded to the far-end router.</p> |
| <b>Default</b>       | <b>No <i>sdp-id</i> is bound to a service</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Special Cases</b> | <b>VPLS —</b> Several SDPs can be bound to a VPLS. Each SDP must be destined for a different router. If two <i>sdp-id</i> bindings terminate on the same 7705 SAR, an error occurs and the second SDP binding is rejected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>    | <p><i>sdp-id</i> — the SDP identifier</p> <p><b>Values</b> 1 to 17407</p> <p><i>vc-id</i> — the virtual circuit identifier. This value is used to validate the VC ID portion of each mesh SDP binding defined in the service. The default value of this object is equal to the service ID.</p> <p><b>Values</b> 1 to 4294967295</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

**vc-type** — this option overrides the default VC type signaled for the spoke or mesh binding to the far end of the SDP. The VC type is a 15-bit quantity containing a value that represents the type of VC. The actual signaling of the VC type depends on the signaling parameter defined for the SDP. If signaling is disabled, the **vc-type** option can still be used to define the dot1q value expected by the far-end provider equipment. A change of the VC type causes the binding to signal the new VC type to the far end when signaling is enabled. VC types are derived according to IETF *draft-martini-l2circuit-trans-mpls*, as follows:

- the VC type value for Ethernet is 0x0005
- the VC type value for an Ethernet VLAN is 0x0004

**Values** ether, vlan

**ether** — defines the VC type as Ethernet. The **ether** and **vlan** keywords are mutually exclusive. When the VC type is not defined, the default is Ethernet for spoke SDP bindings. Defining Ethernet is the same as executing **no vc-type** and restores the default VC type for the spoke SDP binding (hex 5).

**vlan** — defines the VC type as VLAN. The **ether** and **vlan** keywords are mutually exclusive. When the VC type is not defined, the default is Ethernet for spoke SDP bindings.

## spoke-sdp

**Syntax** **spoke-sdp** *sdp-id[:vc-id]* [**vc-type** {**ether** | **vlan**}] [**split-horizon-group** *group-name*] [**create**] [**no-endpoint**]  
**spoke-sdp** *sdp-id[:vc-id]* [**vc-type** {**ether** | **vlan**}] [**split-horizon-group** *group-name*] [**create**] **endpoint** *endpoint-name*  
**no spoke-sdp** *sdp-id[:vc-id]*

**Context** config>service>vpls

**Description** This command binds a service to an existing SDP. A spoke SDP is treated like the equivalent of a traditional bridge “port”, where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke and mesh SDPs or SAPs) and not transmitted on the port it was received.

The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service will be down.

The SDP must already be defined in the **config>service>sdp** context in order to associate an SDP with a VPLS service. If the **sdp sdp-id** is not already configured, an error message is generated. If the *sdp-id* does exist, a binding between that *sdp-id* and the service is created. SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end devices can participate in the service.

The **no** form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to a service. Once removed, no packets are forwarded to the far-end router.

**Default** No *sdp-id* is bound to a service



**Special Cases** **VPLS** — Several SDPs can be bound to a VPLS service. Each SDP must use unique *vc-ids*. An error message is generated if two SDP bindings with identical *vc-ids* terminate on the same router.

Split horizon groups can only be created in the scope of a VPLS service.

**Parameters** *sdp-id* — the SDP identifier

**Values** 1 to 17407

*vc-id* — the virtual circuit identifier

**Values** 1 to 4294967295

**vc-type** — this option overrides the default VC type signaled for the spoke or mesh binding to the far end of the SDP. The VC type is a 15-bit quantity containing a value that represents the type of VC. The actual signaling of the VC type depends on the signaling parameter defined for the SDP. If signaling is disabled, the **vc-type** option can still be used to define the dot1q value expected by the far-end provider equipment. A change of the VC type causes the binding to signal the new VC type to the far end when signaling is enabled. VC types are derived according to IETF *draft-martini-l2circuit-trans-mpls*, as follows:

- the VC type value for Ethernet is 0x0005
- the VC type value for an Ethernet VLAN is 0x0004

**Values** ether, vlan

**ether** — defines the VC type as Ethernet. The **ether** and **vlan** keywords are mutually exclusive. When the VC type is not defined, the default is Ethernet for spoke SDP bindings. Defining Ethernet is the same as executing **no vc-type** and restores the default VC type for the spoke SDP binding (hex 5).

**vlan** — defines the VC type as VLAN. The **ether** and **vlan** keywords are mutually exclusive. When the VC type is not defined, the default is Ethernet for spoke SDP bindings. The VLAN VC-type requires at least one dot1q tag within each encapsulated Ethernet packet transmitted to the far end.

*group-name* — specifies the name of the split horizon group to which the SDP belongs

*endpoint-name* — specifies the service endpoint to which this SDP binding is attached. The service ID of the SDP binding must match the service ID of the service endpoint.

**no-endpoint** — removes the association of a spoke SDP with an explicit endpoint name

### control-word

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] control-word</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vpls>mesh-sdp<br>config>service>vpls>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command enables the use of the control word on pseudowire packets in VPLS and enables the use of the control word individually on each mesh SDP or spoke SDP. By default, the control word is disabled. When the control word is enabled, all VPLS packets are encapsulated with the control word when sent over the pseudowire. The T-LDP control plane behavior is the same as in the implementation of control word for VLL services. The configuration for the two directions of the Ethernet pseudowire should match.</p> <p>The <b>no</b> form of the command reverts the mesh SDP or spoke SDP to the default behavior of not using the control word.</p> |
| <b>Default</b>     | <b>no control-word</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### egress

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                 |
| <b>Context</b>     | config>service>vpls>mesh-sdp<br>config>service>vpls>spoke-sdp |
| <b>Description</b> | This command configures the egress SDP context.               |

### ingress

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                |
| <b>Context</b>     | config>service>vpls>mesh-sdp<br>config>service>vpls>spoke-sdp |
| <b>Description</b> | This command configures the ingress SDP context.              |

### vc-label

|                    |                                                                             |
|--------------------|-----------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label egress-vc-label</b><br><b>no vc-label</b> [egress-vc-label]     |
| <b>Context</b>     | config>service>vpls>mesh-sdp>egress<br>config>service>vpls>spoke-sdp>egress |
| <b>Description</b> | This command configures the egress VC label.                                |

**Parameters** *egress-vc-label* — specifies an egress VC value that indicates a specific connection

**Values** 16 to 1048575

## vc-label

**Syntax** **vc-label** *ingress-vc-label*  
**no vc-label** [*ingress-vc-label*]

**Context** config>service>vpls>mesh-sdp>ingress  
 config>service>vpls>spoke-sdp>ingress

**Description** This command configures the ingress VC label.

**Parameters** *ingress-vc-label* — specifies an ingress VC value that indicates a specific connection

**Values** 2048 to 18431

## precedence

**Syntax** **precedence** [*precedence-value* | **primary**]  
**no precedence**

**Context** config>service>vpls>spoke-sdp

**Description** This command configures the precedence of this SDP binding when there are multiple SDP bindings attached to one service endpoint. When an SDP binding goes down, the next highest precedence SDP binding begins forwarding traffic.

**Default** **no precedence**

**Parameters** *precedence-value* — specifies the precedence of this SDP binding

**Values** 1 to 4

**primary** — assigns this SDP as the primary spoke SDP

## static-mac

**Syntax** [**no**] **static-mac** *ieee-address*

**Context** config>service>vpls>mesh-sdp  
 config>service>vpls>spoke-sdp

**Description** This command creates a remote static MAC entry in the VPLS FDB associated with the SDP.

In a VPLS service, MAC addresses are associated with a SAP or an SDP. MACs associated with a SAP are classified as local MACs, and MACs associated with an SDP are remote MACs.

Remote static MAC entries create a permanent MAC address to SDP association in the FDB for the VPLS instance so that the MAC address will not be learned on the edge device.

Static MAC definitions on one edge device are not propagated to other edge devices participating in the VPLS instance; that is, each edge device has an independent FDB for the VPLS.

Only one static MAC entry (local or remote) can be defined per MAC address per VPLS instance.

The **no** form of this command deletes the static MAC entry with the specified MAC address associated with the SDP from the VPLS FDB.

**Default** n/a

**Parameters** *ieee-address* — specifies the 48-bit MAC address for the static ARP in the form *aa:bb:cc:dd:ee:ff* or *aa-bb-cc-dd-ee-ff* where *aa*, *bb*, *cc*, *dd*, *ee* and *ff* are hexadecimal numbers. Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses.

### vlan-vc-tag

**Syntax** **vlan-vc-tag 0..4094**  
**no vlan-vc-tag [0..4094]**

**Context** config>service>vpls>mesh-sdp  
config>service>vpls>spoke-sdp

**Description** This command specifies an explicit dot1q value that is used when encapsulating to the SDP far end. When signaling is enabled between the near and far end, the configured dot1q tag can be overridden by a received TLV specifying the dot1q value expected by the far end. This signaled value must be stored as the remote signaled dot1q value for the binding. The provisioned local dot1q tag must be stored as the administrative dot1q value for the binding.

When the dot1q tag is not defined, the default value of 0 is stored as the administrative dot1q value. Setting the value to 0 is equivalent to not specifying the value.

The **no** form of this command disables the command.

**Default** no vlan-vc-tag

**Parameters** *0..4094* — specifies a valid VLAN identifier to bind an 802.1Q VLAN tag ID

## VPLS Show Commands

### egress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command displays service information using the range of egress labels. If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed. If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using the range of labels are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>                              |
| <b>Parameters</b>  | <p><i>start-label</i> — the starting egress label value for which to display services using the label range. If only <i>start-label</i> is specified, services only using <i>start-label</i> are displayed.</p> <p><b>Values</b> 0, 2048 to 131071</p> <p><i>end-label</i> — the ending egress label value for which to display services using the label range</p> <p><b>Values</b> 2049 to 131071</p> <p><b>Default</b> the <i>start-label</i> value</p> |
| <b>Output</b>      | The following output is an example of service egress-label information, and <a href="#">Table 44</a> describes the fields.                                                                                                                                                                                                                                                                                                                                |

### Sample Output

```
*A:ALU-48>show>service# egress-label 0 100000
```

```
=====
Martini Service Labels
=====
```

| Svc Id | Sdp Binding | Type | I.Lbl | E.Lbl |
|--------|-------------|------|-------|-------|
| 3      | 15:15       | Spok | 0     | 0     |
| 5      | 5:5         | Spok | 0     | 0     |
| 6      | 5:6         | Spok | 0     | 0     |
| 5000   | 15:5000     | Mesh | 0     | 0     |
| 5000   | 15:5001     | Spok | 0     | 0     |
| 5001   | 5001:100    | Spok | 0     | 0     |

```

Number of Bindings Found : 6

```

```
=====
*A:ALU-48>show>service#
```

**Table 44: Show Service Egress Labels Output Fields**

| Label                    | Description                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------|
| Svc Id                   | The ID that identifies a service                                                                  |
| Sdp Binding              | The binding that identifies an SDP                                                                |
| Type                     | Indicates whether the SDP binding is a spoke or a mesh                                            |
| I. Lbl                   | The VC label used by the far-end device to send packets to this device in this service by the SDP |
| E. Lbl                   | The VC label used by this device to send packets to the far-end device in this service by the SDP |
| Number of Bindings Found | The total number of SDP bindings that exist within the specified egress label range               |

## fdb-info

|                    |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>fdb-info</b>                                                                                                        |
| <b>Context</b>     | show>service                                                                                                           |
| <b>Description</b> | This command displays global forwarding database (FDB) usage information.                                              |
| <b>Output</b>      | The following output is an example of global FDB usage information, and <a href="#">Table 45</a> describes the fields. |

### Sample Output

```
*A:ALU-48>show>service# fdb-info
```

```
=====
Forwarding Database (FDB) Information
=====
Service Id : 5000 Mac Move : Disabled
Primary Factor : 3 Secondary Factor : 2
Mac Move Rate : 2 Mac Move Timeout : 10
Mac Move Retries : 3
Table Size : 250 Total Count : 0
Learned Count : 0 Static Count : 0
OAM-learned Count : 0 DHCP-learned Count : 0
Host-learned Count : 0
Remote Age : 900 Local Age : 300
High Watermark : 95% Low Watermark : 90%
Mac Learning : Enabled Discard Unknown : Disabled
Mac Aging : Enabled Relearn Only : False
Mac Subnet Len : 48
Incl PPP Circ-Id : no
```

```

Service Id : 5001
Primary Factor : 3
Mac Move Rate : 2
Mac Move Retries : 3
Table Size : 250
Learned Count : 0
OAM-learned Count : 0
Host-learned Count : 0
Remote Age : 900
High Watermark : 95%
Mac Learning : Enabled
Mac Aging : Enabled
Mac Subnet Len : 48
Incl PPP Circ-Id : no

Mac Move : Disabled
Secondary Factor : 2
Mac Move Timeout : 10

Total Count : 0
Static Count : 0
DHCP-learned Count : 0

Local Age : 300
Low Watermark : 90%
Discard Unknown : Disabled
Relearn Only : False

```

```

Total Service FDBs : 2
Total FDB Configured Size : 500
Total FDB Entries In Use : 0
PBB MAC Address Indices In Use : 0

=====

```

```
*A:ALU-48>show>service#
```

**Table 45: Show Service FDB-Info Output Fields**

| Label            | Description                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id       | The value that identifies a service                                                                                                                                                                                                                                                                                                                                                                     |
| Mac Move         | Indicates the administrative state of the MAC movement feature associated with the service                                                                                                                                                                                                                                                                                                              |
| Mac Move Rate    | The maximum rate at which MACs can be relearned in this TLS service, before the SAP where the moving MAC was last seen is automatically disabled in order to protect the system against undetected loops or duplicate MACs.<br>The rate is computed as the maximum number of relearns allowed in a 5-s interval. The default rate of 10 relearns per second corresponds to 50 relearns in a 5-s period. |
| Mac Move Timeout | Indicates the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled. A value of 0 indicates that the SAP will not be automatically re-enabled after being disabled. If after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing.                                             |
| Table Size       | The maximum number of learned and static entries allowed in the FDB                                                                                                                                                                                                                                                                                                                                     |
| Total Count      | The current number of entries (both learned and static) in the FDB of this service                                                                                                                                                                                                                                                                                                                      |

**Table 45: Show Service FDB-Info Output Fields (Continued)**

| Label                          | Description                                                                                                                                                                                                                                           |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Learned Count                  | The current number of learned entries in the FDB of this service                                                                                                                                                                                      |
| Static Count                   | The current number of static entries in the FDB of this service                                                                                                                                                                                       |
| OAM-learned Count              | The current number of OAM-learned entries in the FDB of this service                                                                                                                                                                                  |
| DHCP-learned Count             | The current number of DHCP-learned entries in the FDB of this service                                                                                                                                                                                 |
| Host-learned Count             | The current number of host-learned entries in the FDB of this service                                                                                                                                                                                 |
| Remote Age                     | The number of seconds used to age out FDB entries learned on an SDP. These entries correspond to MAC addresses learned on remote SAPs.                                                                                                                |
| Local Age                      | The seconds used to age out FDB entries learned on local SAPs                                                                                                                                                                                         |
| High Watermark                 | The utilization of the FDB table of this service at which a “table full” alarm is raised by the agent                                                                                                                                                 |
| Low Watermark                  | The utilization of the FDB table of this service at which a “table full” alarm is cleared by the agent                                                                                                                                                |
| Mac Learning                   | Specifies whether the MAC learning process is enabled in this service                                                                                                                                                                                 |
| Discard Unknown                | Specifies whether frames received with an unknown destination MAC are discarded in this service                                                                                                                                                       |
| MAC Aging                      | Specifies whether MAC aging is enabled                                                                                                                                                                                                                |
| MAC Pinning                    | Specifies whether MAC pinning is enabled                                                                                                                                                                                                              |
| Relearn Only                   | When enabled, indicates that either the FDB table of this service is full or that the maximum system-wide number of MACs supported by the agent has been reached, and thus MAC learning is temporarily disabled, and only MAC relearns can take place |
| Total Service FDB              | The current number of service FDBs configured on this node                                                                                                                                                                                            |
| Total FDB Configured Size      | The sum of configured FDBs                                                                                                                                                                                                                            |
| Total FDB Entries In Use       | The total number of entries (both learned and static) in use                                                                                                                                                                                          |
| PBB MAC Address Indices in Use | Not applicable                                                                                                                                                                                                                                        |



## fdb-mac

|                    |                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>fdb-mac</b> <i>ieee-address</i> [ <b>expiry</b> ]                                                                                                                                                                                                              |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command displays the FDB entry for a given MAC address.                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><i>ieee-address</i> — the 48-bit MAC address for which to display the FDB entry in the form aa:bb:cc:dd:ee:ff or aa-bb-cc-dd-ee-ff where aa, bb, cc, dd, ee and ff are hexadecimal numbers</p> <p><b>expiry</b> — shows the time until the MAC is aged out</p> |
| <b>Output</b>      | The following output is an example of FDB information for a specific MAC address, and <a href="#">Table 46</a> describes the fields.                                                                                                                              |

**Sample Output**

```
*A:ALU-48>show>service# fdb-mac

=====
Service Forwarding Database
=====
ServId MAC Source-Identifier Type/Age Last Change

1 00:99:00:00:00:00 sap:1/2/7:0 Static 02/17/2007 13:58:41

No. of Entries: 1

Legend: L=Learned; P=MAC is protected
=====
*A:ALU-48>show>service#
#
```

**Table 46: Show Service FDB-MAC Output Fields**

| Label             | Description                           |
|-------------------|---------------------------------------|
| ServId            | The service ID number                 |
| MAC               | The specified MAC address             |
| Source-Identifier | The location where the MAC is defined |

**Table 46: Show Service FDB-MAC Output Fields (Continued)**

| Label       | Description                                                                                                                                    |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Type/Age    | Static — FDB entries created by management                                                                                                     |
|             | Learned — dynamic entries created by the learning process                                                                                      |
|             | OAM — entries created by the OAM process                                                                                                       |
|             | H — host, the entry added by the system for a static configured subscriber host                                                                |
|             | D or DHCP — DHCP-installed MAC. Learned addresses can be temporarily frozen by the DHCP snooping application for the duration of a DHCP lease. |
|             | P — indicates the MAC is protected by the MAC protection feature                                                                               |
| Last Change | The date and time of the last change                                                                                                           |

id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | This command enables the context to display information for a specific <i>service-id</i> . The output display can be filtered by using one of the command filters in the Parameters list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <i>service-id</i> — the unique service identification number that identifies the service in the service domain<br><b>all</b> — display detailed information about the service ( <a href="#">all</a> )<br><b>arp</b> — display ARP entries for the service ( <a href="#">arp</a> )<br><b>base</b> — display basic service information ( <a href="#">base</a> )<br><b>dhcp</b> — display DHCP information ( <a href="#">dhcp</a> )<br><b>endpoint</b> — display service endpoint information ( <a href="#">endpoint</a> )<br><b>fdb</b> — display FDB entries ( <a href="#">fdb</a> )<br><b>labels</b> — display labels being used by this service ( <a href="#">labels</a> )<br><b>mac-move</b> — display MAC-move related information about the service ( <a href="#">mac-move</a> )<br><b>sap</b> — display SAPs associated with the service ( <a href="#">sap</a> ) |

**sdp** — display SDPs associated with the service ([pppoe-circuit-id](#))

**split-horizon-group** — display split horizon group information ([split-horizon-group](#))

**static-host** — display static host information ([static-host](#))

**all**

|                    |                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>all</b>                                                                                                                     |
| <b>Context</b>     | show>service>id                                                                                                                |
| <b>Description</b> | This command displays detailed information for all aspects of a service.                                                       |
| <b>Output</b>      | The following output is an example of detailed information about a service, and <a href="#">Table 47</a> describes the fields. |

### Sample Output

```
*A:ALU-48>show>service>id# all
```

```
=====
Service Detailed Information
=====
```

```
Service Id : 5001
Service Type : VPLS
Description : (Not Specified)
Customer Id : 1
Last Status Change: 10/26/2010 20:13:08
Last Mgmt Change : 10/26/2010 20:13:09
Admin State : Down
Oper State : Down
MTU : 1514
Def. Mesh VC Id : 5001
SAP Count : 1
SDP Bind Count : 1
Snd Flush on Fail : Disabled
Host Conn Verify : Disabled
Propagate MacFlush: Disabled
Def. Gateway IP : None
Def. Gateway MAC : None
```

```

Split Horizon Group specifics

```

```

Split Horizon Group : shg5001

```

```
Description : (Not Specified)
Instance Id : 1
Last Change : 10/26/2010 20:13:09
```

```

Service Destination Points (SDPs)

```

```

Sdp Id 5001:100 -(10.10.10.10)

Description : (Not Specified)
```

## VPLS Command Reference

```

SDP Id : 5001:100 Type : Spoke
Split Horiz Grp : shg5001 VC Tag : n/a
VC Type : Ether Oper Path MTU : 0
Admin Path MTU : 0 Delivery : MPLS
Far End : 10.10.10.10

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Ing ipv6 Fltr : n/a Egr ipv6 Fltr : n/a
Admin ControlWord : Not Preferred Oper ControlWord : False
Last Status Change : 10/26/2010 20:13:08 Signaling : TLDP
Last Mgmt Change : 10/26/2010 20:13:09 Force Vlan-Vc : Disabled
Endpoint : endpoint5000 Precedence : 4
Class Fwding State : Down
Flags : SvcAdminDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall

Time to RetryReset : never Retries Left : 3
Mac Move : Blockable Blockable Level : Tertiary
Peer Pw Bits : None
Peer Fault Ip : None
Max Nbr of MAC Addr: No Limit Total MAC Addr : 0

Learned MAC Addr : 0 Static MAC Addr : 0

MAC Learning : Enabled Discard Unkwn Srce: Disabled
BPDU Translation : Disabled
L2PT Termination : Disabled
MAC Pinning : Disabled
Ignore Standby Sig : False Block On Mesh Fail: False

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 0 I. Dro. Pkts. : 0
I. Fwd. Octs. : 0 I. Dro. Octs. : 0
E. Fwd. Pkts. : 0 E. Fwd. Octets : 0
MCAC Policy Name :
MCAC Max Unconst BW: no limit MCAC Max Mand BW : no limit
MCAC In use Mand BW: 0 MCAC Avail Mand BW: unlimited
MCAC In use Opnl BW: 0 MCAC Avail Opnl BW: unlimited

Associated LSP LIST :
No LSPs Associated

```

---

### Stp Service Destination Point specifics

---

```

Stp Admin State : Down Stp Oper State : Down
Core Connectivity : Down Port State : Discarding
Port Role : N/A Port Priority : 128
Port Number : 0 Auto Edge : Enabled
Port Path Cost : 10

```

```

Admin Edge : Disabled
Link Type : Pt-pt
Root Guard : Disabled
Last BPDU from : N/A
Designated Bridge : N/A

Oper Edge : N/A
BPDU Encap : Dot1d
Active Protocol : N/A

Designated Port Id: 0

Fwd Transitions : 0
Cfg BPDUs rcvd : 0
TCN BPDUs rcvd : 0
RST BPDUs rcvd : 0

Bad BPDUs rcvd : 0
Cfg BPDUs tx : 0
TCN BPDUs tx : 0
RST BPDUs tx : 0

Number of SDPs : 1

Service Access Points

SAP 1/2/4:1/100

Service Id : 5001
SAP : 1/2/4:1/100
Description : (Not Specified)
Admin State : Up
Flags : ServiceAdminDown
 PortOperDown L2OperDown
Multi Svc Site : None
Last Status Change : 10/26/2010 20:13:08
Last Mgmt Change : 10/26/2010 20:13:09
Sub Type : regular
Split Horizon Group: shg5001

Max Nbr of MAC Addr: No Limit
Learned MAC Addr : 0
Admin MTU : 1524
Ingr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a
Ingr IPv6 Fltr-Id : n/a
tod-suite : None
Ing Agg Rate Limit : max
ARP Reply Agent : Disabled
Mac Learning : Enabled
Mac Aging : Enabled
BPDU Translation : Disabled
L2PT Termination : Disabled
Vlan-translation : None

Total MAC Addr : 0
Static MAC Addr : 0
Oper MTU : 1524
Egr IP Fltr-Id : n/a
Egr Mac Fltr-Id : n/a
Egr IPv6 Fltr-Id : n/a
qinq-pbit-marking : n/a
Egr Agg Rate Limit: max
Host Conn Verify : Disabled
Discard Unkwn Srce: Disabled
Mac Pinning : Enabled

Acct. Pol : None
Collect Stats : Disabled

Anti Spoofing : None
Avl Static Hosts : 0
Tot Static Hosts : 0

Calling-Station-Id : n/a
Application Profile: None

MCAC Policy Name :
MCAC Max Unconst BW: no limit
MCAC In use Mand BW: 0
MCAC In use Opnl BW: 0
Restr MacProt Src : Disabled

MCAC Const Adm St : Enable
MCAC Max Mand BW : no limit
MCAC Avail Mand BW: unlimited
MCAC Avail Opnl BW: unlimited
Restr MacUnpr Dst : Disabled

```

## VPLS Command Reference

```
Time to RetryReset : never Retries Left : 3
Mac Move : Blockable Blockable Level : Tertiary
Egr MCast Grp :
Auth Policy : none
```

```
PPPoE Circuit-Id : none
```

---

### Stp Service Access Point specifics

---

```
Stp Admin State : Down Stp Oper State : Down
Core Connectivity : Down
Port Role : N/A Port State : Unknown
Port Number : N/A Port Priority : 128
Port Path Cost : 10 Auto Edge : Enabled
Admin Edge : Disabled Oper Edge : N/A
Link Type : Pt-pt BPDU Encap : Dot1d
Root Guard : Disabled Active Protocol : N/A
Last BPDU from : N/A Designated Port : N/A

Forward transitions: 0 Bad BPDUs rcvd : 0
Cfg BPDUs rcvd : 0 Cfg BPDUs tx : 0
TCN BPDUs rcvd : 0 TCN BPDUs tx : 0
RST BPDUs rcvd : 0 RST BPDUs tx : 0
MST BPDUs rcvd : 0 MST BPDUs tx : 0
```

---

### QOS

---

```
Ingress qos-policy : 1 Egress qos-policy : 1
Shared Q plcy : n/a Multipoint shared : Disabled
I. Sched Pol : (Not Specified)
E. Sched Pol : (Not Specified)
```

---

### DHCP

---

```
Description : (Not Specified)
Admin State : Down Lease Populate : 0
DHCP Snooping : Down Action : Keep

Proxy Admin State : Down
Proxy Lease Time : N/A
Emul. Server Addr : Not Configured
```

---

### Subscriber Management

---

```
Admin State : Down MAC DA Hashing : False
Def Sub-Id : None
Def Sub-Profile : None
Def SLA-Profile : None
Sub-Ident-Policy : None

Subscriber Limit : 1
Single-Sub-Parameters
 Prof Traffic Only : False
 Non-Sub-Traffic : N/A
```

---

### Sap Statistics

-----  
 Last Cleared Time : N/A

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | n/a    |
| Off. HiPrio             | : 0     | n/a    |
| Off. LowPrio            | : n/a   | n/a    |

Queueing Stats(Ingress QoS Policy 1)

|              |       |     |
|--------------|-------|-----|
| Dro. HiPrio  | : 0   | n/a |
| Dro. LowPrio | : n/a | n/a |
| For. InProf  | : 0   | 0   |
| For. OutProf | : 0   | 0   |

Queueing Stats(Egress QoS Policy 1)

|              |       |     |
|--------------|-------|-----|
| Dro. InProf  | : 0   | n/a |
| Dro. OutProf | : n/a | n/a |
| For. InProf  | : 0   | 0   |
| For. OutProf | : n/a | n/a |

-----  
 Sap per Queue stats

|                                       | Packets | Octets |
|---------------------------------------|---------|--------|
| Ingress Queue 1 (Priority)            |         |        |
| Off. HiPrio                           | : 0     | n/a    |
| Off. LoPrio                           | : n/a   | n/a    |
| Press any key to continue (Q to quit) |         |        |
| Ingress Queue 1 (Priority)            |         |        |
| Off. HiPrio                           | : 0     | n/a    |
| Off. LoPrio                           | : n/a   | n/a    |
| Dro. HiPrio                           | : 0     | n/a    |
| Dro. LoPrio                           | : n/a   | n/a    |
| For. InProf                           | : 0     | 0      |
| For. OutProf                          | : 0     | 0      |

Egress Queue 1

|              |       |     |
|--------------|-------|-----|
| For. InProf  | : 0   | 0   |
| For. OutProf | : n/a | n/a |
| Dro. InProf  | : 0   | n/a |
| Dro. OutProf | : n/a | n/a |

-----  
 ATM SAP Configuration Information

|                              |                              |
|------------------------------|------------------------------|
| Ingress TD Profile : 1       | Egress TD Profile : 1        |
| Alarm Cell Handling: Enabled | AAL-5 Encap : aal5snap-brid* |
| OAM Termination : Enabled    | Periodic Loopback : Disabled |

-----  
 VPLS Spanning Tree Information

|                        |                          |
|------------------------|--------------------------|
| VPLS oper state : Down | Core Connectivity : Down |
| Stp Admin State : Down | Stp Oper State : Down    |
| Mode : Rstp            | Vcp Active Prot. : N/A   |

|                                     |                       |
|-------------------------------------|-----------------------|
| Bridge Id : 80:00:a4:58:ff:00:00:00 | Bridge Instance Id: 0 |
| Bridge Priority : 32768             | Tx Hold Count : 6     |
| Topology Change : Inactive          | Bridge Hello Time : 2 |

## VPLS Command Reference

```
Last Top. Change : 0d 00:00:00 Bridge Max Age : 20
Top. Change Count : 0 Bridge Fwd Delay : 15
MST region revision: 0 Bridge max hops : 20
MST region name :

Root Bridge : N/A
Primary Bridge : N/A

Root Path Cost : 0 Root Forward Delay: 15
Rcvd Hello Time : 2 Root Max Age : 20
Root Priority : 32768 Root Port : N/A
```

### ----- Forwarding Database specifics -----

```
Service Id : 5001 Mac Move : Disabled
Primary Factor : 3 Secondary Factor : 2
Mac Move Rate : 2 Mac Move Timeout : 10
Mac Move Retries : 3
Table Size : 250 Total Count : 0
Learned Count : 0 Static Count : 0
OAM-learned Count : 0 DHCP-learned Count: 0
Host-learned Count: 0
Remote Age : 900 Local Age : 300
High Watermark : 95% Low Watermark : 90%
Mac Learning : Enabled Discard Unknown : Disabled
Mac Aging : Enabled Relearn Only : False
Mac Subnet Len : 48
Incl PPP Circ-Id : no
```

### ----- IGMP Snooping Base info -----

```
Admin State : Down
Querier : No querier found
```

| Sap/Sdp Id      | Oper State | MRtr Port | Pim Port | Send Queries | Max Grps | Max Srcs | MVR From-VPLS | Num Grps |
|-----------------|------------|-----------|----------|--------------|----------|----------|---------------|----------|
| sap:1/2/4:1/100 | Down       | No        | No       | No           | None     | None     | Local         | 0        |
| sdp:5001:100    | Down       | No        | No       | No           | None     | None     | N/A           | 0        |

### ----- MLD Snooping Base info -----

```
Admin State : Down
Querier : No querier found
```

| Sap/Sdp Id      | Oper State | MRtr Port | Send Queries | Max Num Groups | MVR From-VPLS | Num Groups |
|-----------------|------------|-----------|--------------|----------------|---------------|------------|
| sap:1/2/4:1/100 | Down       | No        | Disabled     | No Limit       | Local         | 0          |
| sdp:5001:100    | Down       | No        | Disabled     | No Limit       | N/A           | 0          |



```

DHCP Summary, service 5001

```

| Sap/Sdp         | Snoop | Used/<br>Provided | Arp Reply<br>Agent | Info<br>Option | Admin<br>State |
|-----------------|-------|-------------------|--------------------|----------------|----------------|
| sap:1/2/4:1/100 | No    | 0/0               | No                 | Keep           | Down           |
| sdp:5001:100    | No    | N/A               | N/A                | N/A            | N/A            |

```

Number of Entries : 2

```

```

ARP host Summary, service 5001

```

| Sap | Used | Provided | Admin State |
|-----|------|----------|-------------|
|-----|------|----------|-------------|

```

No Entries found

```

```

Service Endpoints

```

```
Endpoint name : endpoint5000
Description : (Not Specified)
Revert time : 0
Act Hold Delay : 0
Ignore Standby Signaling : false
Suppress Standby Signaling : true
Block On Mesh Fail : false
Tx Active : none
Tx Active Up Time : 0d 00:00:00
Revert Time Count Down : N/A
Tx Active Change Count : 0
Last Tx Active Change : 10/26/2010 20:13:08

```

```

Members

```

```
Spoke-sdp: 5001:100 Prec:4 Oper Status: Down
=====
=====
```

```
*A:ALU-48>show>service>id#
```

**Table 47: Show Service Service-ID (All) Output Fields**

| Label                      | Description                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id                 | The service identifier                                                                                                                                         |
| Service Type               | The type of service                                                                                                                                            |
| Description                | Generic information about the service                                                                                                                          |
| Customer Id                | The customer identifier                                                                                                                                        |
| Last Status Change         | The date and time of the most recent status change to this customer                                                                                            |
| Last Mgmt Change           | The date and time of the most recent management-initiated change to this customer                                                                              |
| Admin State                | The administrative state of the service                                                                                                                        |
| Oper State                 | The operational state of the service                                                                                                                           |
| MTU                        | The largest frame size (in octets) that the service can handle                                                                                                 |
| Def. Mesh VC Id            | This object is only valid in services that accept mesh SDP bindings. It is used to validate the VC ID portion of each mesh SDP binding defined in the service. |
| SAP Count                  | The number of SAPs defined on the service                                                                                                                      |
| SDP Bind Count             | The number of SDPs bound to the service                                                                                                                        |
| Snd Flush on Fail          | Specifies the state of sending a MAC flush on failure (enabled or disabled)                                                                                    |
| Host Conn Verify           | Specifies the state of verifying host connectivity (enabled or disabled)                                                                                       |
| Propagate MacFlush         | Specifies the state of propagating a MAC flush (enabled or disabled)                                                                                           |
| Def. Gateway IP            | Specifies the defined gateway IP address for the service                                                                                                       |
| Def. Gateway MAC           | Specifies the defined gateway MAC address for the service                                                                                                      |
| <b>Split Horizon Group</b> |                                                                                                                                                                |
| Description                | Description of the split horizon group                                                                                                                         |
| Last Changed               | The date and time of the most recent management-initiated change to this split horizon group                                                                   |
| Instance Id                | The identifier for this split horizon group instance                                                                                                           |

**Table 47: Show Service Service-ID (All) Output Fields (Continued)**

| Label                                                                                          | Description                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Distribution Points (SDPs) (see <a href="#">Table 56</a>)</b>                       |                                                                                                                                                                                                                                     |
| <b>Service Access Points (see <a href="#">Table 55</a>)</b>                                    |                                                                                                                                                                                                                                     |
| <b>IGMP Snooping Base info</b>                                                                 |                                                                                                                                                                                                                                     |
| The fields under IGMP Snooping Base info do not apply to VPLS services on the 7705 SAR.        |                                                                                                                                                                                                                                     |
| <b>MLD Snooping Base info</b>                                                                  |                                                                                                                                                                                                                                     |
| The fields under MLD Snooping Base info do not apply to VPLS services on the 7705 SAR.         |                                                                                                                                                                                                                                     |
| <b>VPLS Spanning Tree Information</b>                                                          |                                                                                                                                                                                                                                     |
| The fields under VPLS Spanning Tree Information do not apply to VPLS services on the 7705 SAR. |                                                                                                                                                                                                                                     |
| <b>DHCP Summary (see <a href="#">Table 50</a>)</b>                                             |                                                                                                                                                                                                                                     |
| <b>ARP host Summary</b>                                                                        |                                                                                                                                                                                                                                     |
| Sap                                                                                            | The SAP identifier                                                                                                                                                                                                                  |
| Used                                                                                           | The number of lease-states that are currently in use on a specific interface; that is, the number of clients on that interface who received an IP address via ARP. This value is always less than or equal to the “Provided” field. |
| Provided                                                                                       | The lease-populate value that is configured for a specific interface                                                                                                                                                                |
| Admin State                                                                                    | The administrative state of the service                                                                                                                                                                                             |
| <b>Service Endpoints (see <a href="#">Table 51</a>)</b>                                        |                                                                                                                                                                                                                                     |

## base

|                    |                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>base</b>                                                                                                                 |
| <b>Context</b>     | show>service>id                                                                                                             |
| <b>Description</b> | This command displays basic information about the service ID, including service type, description, SAPs, and SDPs.          |
| <b>Output</b>      | The following output is an example of basic information about a service, and <a href="#">Table 48</a> describes the fields. |

**Sample Output**

```

*A:ALU-48>show>service>id# base

=====
Service Basic Information
=====
Service Id : 5001
Service Type : VPLS
Description : (Not Specified)
Customer Id : 1
Last Status Change: 10/26/2010 20:13:08
Last Mgmt Change : 10/26/2010 20:13:09
Admin State : Down
MTU : 1514
SAP Count : 1
Snd Flush on Fail : Disabled
Propagate MacFlush: Disabled
Def. Gateway IP : None
Def. Gateway MAC : None
Oper State : Down
Def. Mesh VC Id : 5001
SDP Bind Count : 1
Host Conn Verify : Disabled

Service Access & Destination Points

Identifier Type AdmMTU OprMTU Adm Opr

sap:1/2/4:1/100 atm 1524 1524 Up Down
sdp:5001:100 S(10.10.10.10) n/a 0 0 Up Down
=====
*A:ALU-48>show>service>id#

```

**Table 48: Show Service Service-ID (Base) Output Fields**

| Label              | Description                                                                       |
|--------------------|-----------------------------------------------------------------------------------|
| Service Id         | The service identifier                                                            |
| Service Type       | The type of service                                                               |
| Description        | Generic information about the service                                             |
| Customer Id        | The customer identifier                                                           |
| Last Status Change | The date and time of the most recent status change to this customer               |
| Last Mgmt Change   | The date and time of the most recent management-initiated change to this customer |
| Admin State        | The administrative state of the service                                           |
| Oper State         | The operational state of the service                                              |
| MTU                | The largest frame size (in octets) that the service can handle                    |

**Table 48: Show Service Service-ID (Base) Output Fields (Continued)**

| <b>Label</b>                                 | <b>Description</b>                                                                                                                                                            |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Def. Mesh VC Id                              | This object is only valid in services that accept mesh SDP bindings. It is used to validate the VC ID portion of each mesh SDP binding defined in the service.                |
| SAP Count                                    | The number of SAPs defined on the service                                                                                                                                     |
| SDP Bind Count                               | The number of SDPs bound to the service                                                                                                                                       |
| Snd Flush on Fail                            | Specifies the state of sending a MAC flush on failure (enabled or disabled)                                                                                                   |
| Host Conn Verify                             | Specifies the state of verifying host connectivity (enabled or disabled)                                                                                                      |
| Propagate MacFlush                           | Specifies the state of propagating a MAC flush (enabled or disabled)                                                                                                          |
| Def. Gateway IP                              | Specifies the defined gateway IP address for the service                                                                                                                      |
| Def. Gateway MAC                             | Specifies the defined gateway MAC address for the service                                                                                                                     |
| <b>Service Access and Destination Points</b> |                                                                                                                                                                               |
| Identifier                                   | Specifies the service access (SAP) and destination (SDP) points                                                                                                               |
| Type                                         | Specifies the signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on the SDP                                              |
| AdmMTU                                       | Specifies the largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented            |
| OprMTU                                       | Specifies the actual largest service frame size (in octets) that can be transmitted through this service to the far-end router, without requiring the packet to be fragmented |
| Adm                                          | The administrative state of the service                                                                                                                                       |
| Opr                                          | The operational state of the service                                                                                                                                          |

## dhcp

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                                             |
| <b>Context</b>     | show>service>id                                                                         |
| <b>Description</b> | This command enables the context to display DHCP information for the specified service. |

## statistics

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|-----------------|---------------|-------------------------------|
| <b>Syntax</b>      | <b>statistics [sap sap-id]</b><br><b>statistics [sdp sdp-id:vc-id]</b><br><b>statistics [interface ip-int-name   ip-address]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Context</b>     | show>service>id>dhcp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Description</b> | This command displays DHCP statistics information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Parameters</b>  | <p><i>sap-id</i> — specifies the physical port identifier portion of the SAP definition</p> <table> <tr> <td><b>Values</b></td><td> null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br/> dot1q : [<i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>]:<i>qtag1</i><br/> atm : [<i>port-id</i>   <i>aps-id</i>][:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> cem : <i>slot/mda/port.channel</i><br/> ipcp : <i>slot/mda/port.channel</i><br/> ima-grp : <i>bundle-id</i>[:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> port-id : <i>slot/mda/port</i>[.<i>channel</i>]<br/> bundle-id : <b>bundle-type</b>-<i>slot/mda.bundle-num</i><br/> <b>bundle</b> : keyword<br/> <i>type</i> : ima   ppp<br/> <i>bundle-num</i>: [1 to 32]<br/> <i>aps-id</i> : <b>aps-group-id</b>[.<i>channel</i>]<br/> <b>aps</b> : keyword<br/> <i>group-id</i> : 1 to 8<br/> qtag1 : 0 to 4094<br/> vpi : 0 to 4095 (NNI)<br/> : 0 to 255 (UNI)<br/> vci : 1   2   5 to 65535 </td></tr> </table> <p><i>sdp-id</i> — the SDP identifier</p> <table> <tr> <td><b>Values</b></td><td>1 to 17407</td></tr> </table> <p><i>vc-id</i> — the virtual circuit ID on the SDP ID for which to display information</p> <table> <tr> <td><b>Values</b></td><td>1 to 4294967295</td></tr> </table> <p><i>ip-int-name</i> — the IP interface name for which to display information</p> <p><i>ip-address</i> — the IP address of the interface for which to display information</p> <table> <tr> <td><b>Values</b></td><td>a.b.c.d (host bits must be 0)</td></tr> </table> | <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 | <b>Values</b> | 1 to 17407 | <b>Values</b> | 1 to 4294967295 | <b>Values</b> | a.b.c.d (host bits must be 0) |
| <b>Values</b>      | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Values</b>      | 1 to 17407                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Values</b>      | 1 to 4294967295                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |
| <b>Values</b>      | a.b.c.d (host bits must be 0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                 |               |                               |

**Output** The following output is an example of DHCP statistics information for a SAP, an SDP, and an interface, and [Table 49](#) describes the fields.

### Sample Output

```
*A:ALU-48>show>service>id>dhcp# statistics

=====
DHCP Statistics, service 5001
=====
Client Packets Snooped : 0
Client Packets Forwarded : 0
Client Packets Dropped : 0
Client Packets Proxied (RADIUS) : 0
Client Packets Proxied (Lease-Split) : 0
Server Packets Snooped : 0
Server Packets Forwarded : 0
Server Packets Dropped : 0
DHCP RELEASEs Spoofed : 0
DHCP FORCERENEWs Spoofed : 0
=====
*A:ALU-48>show>service>id>dhcp#
```

**Table 49: Show Service Service-ID (DHCP Statistics) Output Fields**

| Label                                | Description                                                  |
|--------------------------------------|--------------------------------------------------------------|
| Client Packets Snooped               | Indicates the number of client packets snooped               |
| Client Packets Forwarded             | Indicates the number of client packets forwarded             |
| Client Packets Dropped               | Indicates the number of client packets dropped               |
| Client Packets Proxied (RADIUS)      | Indicates the number of client packets proxied (RADIUS)      |
| Client Packets Proxied (Lease-Split) | Indicates the number of client packets proxied (lease-split) |
| Server Packets Snooped               | Indicates the number of server packets snooped               |
| Server Packets Forwarded             | Indicates the number of server packets forwarded             |
| Server Packets Dropped               | Indicates the number of server packets dropped               |
| DHCP RELEASEs Spoofed                | Indicates the number of DHCP releases spoofed                |
| DHCP FORCERENEWs Spoofed             | Indicates the number of DHCP forced renewals spoofed         |

## summary

|                    |                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>summary</b>                                                                                                     |
| <b>Context</b>     | show>service>id>dhcp                                                                                               |
| <b>Description</b> | This command displays DHCP configuration summary information.                                                      |
| <b>Output</b>      | The following output is an example of DHCP summary information, and <a href="#">Table 50</a> describes the fields. |

**Sample Output**

```
*A:ALU-48>show>service>id>dhcp# summary

=====
DHCP Summary, service 5001
=====
Sap/Sdp Snoop Used/ Arp Reply Info Admin
 Provided Agent Option State

sap:1/2/4:1/100 No 0/0 No Keep Down
sdp:5001:100 No N/A N/A N/A N/A

Number of Entries : 2

*A:ALU-48>show>service>id>dhcp#
```

**Table 50: Show Service Service-ID (DHCP Summary) Output Fields**

| Label           | Description                                                                                                                                                                                                                                                                                                                    |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sap/Sdp         | The SAP or SDP identifier of the router interface                                                                                                                                                                                                                                                                              |
| Snoop           | Specifies whether or not DHCP snooping is enabled                                                                                                                                                                                                                                                                              |
| Used/Provided   | Used — the number of lease-states that are currently in use on a specific interface; that is, the number of clients on that interface who received an IP address via DHCP. This value is always less than or equal to the “Provided” field.<br>Provided — the lease-populate value that is configured for a specific interface |
| Arp Reply Agent | Specifies whether or not the ARP reply agent is enabled                                                                                                                                                                                                                                                                        |
| Info Option     | Indicates whether Option 82 processing is enabled on the interface                                                                                                                                                                                                                                                             |
| Admin State     | Indicates the administrative state                                                                                                                                                                                                                                                                                             |



## endpoint

|                    |                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>endpoint</b> [ <i>endpoint-name</i> ]                                                                                                                 |
| <b>Context</b>     | show>service>id                                                                                                                                          |
| <b>Description</b> | This command displays service endpoint information.                                                                                                      |
| <b>Parameters</b>  | <i>endpoint-name</i> — specifies a name for the endpoint                                                                                                 |
| <b>Values</b>      | any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”). |
| <b>Output</b>      | The following output is an example of endpoint information, and <a href="#">Table 51</a> describes the fields.                                           |

### Sample Output

```
*A:ALU>show>service>id# endpoint

=====
Service 5001 endpoints
=====
Endpoint name : endpoint5000
Description : (Not Specified)
Revert time : 0
Act Hold Delay : 0
Ignore Standby Signaling : false
Suppress Standby Signaling : true
Block On Mesh Fail : false
Tx Active : none
Tx Active Up Time : 0d 00:00:00
Revert Time Count Down : N/A
Tx Active Change Count : 0
Last Tx Active Change : 10/26/2010 20:13:57

Members

Spoke-sdp: 5001:100 Prec:4 Oper Status: Down
=====
*A:ALU>show>service>id#
```

**Table 51: Show Service Service-ID (Endpoint) Output Fields**

| Label                      | Description                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endpoint name              | The name of the endpoint                                                                                                                                       |
| Description                | A description of the endpoint                                                                                                                                  |
| Revert time                | The programmable time delay to switch back to the primary spoke SDP                                                                                            |
| Act Hold Delay             | Not applicable                                                                                                                                                 |
| Ignore Standby Signaling   | Specifies whether or not ignore standby signaling is configured<br>True — standby signaling is ignored<br>False — standby signaling is not ignored             |
| Suppress Standby Signaling | Specifies whether or not suppress standby signaling is configured<br>True — standby signaling is suppressed<br>False — standby signaling is not suppressed     |
| Block On Mesh Fail         | Specifies whether or not to take down the spoke SDP when the mesh SDP is down<br>True — the spoke SDP is not taken down<br>False — the spoke SDP is taken down |
| Tx Active                  | The identifier of the active spoke SDP                                                                                                                         |
| Tx Active Up Time          | The total amount of time that a spoke SDP remains the active spoke SDP                                                                                         |
| Revert Time Count Down     | The amount of time remaining before active transmission reverts to the primary spoke SDP                                                                       |
| Tx Active Change Count     | The number of times that the active spoke SDP has changed                                                                                                      |
| Last Tx Active Change      | The timestamp of the last active spoke SDP change                                                                                                              |
| <b>Members</b>             |                                                                                                                                                                |
| Spoke-sdp                  | Identifies the spoke SDP                                                                                                                                       |
| Prec                       | Specifies the precedence of this SDP binding when there are multiple SDP bindings attached to one service endpoint                                             |
| Oper Status                | Indicates the operational status of the endpoint                                                                                                               |

## fdb

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>fdb</b> [ <b>sap</b> <i>sap-id</i>   <b>sdp</b> <i>sdp-id</i>   <b>mac</b> <i>ieee-address</i>   <b>endpoint</b> <i>endpoint</i>   <b>detail</b> ] [ <b>expiry</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Description</b> | This command displays FDB entries for a specified entity associated with the service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Parameters</b>  | <p><i>sap-id</i> — specifies the physical port identifier portion of the SAP definition</p> <table> <tr> <td><b>Values</b></td><td> null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br/> dot1q : [<i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>]:<i>qtag1</i><br/> atm : [<i>port-id</i>   <i>aps-id</i>][:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> cem : <i>slot/mda/port.channel</i><br/> ipcp : <i>slot/mda/port.channel</i><br/> ima-grp : <i>bundle-id</i>[:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> port-id : <i>slot/mda/port</i>[.<i>channel</i>]<br/> bundle-id : <b>bundle-type</b>-<i>slot/mda.bundle-num</i><br/> <b>bundle</b> : keyword<br/> <i>type</i> : ima   ppp<br/> <i>bundle-num</i>: [1 to 32]<br/> <i>aps-id</i> : <b>aps-group-id</b>[.<i>channel</i>]<br/> <b>aps</b> : keyword<br/> <i>group-id</i> : 1 to 8<br/> qtag1 : 0 to 4094<br/> vpi : 0 to 4095 (NNI)<br/> : 0 to 255 (UNI)<br/> vci : 1   2   5 to 65535 </td></tr> </table> <p><i>sdp-id</i> — specifies the SDP ID for the display</p> <table> <tr> <td><b>Values</b></td><td>1 to 17407</td></tr> </table> <p><i>ieee-address</i> — : xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx</p> <p><i>endpoint</i> — specifies an endpoint name</p> <table> <tr> <td><b>Values</b></td><td>any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”).</td></tr> </table> <p><b>detail</b> — displays detailed information</p> <p><b>expiry</b> — displays the time until entity is aged out</p> | <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 | <b>Values</b> | 1 to 17407 | <b>Values</b> | any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”). |
| <b>Values</b>      | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Values</b>      | 1 to 17407                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Values</b>      | any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |
| <b>Output</b>      | The following output is an example of FDB entries for a specific MAC address, and <a href="#">Table 52</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |            |               |                                                                                                                                                          |

**Sample Output**

```
*A:ALU-48>show>service>id# fdb
```

```
=====
Forwarding Database, Service 5001
=====
Service Id : 5001 Mac Move : Disabled
Primary Factor : 3 Secondary Factor : 2
Mac Move Rate : 2 Mac Move Timeout : 10
Mac Move Retries : 3
Table Size : 250 Total Count : 0
Learned Count : 0 Static Count : 0
OAM-learned Count : 0 DHCP-learned Count : 0
Host-learned Count : 0
Remote Age : 900 Local Age : 300
High Watermark : 95% Low Watermark : 90%
Mac Learning : Enabled Discard Unknown : Disabled
Mac Aging : Enabled Relearn Only : False
Mac Subnet Len : 48
Incl PPP Circ-Id : no
=====
```

```
*A:ALU-48>show>service>id#
```

```
*A:ALU>show>service>id# fdb sap 1/2/4:1/100
```

```
=====
Forwarding Database, Service 5001
=====
ServId MAC Source-Identifier Type/Age Last Change

No Matching Entries
=====
```

```
*A:ALU>show>service>id#
```

```
*A:ALU>show>service>id# fdb sdp 5001
```

```
=====
Forwarding Database, Service 5001
=====
ServId MAC Source-Identifier Type/Age Last Change

No Matching Entries
=====
```

```
*A:ALU>show>service>id#
```

```
*A:ALU-48>show>service>id# fdb mac 34-34-34-34-34-34
```

```
=====
Forwarding Database, Service 5001
=====
ServId MAC Source-Identifier Type/Age Last Change

No Matching Entries
=====
```

```
*A:ALU-48>show>service>id#
```

```
*A:ALU-48>show>service>id# fdb endpoint 10.10.10.10
```

```
=====
Forwarding Database, Service 5001
=====
```

```
ServId MAC Source-Identifier Type/Age Last Change

```

```
No Matching Entries
=====
```

```
*A:ALU-48>show>service>id#
```

```
*A:ALU>show>service>id# fdb detail
```

```
=====
Forwarding Database, Service 5001
=====
```

```
ServId MAC Source-Identifier Type/Age Last Change

```

```
No Matching Entries
=====
```

```
*A:ALU>show>service>id#
```

**Table 52: Show Service Service-ID (FDB) Output Fields**

| Label            | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ServID           | Displays the service ID                                                                                                                                                                                                                                                                                                                                                                                                  |
| Mac Move         | Displays the administrative state of the MAC movement feature associated with this service                                                                                                                                                                                                                                                                                                                               |
| Primary Factor   | Displays a factor for the primary ports defining how many MAC relearn periods should be used to measure the MAC relearn rate                                                                                                                                                                                                                                                                                             |
| Secondary Factor | Displays a factor for the secondary ports defining how many MAC relearn periods should be used to measure the MAC relearn rate                                                                                                                                                                                                                                                                                           |
| Mac Move Rate    | Displays the maximum rate at which MACs can be relearned in this service, before the SAP where the moving MAC was last seen is automatically disabled in order to protect the system against undetected loops or duplicate MACs.<br>The rate is computed as the maximum number of relearns allowed in a 5-s interval: for example, the default rate of 2 relearns per second corresponds to 10 relearns in a 5-s period. |
| Mac Move Timeout | Displays the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled. A value of 0 indicates that the SAP will not be automatically re-enabled after being disabled. If after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing.                                                               |
| Mac Move Retries | Displays the number of times retries are performed for re-enabling the SAP/SDP                                                                                                                                                                                                                                                                                                                                           |

**Table 52: Show Service Service-ID (FDB) Output Fields (Continued)**

| Label              | Description                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table Size         | Specifies the maximum number of learned and static entries allowed in the FDB of this service                                                                                                                                                    |
| Total Count        | Displays the total number of learned entries in the FDB of this service                                                                                                                                                                          |
| Learned Count      | Displays the current number of learned entries in the FDB of this service                                                                                                                                                                        |
| Static Count       | Displays the current number of static entries in the FDB of this service                                                                                                                                                                         |
| OAM-learned Count  | Displays the current number of OAM entries in the FDB of this service                                                                                                                                                                            |
| DHCP-learned Count | Displays the current number of DHCP-learned entries in the FDB of this service                                                                                                                                                                   |
| Host-learned Count | Displays the current number of host-learned entries in the FDB of this service                                                                                                                                                                   |
| Remote Age         | Displays the number of seconds used to age out FDB entries learned on an SDP. These entries correspond to MAC addresses learned on remote SAPs.                                                                                                  |
| Local Age          | Displays the number of seconds used to age out FDB entries learned on local SAPs                                                                                                                                                                 |
| High Watermark     | Displays the utilization of the FDB table of this service at which a table full alarm will be raised by the agent                                                                                                                                |
| Low Watermark      | Displays the utilization of the FDB table of this service at which a table full alarm will be cleared by the agent                                                                                                                               |
| Mac Learning       | Specifies whether MAC learning is enabled                                                                                                                                                                                                        |
| Discard Unknown    | Specifies whether frames received with an unknown destination MAC are discarded                                                                                                                                                                  |
| Mac Aging          | Indicates whether MAC aging is enabled                                                                                                                                                                                                           |
| Relearn Only       | When enabled, displays that either the FDB table of this service is full or the maximum system-wide number of MACs supported by the agent has been reached, and thus MAC learning is temporarily disabled, and only MAC relearns can take place. |
| Mac Subnet Len     | Displays the number of bits to be considered when performing MAC-learning or MAC-switching                                                                                                                                                       |
| Source-Identifier  | The location where the MAC is defined                                                                                                                                                                                                            |

**Table 52: Show Service Service-ID (FDB) Output Fields (Continued)**

| Label       | Description                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Type/Age    | Type — specifies the number of seconds used to age out TLS FDB entries learned on local SAPs                                                               |
|             | Age — specifies the number of seconds used to age out TLS FDB entries learned on an SDP. These entries correspond to MAC addresses learned on remote SAPs. |
|             | L — learned - dynamic entries created by the learning process<br>OAM — entries created by the OAM process                                                  |
|             | H — host, the entry added by the system for a static configured subscriber host                                                                            |
|             | D or DHCP — DHCP-installed MAC. Learned addresses can be temporarily frozen by the DHCP snooping application for the duration of a DHCP lease.             |
|             | P — indicates the MAC is protected by the MAC protection feature                                                                                           |
|             | Static — statically configured                                                                                                                             |
| Last Change | Indicates the time of the most recent state changes                                                                                                        |

## labels

**Syntax** labels

**Context** show>service>id

**Description** This command displays information about ingress and egress labels for the specified service.

**Output** The following output is an example of service label information, and [Table 53](#) describes the fields.

### Sample Output

```
*A:ALU-48>show>service>id# labels
```

```
=====
Martini Service Labels
=====
```

```

Svc Id Sdp Binding Type I.Lbl E.Lbl

5001 5001:100 Spok 0 0

```

```
Number of Bound SDPs : 1

```

```
*A:ALU-48>show>service>id#
```

**Table 53: Show Service Service-ID (Labels) Output Fields**

| Label                | Description                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------------------|
| Svc Id               | The service identifier                                                                                 |
| Sdp Binding          | The SDP binding identifier                                                                             |
| Type                 | Indicates whether the SDP is spoke or mesh                                                             |
| I.Lbl                | The ingress label used by the far-end device to send packets to this device in this service by the SDP |
| E.Lbl                | The egress label used by this device to send packets to the far-end device in this service by the SDP  |
| Number of Bound SDPs | The number of SDP bindings                                                                             |

## mac-move

|                    |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mac-move</b>                                                                                                        |
| <b>Context</b>     | show>service>id                                                                                                        |
| <b>Description</b> | This command displays information related to the <b>mac-move</b> feature for the specified service.                    |
| <b>Output</b>      | The following output is an example of service MAC move information, and <a href="#">Table 54</a> describes the fields. |

### Sample Output

```
*A:ALU-48>show>service>id# mac-move
=====
Service Mac Move Information
=====
Service Id : 5001 Mac Move : Disabled
Primary Factor : 3 Secondary Factor : 2
Mac Move Rate : 2 Mac Move Timeout : 10
Mac Move Retries : 3

SAP Mac Move Information: 1/2/4:1/100

Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown L2OperDown
Time to RetryReset: never Retries Left : 3
Mac Move : Blockable Blockable Level : Tertiary

```



```

SDP Mac Move Information: 5001:100

Admin State : Up Oper State : Down
Flags : SvcAdminDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall
Time to RetryReset: never Retries Left : 3
Mac Move : Blockable Blockable Level : Tertiary
=====
*A:ALU-48>show>service>id#

```

**Table 54: Show Service Service-ID (MAC Move) Output Fields**

| Label                            | Description                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id                       | The service identifier                                                                                                                                                                                                                                                                                                                                                                                                   |
| Mac Move                         | Displays the administrative state of the MAC movement feature associated with this service                                                                                                                                                                                                                                                                                                                               |
| Primary Factor                   | Displays a factor for the primary ports defining how many MAC relearn periods should be used to measure the MAC relearn rate                                                                                                                                                                                                                                                                                             |
| Secondary Factor                 | Displays a factor for the secondary ports defining how many MAC relearn periods should be used to measure the MAC relearn rate                                                                                                                                                                                                                                                                                           |
| Mac Move Rate                    | Displays the maximum rate at which MACs can be relearned in this service, before the SAP where the moving MAC was last seen is automatically disabled in order to protect the system against undetected loops or duplicate MACs.<br>The rate is computed as the maximum number of relearns allowed in a 5-s interval: for example, the default rate of 2 relearns per second corresponds to 10 relearns in a 5-s period. |
| Mac Move Timeout                 | Displays the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled.<br>A value of 0 indicates that the SAP will not be automatically re-enabled after being disabled. If after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing.                                                            |
| Mac Move Retries                 | Displays the number of times retries are performed for re-enabling the SAP or SDP                                                                                                                                                                                                                                                                                                                                        |
| <b>SAP Mac Move Information:</b> |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Admin State                      | The administrative state of the SAP                                                                                                                                                                                                                                                                                                                                                                                      |

**Table 54: Show Service Service-ID (MAC Move) Output Fields (Continued)**

| Label                            | Description                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper State                       | The operational state of the SAP                                                                                                                                                                                                                                                                                                                              |
| Flags                            | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, PortOperDown, L2OperDown.                                                                                                                                                                                                                   |
| Time to RetryReset               | Displays the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled.<br>A value of 0 indicates that the SAP will not be automatically re-enabled after being disabled. If after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing. |
| Retries Left                     | Displays the number of remaining attempts to re-enable the SAP                                                                                                                                                                                                                                                                                                |
| Mac Move                         | Specifies whether MAC move is configured as blockable or not blockable on the SAP                                                                                                                                                                                                                                                                             |
| Blockable Level                  | Specifies the level at which MAC move is blockable on the SAP (primary, secondary, or tertiary)                                                                                                                                                                                                                                                               |
| <b>SDP Mac Move Information:</b> |                                                                                                                                                                                                                                                                                                                                                               |
| Admin State                      | The administrative state of the SDP                                                                                                                                                                                                                                                                                                                           |
| Oper State                       | The operational state of the SDP                                                                                                                                                                                                                                                                                                                              |
| Flags                            | Specifies the conditions that affect the operating status of this SDP. Display output includes: SvcAdminDown, SdpOperDown, NoIngVCLabel, NoEgrVCLabel, PathMTUTooSmall.                                                                                                                                                                                       |
| Time to RetryReset               | Displays the time, in seconds, to wait before a SDP that has been disabled after exceeding the maximum relearn rate is re-enabled.<br>A value of 0 indicates that the SDP will not be automatically re-enabled after being disabled. If after the SDP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing. |
| Retries Left                     | Displays the number of remaining attempts to re-enable the SDP                                                                                                                                                                                                                                                                                                |
| Mac Move                         | Specifies whether MAC move is configured as blockable or not blockable on the SDP                                                                                                                                                                                                                                                                             |
| Blockable Level                  | Specifies the level at which MAC move is blockable on the SDP (primary, secondary, or tertiary)                                                                                                                                                                                                                                                               |

## sap

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sap</b><br><b>sap</b> <i>sap-id</i> [ <b>atm</b>   <b>base</b>   <b>detail</b>   <b>qos</b>   <b>sap-stats</b>   <b>stats</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | This command displays information about SAPs. When the <b>sap</b> command is used without specifying a <i>sap-id</i> , the display shows all the information for all SAPs in the service. Including the <i>sap-id</i> and a filtering keyword with the <b>sap</b> command displays information pertaining to the keyword.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <i>sap-id</i> — specifies the physical port identifier portion of the SAP definition <table> <tr> <td><b>Values</b></td><td> null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br/> dot1q : [<i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>]:<i>qtag1</i><br/> atm : [<i>port-id</i>   <i>aps-id</i>][:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> cem : <i>slot/mda/port.channel</i><br/> ipcp : <i>slot/mda/port.channel</i><br/> ima-grp : <i>bundle-id</i>[:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> port-id : <i>slot/mda/port</i>[.<i>channel</i>]<br/> bundle-id : <b>bundle-type</b>-<i>slot/mda.bundle-num</i><br/> <b>bundle</b> : keyword<br/> <i>type</i> : ima   ppp<br/> <i>bundle-num</i>: [1 to 32]<br/> <i>aps-id</i> : <b>aps-group-id</b>[.<i>channel</i>]<br/> <b>aps</b> : keyword<br/> <i>group-id</i> : 1 to 8<br/> qtag1 : 0 to 4094<br/> vpi : 0 to 4095 (NNI)<br/> : 0 to 255 (UNI)<br/> vci : 1   2   5 to 65535 </td></tr> </table> <p> <b>atm</b> — filters the command results to display ATM information for the specified SAP<br/> <b>base</b> — filters the command results to display base information for the specified SAP<br/> <b>detail</b> — displays detail information for the specified SAP<br/> <b>qos</b> — filters the command results to display QoS information for the specified SAP<br/> <b>sap-stats</b> — filters the command results to display SAP statistics information for the specified SAP<br/> <b>stats</b> — filters the command results to display statistics information for the specified SAP </p> | <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 |
| <b>Values</b>      | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Output</b>      | The following output is an example of service SAP information, and <a href="#">Table 55</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Sample Output**

```
*A:ALU-48>show>service>id# sap
```

```
=====
SAP(Summary), Service 5001
=====
```

| PortId      | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|-------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/2/4:1/100 | 5001  | 1           | none         | 1           | none         | Up  | Down |

```

Number of SAPs : 1

```

```
=====
*A:ALU-48>show>service>id#
```

```
*A:ALU-48>show>service>id# sap 1/2/4:1/100 detail
```

```
=====
Service Access Points(SAP)
=====
```

```
Service Id : 5001
SAP : 1/2/4:1/100 Encap : atm
Description : (Not Specified)
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown L2OperDown
Multi Svc Site : None
Last Status Change : 10/26/2010 20:13:11
Last Mgmt Change : 10/26/2010 20:13:12
Sub Type : regular
Split Horizon Group: shg5001

Max Nbr of MAC Addr: No Limit Total MAC Addr : 0
Learned MAC Addr : 0 Static MAC Addr : 0
Admin MTU : 1524 Oper MTU : 1524
Ingr IP Fltr-Id : n/a Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
Ingr IPv6 Fltr-Id : n/a Egr IPv6 Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : n/a
Ing Agg Rate Limit : max Egr Agg Rate Limit: max
ARP Reply Agent : Disabled Host Conn Verify : Disabled
Mac Learning : Enabled Discard Unkwn Srce: Disabled
Mac Aging : Enabled Mac Pinning : Enabled
BPDU Translation : Disabled
L2PT Termination : Disabled
Vlan-translation : None

Acct. Pol : None Collect Stats : Disabled

Anti Spoofing : None Avl Static Hosts : 0
 Tot Static Hosts : 0

Calling-Station-Id : n/a
Application Profile: None

MCAC Policy Name : MCAC Const Adm St : Enable
```

|                               |                               |
|-------------------------------|-------------------------------|
| MCAC Max Unconst BW: no limit | MCAC Max Mand BW : no limit   |
| MCAC In use Mand BW: 0        | MCAC Avail Mand BW: unlimited |
| MCAC In use Opnl BW: 0        | MCAC Avail Opnl BW: unlimited |
| Restr MacProt Src : Disabled  | Restr MacUnpr Dst : Disabled  |
| Time to RetryReset : never    | Retries Left : 3              |
| Mac Move : Blockable          | Blockable Level : Tertiary    |
| Egr MCast Grp :               |                               |
| Auth Policy : none            |                               |
| PPPoE Circuit-Id : none       |                               |

-----

Stp Service Access Point specifics

-----

|                          |                       |
|--------------------------|-----------------------|
| Stp Admin State : Down   | Stp Oper State : Down |
| Core Connectivity : Down |                       |
| Port Role : N/A          | Port State : Unknown  |
| Port Number : N/A        | Port Priority : 128   |
| Port Path Cost : 10      | Auto Edge : Enabled   |
| Admin Edge : Disabled    | Oper Edge : N/A       |
| Link Type : Pt-pt        | BPDUs Encap : Dot1d   |
| Root Guard : Disabled    | Active Protocol : N/A |
| Last BPDUs from : N/A    |                       |
| CIST Desig Bridge : N/A  | Designated Port : N/A |
| Forward transitions: 0   | Bad BPDUs rcvd : 0    |
| Cfg BPDUs rcvd : 0       | Cfg BPDUs tx : 0      |
| TCN BPDUs rcvd : 0       | TCN BPDUs tx : 0      |
| RST BPDUs rcvd : 0       | RST BPDUs tx : 0      |
| MST BPDUs rcvd : 0       | MST BPDUs tx : 0      |

-----

QOS

-----

|                                |                              |
|--------------------------------|------------------------------|
| Ingress qos-policy : 1         | Egress qos-policy : 1        |
| Shared Q plcy : n/a            | Multipoint shared : Disabled |
| I. Sched Pol : (Not Specified) |                              |
| E. Sched Pol : (Not Specified) |                              |

-----

DHCP

-----

|                                    |                    |
|------------------------------------|--------------------|
| Description : (Not Specified)      |                    |
| Admin State : Down                 | Lease Populate : 0 |
| DHCP Snooping : Down               | Action : Keep      |
| Proxy Admin State : Down           |                    |
| Proxy Lease Time : N/A             |                    |
| Emul. Server Addr : Not Configured |                    |

-----

Subscriber Management

-----

|                         |                        |
|-------------------------|------------------------|
| Admin State : Down      | MAC DA Hashing : False |
| Def Sub-Id : None       |                        |
| Def Sub-Profile : None  |                        |
| Def SLA-Profile : None  |                        |
| Sub-Ident-Policy : None |                        |
| Subscriber Limit : 1    |                        |
| Single-Sub-Parameters   |                        |

## VPLS Command Reference

```

Prof Traffic Only : False
Non-Sub-Traffic : N/A

Sap Statistics

Last Cleared Time : N/A

 Packets Octets
Forwarding Engine Stats
Dropped : 0 n/a
Off. HiPrio : 0 n/a
Off. LowPrio : n/a n/a

Queueing Stats(Ingress QoS Policy 1)
Dro. HiPrio : 0 n/a
Dro. LowPrio : n/a n/a
For. InProf : 0 0
For. OutProf : 0 0

Queueing Stats(Egress QoS Policy 1)
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a
For. InProf : 0 0
For. OutProf : n/a n/a

Sap per Queue stats

 Packets Octets

Ingress Queue 1 (Priority)
Off. HiPrio : 0 n/a
Off. LoPrio : n/a n/a
Dro. HiPrio : 0 n/a
Dro. LoPrio : n/a n/a
For. InProf : 0 0
For. OutProf : 0 0

Egress Queue 1
For. InProf : 0 0
For. OutProf : n/a n/a
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a

ATM SAP Configuration Information

Ingress TD Profile : 1 Egress TD Profile : 1
Alarm Cell Handling: Enabled AAL-5 Encap : aal5snap-brid*
OAM Termination : Enabled Periodic Loopback : Disabled
=====
* indicates that the corresponding row element may have been truncated.
*A:ALU-48>show>service>id#

*A:ALU-48>show>service>id# sap 1/2/4:1/100 qos

=====
Service Access Points (SAP)
=====
Service Id : 5001
SAP : 1/2/4:1/100 Encap : atm

```

```

Description : (Not Specified)
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown L2OperDown
Multi Svc Site : None
Last Status Change : 10/26/2010 20:13:11
Last Mgmt Change : 10/26/2010 20:13:12

```

-----

QoS

-----

```

Ingress qos-policy : 1 Egress qos-policy : 1
Shared Q plcy : n/a Multipoint shared : Disabled
I. Sched Pol : (Not Specified)
E. Sched Pol : (Not Specified)

```

=====

\*A:ALU-48>show>service>id#

.

**Table 55: Show Service ID (SAP) Output Fields**

| Label               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id          | The service identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| SAP                 | The SAP identifier.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Encap               | The encapsulation type of the SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Admin State         | The administrative state of the SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Oper State          | The operating state of the SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flags               | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SapAdminDown, InterfaceAdminDown, PortOperDown, PortMTUTooSmall, L2OperDown, SapIngressQoSMismatch, SapEgressQoSMismatch, RelearnLimitExceeded, RxProtSrcMac, ParentIfAdminDown, NoSapIpipeCeIpAddr, TodResourceUnavail, TodMssResourceUnavail, SapParamMismatch, CemSapNoEcidOrMacAddr, StandByForMcRing, ServiceMTUTooSmall, SapIngressNamedPoolMismatch, SapEgressNamedPoolMismatch, NoSapEpipeRingNode. |
| Last Status Change  | The time of the most recent operating status change to this SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Last Mgmt Change    | The time of the most recent management-initiated change to this SAP.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sub Type            | The supported sub type: regular.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Split Horizon Group | Indicates the split horizon group that this SAP is a member of.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**Table 55: Show Service ID (SAP) Output Fields (Continued)**

| Label              | Description                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Admin MTU          | The desired largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented.                                                                                                                                                                                              |
| Oper MTU           | The actual largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented.                                                                                                                                                                                               |
| Ingr IP Fltr-Id    | The IPv4 ingress filter policy ID assigned to the SAP.                                                                                                                                                                                                                                                                                                        |
| Egr IP Fltr-Id     | The IPv4 egress filter policy ID assigned to the SAP.                                                                                                                                                                                                                                                                                                         |
| Ingr Mac Fltr-Id   | Not applicable.                                                                                                                                                                                                                                                                                                                                               |
| Egr Mac Fltr-Id    | Not applicable.                                                                                                                                                                                                                                                                                                                                               |
| Ingr IPv6 Fltr-Id  | The IPv6 ingress filter policy ID assigned to the SAP.                                                                                                                                                                                                                                                                                                        |
| Egr IPv6 Fltr-Id   | The IPv6 egress filter policy ID assigned to the SAP.                                                                                                                                                                                                                                                                                                         |
| tod-suite          | Indicates whether a time-based policy is applied to a multiservice site.                                                                                                                                                                                                                                                                                      |
| qinq-pbit-marking  | Not applicable.                                                                                                                                                                                                                                                                                                                                               |
| ARP Reply Agent    | Specifies whether or not the ARP reply agent is enabled.                                                                                                                                                                                                                                                                                                      |
| Host Conn Verify   | Specifies the state of verifying host connectivity (enabled or disabled).                                                                                                                                                                                                                                                                                     |
| Mac Learning       | Specifies whether MAC learning is enabled.                                                                                                                                                                                                                                                                                                                    |
| Discard Unkwn Srce | Specifies whether frames received with an unknown destination MAC are discarded.                                                                                                                                                                                                                                                                              |
| Mac Aging          | Specifies whether MAC aging is enabled.                                                                                                                                                                                                                                                                                                                       |
| Mac Pinning        | Specifies whether MAC pinning is enabled.                                                                                                                                                                                                                                                                                                                     |
| Acct. Pol          | The accounting policy ID applied to the SAP.                                                                                                                                                                                                                                                                                                                  |
| Collect Stats      | Specifies whether accounting statistics are collected on the SAP.                                                                                                                                                                                                                                                                                             |
| Time to RetryReset | Displays the time, in seconds, to wait before a SAP that has been disabled after exceeding the maximum relearn rate is re-enabled.<br>A value of 0 indicates that the SAP will not be automatically re-enabled after being disabled. If after the SAP is re-enabled it is disabled again, the effective retry timeout is doubled in order to avoid thrashing. |



**Table 55: Show Service ID (SAP) Output Fields (Continued)**

| Label                                                                                 | Description                                                                                                        |
|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Retries Left                                                                          | Displays the number of remaining attempts to re-enable the SAP.                                                    |
| Mac Move                                                                              | Indicates the administrative state of the MAC movement feature associated with the SAP.                            |
| Blockable Level                                                                       | Specifies the level at which MAC move is blockable on the SAP (primary, secondary, or tertiary).                   |
| PPPoE Circuit-Id                                                                      | Specifies the agent-circuit-id, as specified in RFC 4679 (applies to ATM VPLS instances only).                     |
| <b>Stp Service Access Point specifics</b>                                             |                                                                                                                    |
| The fields under STP SAP specifics do not apply to VPLS services on the 7705 SAR.     |                                                                                                                    |
| <b>QOS</b>                                                                            |                                                                                                                    |
| Ingress qos-policy                                                                    | The ingress QoS policy ID assigned to the SAP                                                                      |
| Egress qos-policy                                                                     | The egress QoS policy ID assigned to the SAP                                                                       |
| Shared Q plcy                                                                         | Not applicable.                                                                                                    |
| Multipoint shared                                                                     | Not applicable.                                                                                                    |
| <b>DHCP</b>                                                                           |                                                                                                                    |
| Admin State                                                                           | Specifies whether DHCP Relay is enabled on this SAP.                                                               |
| DHCP Snooping                                                                         | The status of the DHCP snooping function (up or down).                                                             |
| Action                                                                                | The DHCP action to be used for the Relay Agent Information Option (Option 82) processing (forward, drop, or keep). |
| <b>Subscriber Management</b>                                                          |                                                                                                                    |
| The fields under subscriber management do not apply to VPLS services on the 7705 SAR. |                                                                                                                    |
| <b>Sap Statistics</b>                                                                 |                                                                                                                    |
| Last Cleared Time                                                                     | The date and time that a clear command was issued on statistics.                                                   |
| Forwarding Engine Stats                                                               |                                                                                                                    |
| Dropped                                                                               | The number of packets or octets dropped by the forwarding engine.                                                  |
| Off. HiPrio                                                                           | The number of high-priority packets or octets offered to the forwarding engine.                                    |

**Table 55: Show Service ID (SAP) Output Fields (Continued)**

| Label                               | Description                                                                                                             |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Off. LowPrio                        | The number of low-priority packets offered to the forwarding engine.                                                    |
| Queueing Stats (Ingress QoS Policy) |                                                                                                                         |
| Dro. HiPrio                         | The number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy.                   |
| Dro. LowPrio                        | The number of low-priority packets discarded, as determined by the SAP ingress QoS policy.                              |
| For. InProf                         | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy.     |
| For. OutProf                        | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy. |
| Queueing Stats (Egress QoS Policy)  |                                                                                                                         |
| Dro. InProf                         | The number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy.                       |
| Dro. OutProf                        | The number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy.                   |
| For. InProf                         | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy.      |
| For. OutProf                        | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy.  |
| <b>Sap per Queue stats</b>          |                                                                                                                         |
| Ingress Queue <i>n</i>              | The index of the ingress QoS queue of this SAP, where <i>n</i> is the index number.                                     |
| Off. HiPrio                         | The number of packets or octets of high-priority traffic for the SAP (offered).                                         |
| Off. LoPrio                         | The number of packets or octets of low-priority traffic for the SAP (offered).                                          |
| Dro. HiPrio                         | The number of high-priority traffic packets or octets dropped.                                                          |
| Dro. LoPrio                         | The number of low-priority traffic packets or octets dropped.                                                           |

**Table 55: Show Service ID (SAP) Output Fields (Continued)**

| Label                                    | Description                                                                         |
|------------------------------------------|-------------------------------------------------------------------------------------|
| For. InProf                              | The number of in-profile packets or octets (rate below CIR) forwarded.              |
| For. OutProf                             | The number of out-of-profile packets or octets (rate above CIR) forwarded.          |
| Egress Queue <i>n</i>                    | The index of the egress QoS queue of the SAP, where <i>n</i> is the index number.   |
| For. InProf                              | The number of in-profile packets or octets (rate below CIR) forwarded.              |
| For. OutProf                             | The number of out-of-profile packets or octets (rate above CIR) forwarded.          |
| Dro. InProf                              | The number of in-profile packets or octets dropped for the SAP.                     |
| Dro. OutProf                             | The number of out-of-profile packets or octets discarded.                           |
| <b>ATM SAP Configuration Information</b> |                                                                                     |
| Ingress TD Profile                       | The profile ID of the traffic descriptor applied to the ingress SAP                 |
| Egress TD Profile                        | The profile ID of the traffic descriptor applied to the egress SAP                  |
| Alarm Cell Handling                      | Indicates that OAM cells are being processed                                        |
| OAM Termination                          | Indicates whether this SAP is an OAM termination point                              |
| AAL-5 Encap                              | Indicates the type of AAL5 encapsulation for this ATM SAP                           |
| OAM Termination                          | Indicates the state of the OAM termination for this ATM SAP (enabled or disabled)   |
| Periodic Loopback                        | Indicates the state of the periodic loopback for this ATM SAP (enabled or disabled) |

## pppoe-circuit-id

|                    |                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>pppoe-circuit-id statistics</b>                                                                                                           |
| <b>Context</b>     | show>service>id>sap                                                                                                                          |
| <b>Description</b> | This command displays statistics related to the agent-circuit-id, as specified in RFC 4679. This command applies to ATM VPLS instances only. |

## sdp

|                    |                                                                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sdp</b><br><b>sdp</b> { <i>sdp-id</i> [: <i>vc-id</i> ]   <b>far-end</b> <i>ip-address</i> } [ <b>detail</b> ]                                                                                                                                                                                                         |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | This command displays information about SDPs. When the <b>sdp</b> command is used without specifying a <i>sdp-id</i> , the display shows all the information for all SDPs in the service. Including the <i>sdp-id</i> and a filtering keyword with the <b>sdp</b> command displays information pertaining to the keyword. |
| <b>Parameters</b>  | <i>sdp-id</i> — the SDP identifier<br><b>Values</b> 1 to 17407<br><i>vc-id</i> — the VC identifier<br><b>Values</b> 1 to 4294967295<br><i>ip-address</i> — displays information for the SDP having this as far-end IP address<br><b>Values</b> a.b.c.d<br><b>detail</b> — adds details to SDP information                 |
| <b>Output</b>      | The following output is an example of service SDP information, and <a href="#">Table 56</a> describes the fields.                                                                                                                                                                                                         |

**Sample Output**

```
*A:ALU-48>show>service>id# sdp 5001

=====
Service Destination Point (Sdp Id : 5001)
=====
SdpId Type IP address Adm Opr I.Lbl E.Lbl

5001:100 Spok 10.10.10.10 Up Down 0 0
=====
*A:ALU-48>show>service>id#

*A:ALU-48>show>service>id# sdp 5001 detail

=====
Service Destination Point (Sdp Id : 5001) Details
=====

Sdp Id 5001:100 -(10.10.10.10)

Description : (Not Specified)
SDP Id : 5001:100 Type : Spoke
Split Horiz Grp : shg5001
VC Type : Ether VC Tag : n/a
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 10.10.10.10 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
```

```

Ing mac Fltr : n/a
Ing ip Fltr : n/a
Ing ipv6 Fltr : n/a
Admin ControlWord : Not Preferred
Last Status Change : 10/26/2010 20:14:00
Last Mgmt Change : 10/26/2010 20:14:01
Endpoint : endpoint5000
Class Fwding State : Down
Flags : SvcAdminDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall

Time to RetryReset : never
Mac Move : Blockable
Peer Pw Bits : None
Peer Fault Ip : None
Max Nbr of MAC Addr : No Limit
Learned MAC Addr : 0

MAC Learning : Enabled
BPDU Translation : Disabled
L2PT Termination : Disabled
MAC Pinning : Disabled
Ignore Standby Sig : False

KeepAlive Information :
Admin State : Disabled
Hello Time : 10
Max Drop Count : 3

Statistics :
I. Fwd. Pkts. : 0
I. Fwd. Octs. : 0
E. Fwd. Pkts. : 0
MCAC Policy Name :
MCAC Max Unconst BW : no limit
MCAC In use Mand BW : 0
MCAC In use Opnl BW : 0

Egr mac Fltr : n/a
Egr ip Fltr : n/a
Egr ipv6 Fltr : n/a
Oper ControlWord : False
Signaling : TLDP
Force Vlan-Vc : Disabled
Precedence : 4

Retries Left : 3
Blockable Level : Tertiary

Total MAC Addr : 0
Static MAC Addr : 0

Discard Unkwn Srce : Disabled

Block On Mesh Fail : False

Oper State : Disabled
Hello Msg Len : 0
Hold Down Time : 10

I. Dro. Pkts. : 0
I. Dro. Octs. : 0
E. Fwd. Octets : 0
MCAC Max Mand BW : no limit
MCAC Avail Mand BW : unlimited
MCAC Avail Opnl BW : unlimited

Associated LSP LIST :
No LSPs Associated

```

-----  
Stp Service Destination Point specifics  
-----

```

Stp Admin State : Down
Core Connectivity : Down
Port Role : N/A
Port Number : 0
Port Path Cost : 10
Admin Edge : Disabled
Link Type : Pt-pt
Root Guard : Disabled
Last BPDU from : N/A
Designated Bridge : N/A

Stp Oper State : Down
Port State : Discarding
Port Priority : 128
Auto Edge : Enabled
Oper Edge : N/A
BPDU Encap : Dot1d
Active Protocol : N/A

Designated Port Id : 0

Fwd Transitions : 0
Cfg BPDUs rcvd : 0
TCN BPDUs rcvd : 0

Bad BPDUs rcvd : 0
Cfg BPDUs tx : 0
TCN BPDUs tx : 0

```

```

RST BPDUs rcvd : 0 RST BPDUs tx : 0
=====

=====

*A:ALU-48>show>service>id#

*A:ALU-48>show>service>id# sdp far-end 10.10.10.10

=====
Service Destination Point(Far-End : 10.10.10.10)
=====
SdpId Type IP address Adm Opr I.Lbl E.Lbl

5001:100 Spok 10.10.10.10 Up Down 0 0

Number of SDPs : 1

*A:ALU-48>show>service>id# sdp far-end 10.10.10.10 detail

=====
Service Destination Point(Far-End : 10.10.10.10) Details
=====

Sdp Id 5001:100 -(10.10.10.10)

Description : (Not Specified)
SDP Id : 5001:100 Type : Spoke
Split Horiz Grp : shg5001
VC Type : Ether VC Tag : n/a
Admin Path MTU : 0 Oper Path MTU : 0
Far End : 10.10.10.10 Delivery : MPLS

Admin State : Up Oper State : Down
Acct. Pol : None Collect Stats : Disabled
Ingress Label : 0 Egress Label : 0
Ing mac Fltr : n/a Egr mac Fltr : n/a
Ing ip Fltr : n/a Egr ip Fltr : n/a
Ing ipv6 Fltr : n/a Egr ipv6 Fltr : n/a
Admin ControlWord : Not Preferred Oper ControlWord : False
Last Status Change : 10/26/2010 20:14:00 Signaling : TLDP
Last Mgmt Change : 10/26/2010 20:14:01 Force Vlan-Vc : Disabled
Endpoint : endpoint5000 Precedence : 4
Class Fwding State : Down
Flags : SvcAdminDown SdpOperDown
 NoIngVCLabel NoEgrVCLabel
 PathMTUTooSmall

Time to RetryReset : never Retries Left : 3
Mac Move : Blockable Blockable Level : Tertiary
Peer Pw Bits : None
Peer Fault Ip : None
Max Nbr of MAC Addr: No Limit Total MAC Addr : 0
Learned MAC Addr : 0 Static MAC Addr : 0

MAC Learning : Enabled Discard Unkwn Srce: Disabled
BPDU Translation : Disabled
L2PT Termination : Disabled
MAC Pinning : Disabled

```

```

Ignore Standby Sig : False
Block On Mesh Fail: False

KeepAlive Information :
Admin State : Disabled
Hello Time : 10
Max Drop Count : 3
Oper State : Disabled
Hello Msg Len : 0
Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : 0
I. Fwd. Octs. : 0
E. Fwd. Pkts. : 0
MCAC Policy Name :
MCAC Max Unconst BW : no limit
MCAC In use Mand BW : 0
MCAC In use Opnl BW : 0
I. Dro. Pkts. : 0
I. Dro. Octs. : 0
E. Fwd. Octets : 0
MCAC Max Mand BW : no limit
MCAC Avail Mand BW : unlimited
MCAC Avail Opnl BW : unlimited

Associated LSP LIST :
No LSPs Associated

```

-----  
Stp Service Destination Point specifics  
-----

```

Stp Admin State : Down
Core Connectivity : Down
Port Role : N/A
Port Number : 0
Port Path Cost : 10
Admin Edge : Disabled
Link Type : Pt-pt
Root Guard : Disabled
Last BPDUs from : N/A
Designated Bridge : N/A
Stp Oper State : Down
Port State : Discarding
Port Priority : 128
Auto Edge : Enabled
Oper Edge : N/A
BPDU Encap : Dot1d
Active Protocol : N/A
Designated Port Id: 0

Fwd Transitions : 0
Cfg BPDUs rcvd : 0
TCN BPDUs rcvd : 0
RST BPDUs rcvd : 0
Bad BPDUs rcvd : 0
Cfg BPDUs tx : 0
TCN BPDUs tx : 0
RST BPDUs tx : 0

```

-----  
Number of SDPs : 1  
-----

=====

```

*A:ALU-48>show>service>id#

```

**Table 56: Show Service ID (SDP) Output Fields**

| Label               | Description                                                     |
|---------------------|-----------------------------------------------------------------|
| SDP Id              | The SDP identifier                                              |
| Type                | Indicates whether this service SDP binding is a spoke or a mesh |
| Split Horizon Group | The name of the split horizon group                             |
| VC Type             | The VC type: ether or vlan                                      |

**Table 56: Show Service ID (SDP) Output Fields (Continued)**

| Label             | Description                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VC Tag            | The explicit dot1q value used when encapsulating to the SDP far end                                                                                              |
| Admin Path MTU    | The desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |
| Oper Path MTU     | The actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented  |
| Far End           | Specifies the IP address of the remote end of the GRE, MPLS, or IP tunnel defined by this SDP                                                                    |
| Delivery          | Specifies the type of delivery used by the SDP: GRE, MPLS, or IP                                                                                                 |
| Admin State       | The administrative state of this SDP                                                                                                                             |
| Oper State        | The operational state of this SDP                                                                                                                                |
| Acct. Pol         | The accounting policy applied to the SDP                                                                                                                         |
| Collect Stats     | Specifies whether accounting statistics are collected on the SDP                                                                                                 |
| Ingress Label     | The label used by the far-end device to send packets to this device in this service by this SDP                                                                  |
| Egress Label      | The label used by this device to send packets to the far-end device in this service by this SDP                                                                  |
| Ing mac Fltr      | Not applicable                                                                                                                                                   |
| Egr mac Fltr      | Not applicable                                                                                                                                                   |
| Ing ip Fltr       | The SDP ingress filter policy ID for IPv4                                                                                                                        |
| Egr ip Fltr       | The SDP egress filter policy ID for IPv4                                                                                                                         |
| Ing ipv6 Fltr     | Not applicable                                                                                                                                                   |
| Egr ipv6 Fltr     | Not applicable                                                                                                                                                   |
| Admin ControlWord | The administrative state of the control word: Preferred (control word enabled) or Not Preferred (control word disabled)                                          |
| Oper ControlWord  | The operational state of the control word: True (control word enabled) or False (control word disabled)                                                          |



**Table 56: Show Service ID (SDP) Output Fields (Continued)**

| Label                        | Description                                                                                                                                                                               |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Status Change           | The date and time of the most recent status change to this SDP                                                                                                                            |
| Signaling                    | The signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on this SDP                                                                   |
| Last Mgmt Change             | The date and time of the most recent management-initiated change to this SDP                                                                                                              |
| Endpoint                     | The name of the service endpoint.                                                                                                                                                         |
| Precedence                   | Specifies the precedence of this SDP binding when there are multiple SDP bindings attached to one service endpoint.                                                                       |
| Flags                        | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SvcAdminDown, SdpOperDown, NoIngVCLabel, NoEgrVCLabel, PathMTUTooSmall. |
| Retries Left                 | Displays the number of remaining attempts to re-enable the SDP.                                                                                                                           |
| Mac Move                     | Indicates the administrative state of the MAC movement feature associated with the SDP.                                                                                                   |
| Blockable Level              | Specifies the level at which MAC move is blockable on the SAP (primary, secondary, or tertiary).                                                                                          |
| MAC Learning                 | Specifies whether MAC learning is enabled.                                                                                                                                                |
| MAC Pinning                  | Specifies whether MAC pinning is enabled in this SDP.                                                                                                                                     |
| Ignore Standby Sig           | Specifies whether or not ignore standby signaling is configured.<br>True — standby signaling is ignored<br>False — standby signaling is not ignored                                       |
| Block On Mesh Fail           | Specifies whether or not to take down the spoke SDP when the mesh SDP is down.<br>True — the spoke SDP is not taken down<br>False — the spoke SDP is taken down                           |
| <b>KeepAlive Information</b> |                                                                                                                                                                                           |
| Admin State                  | The operating status of the keepalive protocol                                                                                                                                            |
| Oper State                   | The current status of the keepalive protocol                                                                                                                                              |

**Table 56: Show Service ID (SDP) Output Fields (Continued)**

| <b>Label</b>        | <b>Description</b>                                                                                                                                                                                                                                                      |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hello Time          | Specifies how often the SDP echo request messages are transmitted on this SDP                                                                                                                                                                                           |
| Hello Msg Len       | The length of the SDP echo request messages transmitted on this SDP                                                                                                                                                                                                     |
| Max Drop Count      | The maximum number of consecutive SDP Echo Request messages that can be unacknowledged before the keepalive protocol reports a fault                                                                                                                                    |
| Hold Down Time      | The time to wait before the keepalive operating status is eligible to enter the alive state                                                                                                                                                                             |
| <b>Statistics</b>   |                                                                                                                                                                                                                                                                         |
| I. Fwd. Pkts.       | The number of forwarded ingress packets                                                                                                                                                                                                                                 |
| I. Dro. Pkts.       | The number of dropped ingress packets                                                                                                                                                                                                                                   |
| I. Fwd. Octs.       | The number of forwarded ingress octets                                                                                                                                                                                                                                  |
| I. Dro. Octs.       | The number of dropped ingress octets                                                                                                                                                                                                                                    |
| E. Fwd. Pkts.       | The number of forwarded egress packets                                                                                                                                                                                                                                  |
| E. Fwd. Octets      | The number of forwarded egress octets                                                                                                                                                                                                                                   |
| Associated LSP LIST | If the SDP type is MPLS, a list of LSPs used to reach the far-end router displays. All the LSPs in the list must terminate at the IP address specified in the far-end field. If the SDP type is GRE, the following message displays: SDP delivery mechanism is not MPLS |
| Number of SDPs      | The total number of SDPs applied to this service ID                                                                                                                                                                                                                     |

## split-horizon-group

|                    |                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>split-horizon-group</b> [ <i>group-name</i> ]                                                                                                         |
| <b>Context</b>     | show>service>id                                                                                                                                          |
| <b>Description</b> | This command displays information related to all split horizon groups in the service or the specified service split horizon group.                       |
| <b>Parameters</b>  | <i>group-name</i> — specifies a split horizon group name                                                                                                 |
| <b>Values</b>      | any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, enclose the entire string in quotation marks (“ ”). |
| <b>Output</b>      | The following output is an example of service split horizon group information, and <a href="#">Table 57</a> describes the fields.                        |

### Sample Output

```
*A:ALU-48>show>service>id# split-horizon-group
=====
Service: Split Horizon Group
=====
Name Description

R shg5001

R = Residential Split Horizon Group
A = Auto Created Split Horizon Group
No. of Split Horizon Groups: 1
=====
*A:ALU-48>show>service>id#

*A:ALU-48>show>service>id# split-horizon-group shg5001
=====
Service: Split Horizon Group
=====
Name Description

R shg5001

Associations

SAP 1/2/4:1/100
SDP 5001:100

R = Residential Split Horizon Group
SAPs Associated : 1 SDPs Associated : 1
=====
*A:ALU-48>show>service>id#
```

**Table 57: Show Service ID (Split Horizon Group) Output Fields**

| Label        | Description                                                                                                |
|--------------|------------------------------------------------------------------------------------------------------------|
| Name         | The name of the split horizon group. When preceded by “R”, the group is a residential split horizon group. |
| Description  | A description of the split horizon group as configured by the user                                         |
| Associations | A list of SAPs and SDPs associated with the split horizon group.                                           |

## static-host

**Syntax** **static-host** [**sap** *sap-id*] [**wholesaler** *service-id*] [**port** *port-id*] [**inter-dest-id** *intermediate-destination-id*] [**detail**] [**mac** *ieee-address*] [**ip-address** *ip-address*]  
**static-host** [**sap** *sap-id*] [**wholesaler** *service-id*] [**port** *port-id*] **no-inter-dest-id** [**detail**]  
**static-host summary**

**Context** show>service>id

**Description** This command displays services using the static host specified by the syntax.

**Parameters** *sap-id* — specifies the physical port identifier portion of the SAP definition

**Values**

|                   |                                                                                         |
|-------------------|-----------------------------------------------------------------------------------------|
| null              | : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>                                     |
| dot1q             | : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i>                   |
| atm               | : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |
| cem               | : <i>slot/mda/port.channel</i>                                                          |
| ipcp              | : <i>slot/mda/port.channel</i>                                                          |
| ima-grp           | : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]                  |
| port-id           | : <i>slot/mda/port</i> [ <i>.channel</i> ]                                              |
| bundle-id         | : <b>bundle-type</b> - <i>slot/mda.bundle-num</i>                                       |
| <b>bundle</b>     | : keyword                                                                               |
| <i>type</i>       | : ima   ppp                                                                             |
| <i>bundle-num</i> | : [1 to 32]                                                                             |
| <i>aps-id</i>     | : <b>aps-group-id</b> [ <i>.channel</i> ]                                               |
| <b>aps</b>        | : keyword                                                                               |
| <i>group-id</i>   | : 1 to 8                                                                                |
| qtag1             | : 0 to 4094                                                                             |
| vpi               | : 0 to 4095 (NNI)                                                                       |
|                   | : 0 to 255 (UNI)                                                                        |
| vci               | : 1   2   5 to 65535                                                                    |

**summary** — displays summary information

*service-id* — specifies the service identifier

**Values** 1 to 2147483647]

*port-id* — specifies the port identifier

**Values**      *slot/mda/port[.channel]*  
                  *bundle-id*        : **bundle-type-slot/mda.bundle-num**  
                         **bundle**        : keyword  
                         *type*         : ima | ppp  
                         *bundle-num* : [1 to 32]  
                  *aps-id*         : **aps-group-id[.channel]**  
                         **aps**         : keyword  
                         *group-id*     : 1 to 8

*intermediate-destination-id* — specifies the intermediate destination identifier

**no-inter-dest-id** — specifies that there is no intermediate identifier

**detail** — displays detailed static host information for the service

*ieee-address* — xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx (cannot be all zeros)

*ip-address* — a.b.c.d

**Output**      The following output is an example of static host service information.

### Sample Output

```
*A:ALU-48>show>service>id# static-host

=====
Static Hosts for service 5001
=====
Sap IP Address Configured MAC Dynamic MAC
Subscriber Admin State

Number of static hosts : 0
=====
*A:ALU-48>show>service>id#

*A:ALU-48>show>service>id# static-host port 1/2/4

=====
Static Hosts for service 5001
=====
Sap IP Address Configured MAC Dynamic MAC
Subscriber Admin State

Number of static hosts : 0
=====
*A:ALU-48>show>service>id#
```

## ingress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command displays services using a range of ingress labels.</p> <p>If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed.</p> <p>If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using the range of labels are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>                                             |
| <b>Parameters</b>  | <p><i>start-label</i> — the starting ingress label value for which to display services using the label range. If only <i>start-label</i> is specified, services only using <i>start-label</i> are displayed.</p> <p><b>Values</b>      0, 2048 to 131071</p> <p><i>end-label</i> — the ending ingress label value for which to display services using the label range</p> <p><b>Values</b>      2049 to 131071</p> <p><b>Default</b>      the <i>start-label</i> value</p> |
| <b>Output</b>      | The following output is an example of information about services using the specified range of ingress labels, and <a href="#">Table 58</a> describes the fields.                                                                                                                                                                                                                                                                                                           |

**Sample Output**

```
*A:ALU-48>show>service# ingress-label 0

=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

3 15:15 Spok 0 0
5 5:5 Spok 0 0
6 5:6 Spok 0 0
5000 15:5000 Mesh 0 0
5000 15:5001 Spok 0 0
5001 5001:100 Spok 0 0

Number of Bindings Found : 6
=====
*A:ALU-48>show>service#
```

**Table 58: Show Service Ingress-Label Output Fields**

| Label                    | Description                                                                                             |
|--------------------------|---------------------------------------------------------------------------------------------------------|
| Svc ID                   | The service identifier.                                                                                 |
| SDP Binding              | The SDP binding identifier.                                                                             |
| Type                     | Indicates whether the SDP is spoke or mesh.                                                             |
| I.Lbl                    | The ingress label used by the far-end device to send packets to this device in this service by the SDP. |
| E.Lbl                    | The egress label used by this device to send packets to the far-end device in this service by the SDP.  |
| Number of Bindings Found | The number of SDP bindings within the label range specified.                                            |

## sap-using

**Syntax**     **sap-using interface** [*ip-address* | *ip-int-name*]  
**sap-using** [**ingress** | **egress**] **filter** *filter-id*  
**sap-using** [**sap** *sap-id*]  
**sap-using** [**ingress** | **egress**] **atm-td-profile** *td-profile-id*  
**sap-using authentication-policy** *auth-plcy-name*  
**sap-using** [**ingress** | **egress**] **qos-policy** *qos-policy-id*

**Context**     show>service

**Description**     This command displays SAP information.

If no optional parameters are specified, the command displays a summary of all defined SAPs.

The optional parameters restrict output to only SAPs matching the specified properties.

**Parameters**     **ingress** — specifies matching an ingress policy  
**egress** — specifies matching an egress policy  
*qos-policy-id* — the ingress or egress QoS Policy ID for which to display matching SAPs

**Values**     1 to 65535

*td-profile-id* — Displays SAPs using this traffic description

*filter-id* — the ingress or egress filter policy ID for which to display matching SAPs

**Values**     1 to 65535

*auth-plcy-name* — the session authentication policy for which to display matching SAPs

*sap-id* — specifies the physical port identifier portion of the SAP definition

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [ <i>.channel</i> ]<br>bundle-id : <b>bundle-type-slot/mda.bundle-num</b><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [ <i>.channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**interface** — specifies matching SAPs with the specified IP interface

*ip-address* — the IP address of the interface for which to display matching SAPs

**Values** 1.0.0.0 to 223.255.255.255

*ip-int-name* — the IP interface name for which to display matching SAPs

**Output** The following output is an example of information about SAPs matching the specified properties, and [Table 59](#) describes the fields.

### Sample Output

```
*A:ALU-48>show>service# sap-using
=====
Service Access Points
=====
```

| PortId      | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|-------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/5/1       | 2     | 1           | none         | 1           | none         | Up  | Down |
| 1/5/2       | 2     | 1           | none         | 1           | none         | Up  | Down |
| 1/5/5       | 5000  | 1           | mac          | 1           | ip4          | Up  | Down |
| 1/2/4:1/100 | 5001  | 1           | none         | 1           | none         | Up  | Down |

```

Number of SAPs : 4

=====
*A:ALU-48>show>service#
```



**Table 59: Show Service SAP-Using Output Fields**

| <b>Label</b>   | <b>Description</b>                                              |
|----------------|-----------------------------------------------------------------|
| Port ID        | The ID of the access port where the SAP is defined.             |
| SvcID          | The service identifier.                                         |
| Ing.QoS        | The SAP ingress QoS policy number specified on the ingress SAP. |
| Ing. Fltr      | The filter policy ID applied to the ingress SAP.                |
| Egr.QoS        | The SAP egress QoS policy number specified on the egress SAP.   |
| Egr. Fltr      | The filter policy ID applied to the egress SAP.                 |
| Adm            | The administrative state of the SAP.                            |
| Opr            | The actual state of the SAP.                                    |
| Number of SAPs | The total number of SAPs listed in the output.                  |

## VPLS Clear Commands

### id

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                   |
| <b>Context</b>     | clear>service<br>clear>service>statistics                     |
| <b>Description</b> | This command clears commands for a specific service.          |
| <b>Parameters</b>  | <i>service-id</i> — the ID that uniquely identifies a service |
| <b>Values</b>      | 1 to 2147483647                                               |

### statistics

|                    |                                                                                                                                                          |   |                                                                                       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [ <b>sap</b> <i>sap-id</i>   <b>sdp</b> <i>sdp-id</i> [: <i>vc-id</i> ]   <b>interface</b> [ <i>ip-address</i>   <i>ip-int-name</i> ]] |   |                                                                                       |
| <b>Context</b>     | clear>service>id>dhcp                                                                                                                                    |   |                                                                                       |
| <b>Description</b> | This command clears DHCP statistics for this service.                                                                                                    |   |                                                                                       |
| <b>Parameters</b>  | <i>sap-id</i> — clears the specified SAP statistics                                                                                                      |   |                                                                                       |
| <b>Values</b>      | null                                                                                                                                                     | : | <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>                                     |
|                    | dot1q                                                                                                                                                    | : | [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i>                   |
|                    | atm                                                                                                                                                      | : | [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |
|                    | cem                                                                                                                                                      | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ipcp                                                                                                                                                     | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ima-grp                                                                                                                                                  | : | <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]                  |
|                    | port-id                                                                                                                                                  | : | <i>slot/mda/port</i> [. <i>channel</i> ]                                              |
|                    | bundle-id                                                                                                                                                | : | <b>bundle-type</b> - <i>slot/mda.bundle-num</i>                                       |
|                    | <b>bundle</b>                                                                                                                                            | : | keyword                                                                               |
|                    | <i>type</i>                                                                                                                                              | : | ima   ppp                                                                             |
|                    | <i>bundle-num</i>                                                                                                                                        | : | [1 to 32]                                                                             |
|                    | <i>aps-id</i>                                                                                                                                            | : | <b>aps</b> -< <i>group-id</i> >[. <i>channel</i> ]                                    |
|                    | <b>aps</b>                                                                                                                                               | : | keyword                                                                               |
|                    | <i>group-id</i>                                                                                                                                          | : | 1 to 8                                                                                |
|                    | <i>qtag1</i>                                                                                                                                             | : | 0 to 4094                                                                             |
|                    | <i>vpi</i>                                                                                                                                               | : | 0 to 4095 (NNI)                                                                       |
|                    |                                                                                                                                                          | : | 0 to 255 (UNI)                                                                        |
|                    | <i>vci</i>                                                                                                                                               | : | 1   2   5 to 65535                                                                    |
|                    | <i>sdp-id</i> — the SDP ID to be cleared                                                                                                                 |   |                                                                                       |
| <b>Values</b>      | 1                                                                                                                                                        | : | 17407                                                                                 |

*vc-id* — the virtual circuit ID on the SDP ID to be cleared

**Values** 1 to 4294967295

*ip-int-name* — clears the statistics for the IP interface with the specified name

*ip-addr* — clears the statistics for the IP interface with the specified IP address

## fdb

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>fdb {all   mac <i>ieee-address</i>   sap <i>sap-id</i>   mesh-sdp <i>sdp-id</i>[:<i>vc-id</i>]   spoke-sdp <i>sdp-id</i>:<i>vcid</i>}</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | clear>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | This command clears FDB entries for the service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <p><b>all</b> — clears all FDB entries</p> <p><i>ieee-address</i> — clears only FDB entries in the FDB table with the specified 48-bit MAC address. The MAC address can be expressed in the form aa:bb:cc:dd:ee:ff or aa-bb-cc-dd-ee-ff where aa, bb, cc, dd, ee and ff are hexadecimal numbers.</p> <p><i>sap-id</i> — specifies the physical port identifier portion of the SAP definition</p> <table> <tr> <td><b>Values</b></td><td> null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br/> dot1q : [<i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>]:<i>qtag1</i><br/> atm : [<i>port-id</i>   <i>aps-id</i>][:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> cem : <i>slot/mda/port.channel</i><br/> ipcp : <i>slot/mda/port.channel</i><br/> ima-grp : <i>bundle-id</i>[:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]<br/> port-id : <i>slot/mda/port</i>[.<i>channel</i>]<br/> bundle-id : <b>bundle-type</b>-<i>slot/mda.bundle-num</i><br/> <b>bundle</b> : keyword<br/> <i>type</i> : ima   ppp<br/> <i>bundle-num</i>: [1 to 32]<br/> <i>aps-id</i> : <b>aps-group-id</b>[.<i>channel</i>]<br/> <b>aps</b> : keyword<br/> <i>group-id</i> : 1 to 8<br/> qtag1 : 0 to 4094<br/> vpi : 0 to 4095 (NNI)<br/> : 0 to 255 (UNI)<br/> vci : 1   2   5 to 65535 </td></tr> </table> <p><i>mesh-sdp</i> — clears only service FDB entries associated with the specified mesh SDP ID. For a mesh SDP, the VC ID is optional.</p> <p><i>spoke-sdp</i> — clears only service FDB entries associated with the specified spoke SDP ID. For a spoke SDP, the VC ID must be specified.</p> <p><i>sdp-id</i> — the SDP ID for which to clear associated FDB entries</p> <p><b>Values</b> 1 to 17407</p> | <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 |
| <b>Values</b>      | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [. <i>channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [. <i>channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

*vc-id* — the virtual circuit ID on the SDP ID for which to clear associated FDB entries

**Values** 1 to 4294967295

### mesh-sdp

|                    |                                                                                                                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mesh-sdp</b> <i>sdp-id[:vc-id]</i> <b>ingress-vc-label</b>                                                                                                                                                          |
| <b>Context</b>     | clear>service>id                                                                                                                                                                                                       |
| <b>Description</b> | This command clears and resets the mesh SDP bindings for the service.                                                                                                                                                  |
| <b>Parameters</b>  | <i>sdp-id</i> — the mesh SDP ID to be reset<br><b>Values</b> 1 to 17407<br><i>vc-id</i> — the virtual circuit ID on the SDP ID to be reset<br><b>Values</b> 1 to 4294967295<br><b>Default</b> All VC IDs on the SDP ID |

### pppoe-circuit-id

|                    |                                                                    |
|--------------------|--------------------------------------------------------------------|
| <b>Syntax</b>      | <b>pppoe-circuit-id statistics</b>                                 |
| <b>Context</b>     | clear>service>id>sap                                               |
| <b>Description</b> | This command clears and resets the SAP statistics for the service. |

### spoke-sdp

|                    |                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> <b>ingress-vc-label</b>                                                                                                                 |
| <b>Context</b>     | clear>service>id                                                                                                                                                             |
| <b>Description</b> | This command clears and resets the spoke SDP bindings for the service.                                                                                                       |
| <b>Parameters</b>  | <i>sdp-id</i> — the spoke SDP ID to be reset<br><b>Values</b> 1 to 17407<br><i>vc-id</i> — the virtual circuit ID on the SDP ID to be reset<br><b>Values</b> 1 to 4294967295 |

## cem

|                    |                                                      |
|--------------------|------------------------------------------------------|
| <b>Syntax</b>      | <b>cem</b>                                           |
| <b>Context</b>     | clear>service>statistics>id                          |
| <b>Description</b> | This command clears CEM statistics for this service. |

## counters

|                    |                                                                                |
|--------------------|--------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>counters</b>                                                                |
| <b>Context</b>     | clear>service>statistics>id                                                    |
| <b>Description</b> | This command clears all traffic queue counters associated with the service ID. |

## spoke-sdp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> { <b>all</b>   <b>counters</b>   <b>l2pt</b>   <b>mrp</b> }                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | clear>service>statistics>id                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | This command clears statistics for the spoke SDP bound to the service.                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <i>sdp-id</i> — the spoke SDP ID for which to clear statistics<br><b>Values</b> 1 to 17407<br><i>vc-id</i> — the virtual circuit ID on the SDP ID to be reset<br><b>Values</b> 1 to 4294967295<br><b>all</b> — clears all queue statistics associated with the SDP<br><b>counters</b> — clears all queue counters associated with the SDP<br><b>l2pt</b> — clears all L2PT statistics associated with the SDP<br><b>mrp</b> — clears all MRP statistics associated with the SDP |

## sap

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sap</b> <i>sap-id</i> { <b>all</b>   <b>cem</b>   <b>counters</b>   <b>l2pt</b>   <b>mrp</b> } |
| <b>Context</b>     | clear>service>statistics                                                                          |
| <b>Description</b> | This command clears statistics for the SAP bound to the service.                                  |

**Parameters** *sap-id* — specifies the physical port identifier portion of the SAP definition

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Values</b> | null : <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i><br>dot1q : [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i><br>atm : [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>cem : <i>slot/mda/port.channel</i><br>ipcp : <i>slot/mda/port.channel</i><br>ima-grp : <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]<br>port-id : <i>slot/mda/port</i> [ <i>.channel</i> ]<br>bundle-id : <b>bundle-type</b> - <i>slot/mda.bundle-num</i><br><b>bundle</b> : keyword<br><i>type</i> : ima   ppp<br><i>bundle-num</i> : [1 to 32]<br><i>aps-id</i> : <b>aps-group-id</b> [ <i>.channel</i> ]<br><b>aps</b> : keyword<br><i>group-id</i> : 1 to 8<br>qtag1 : 0 to 4094<br>vpi : 0 to 4095 (NNI)<br>: 0 to 255 (UNI)<br>vci : 1   2   5 to 65535 |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**all** — clears all queue statistics associated with the SAP

**cem** — clears all CEM statistics associated with the SAP

**counters** — clears all queue counters associated with the SAP

**l2pt** — clears all L2PT statistics associated with the SAP

**mrp** — clears all MRP statistics associated with the SAP

## sdp

**Syntax** **sdp** *sdp-id* **keep-alive**

**Context** clear>service>statistics

**Description** This command clears keepalive statistics associated with the SDP ID.

**Parameters** *sdp-id* — the SDP ID for which to clear statistics

**Values** 1 to 17407

**keep-alive** — clears the keep alive history associated with this SDP ID

## dhcp

|                    |                                                                    |
|--------------------|--------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                        |
| <b>Context</b>     | clear>router                                                       |
| <b>Description</b> | This command enables the context to clear and reset DHCP entities. |

## statistics

|                    |                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [ <b>interface</b> <i>ip-int-name</i>   <i>ip-address</i> ]                                                                                                        |
| <b>Context</b>     | clear>router>dhcp                                                                                                                                                                    |
| <b>Description</b> | This command clears DHCP statistics.                                                                                                                                                 |
| <b>Parameters</b>  | <i>ip-int-name</i> — clears the statistics for the IP interface with the specified name<br><i>ip-addr</i> — clears the statistics for the IP interface with the specified IP address |

---

## VPLS Debug Commands

### id

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                   |
| <b>Context</b>     | debug>service                                                 |
| <b>Description</b> | This command debugs commands for a specific service.          |
| <b>Parameters</b>  | <i>service-id</i> — the ID that uniquely identifies a service |

### event-type

|                    |                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] event-type {config-change   svc-oper-status-change   sap-oper-status-change   sdpbind-oper-status-change}</b>                                                                                                                                                                                           |
| <b>Context</b>     | debug>service>id                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables a particular debugging event type.</p> <p>The <b>no</b> form of the command disables the event type debugging.</p>                                                                                                                                                                      |
| <b>Parameters</b>  | <p><b>config-change</b> — debugs configuration change events</p> <p><b>svc-oper-status-change</b> — debugs service operational status changes</p> <p><b>sap-oper-status-change</b> — debugs SAP operational status changes</p> <p><b>sdpbind-oper-status-change</b> — debugs SDP operational status changes</p> |



## sap

|                    |                                                                                      |   |                                                                                       |
|--------------------|--------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap <i>sap-id</i></b>                                                        |   |                                                                                       |
| <b>Context</b>     | debug>service>id                                                                     |   |                                                                                       |
| <b>Description</b> | This command enables debugging for a particular SAP.                                 |   |                                                                                       |
| <b>Parameters</b>  | <i>sap-id</i> — specifies the physical port identifier portion of the SAP definition |   |                                                                                       |
| <b>Values</b>      | null                                                                                 | : | <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>                                     |
|                    | dot1q                                                                                | : | [ <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i> ]: <i>qtag1</i>                   |
|                    | atm                                                                                  | : | [ <i>port-id</i>   <i>aps-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |
|                    | cem                                                                                  | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ipcp                                                                                 | : | <i>slot/mda/port.channel</i>                                                          |
|                    | ima-grp                                                                              | : | <i>bundle-id</i> [: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ]                  |
|                    | port-id                                                                              | : | <i>slot/mda/port</i> [ <i>.channel</i> ]                                              |
|                    | bundle-id                                                                            | : | <b>bundle-type-slot/mda.bundle-num</b>                                                |
|                    | <b>bundle</b>                                                                        | : | keyword                                                                               |
|                    | <i>type</i>                                                                          | : | ima   ppp                                                                             |
|                    | <i>bundle-num</i> :                                                                  | : | [1 to 32]                                                                             |
|                    | <i>aps-id</i>                                                                        | : | <b>aps-group-id</b> [ <i>.channel</i> ]                                               |
|                    | <b>aps</b>                                                                           | : | keyword                                                                               |
|                    | <i>group-id</i>                                                                      | : | 1 to 8                                                                                |
|                    | qtag1                                                                                | : | 0 to 4094                                                                             |
|                    | vpi                                                                                  | : | 0 to 4095 (NNI)                                                                       |
|                    |                                                                                      | : | 0 to 255 (UNI)                                                                        |
|                    | vci                                                                                  | : | 1   2   5 to 65535                                                                    |



# Internet Enhanced Service

---

## In This Chapter

This chapter provides information about Internet Enhanced Service (IES), used to provide IP routing services; that is, direct forwarding of IP traffic between CE devices, and also to facilitate the transport of in-band management datagrams of the 7705 SAR over ATM links.

Topics in this chapter include:

- [IES for In-band Management on page 500](#)
  - [Setting Up Connections Between the 5620 SAM and the 7705 SAR on page 500](#)
  - [Encapsulation on page 501](#)
  - [Layer 2 and Layer 3 Traffic Management on page 501](#)
  - [Troubleshooting and Fault Detection Services on page 502](#)
- [IES for Customer Traffic on page 503](#)
  - [DHCP Relay and DHCPv6 Relay on page 504](#)
  - [IPCP on page 507](#)
  - [Troubleshooting and Fault Detection Services on page 507](#)
  - [SAPs on page 508](#)
  - [Spoke SDP Termination to IES on page 509](#)
- [Configuring IES with CLI on page 513](#)
- [IES Command Reference on page 527](#)

Internet Enhanced Services can coexist with IES management SAP services on the same 7705 SAR node. IP over ATM is used exclusively for in-band management of the 7705 SAR. Up to two IPoATM SAPs can be bound to IES along with many other SAPs with other (non-ATM) supported SAP encapsulation types. Traffic from IPoATM SAPs is extracted to the CSM for further processing. Traffic received from other IES SAPs is forwarded as per the forwarding table (FIB).

## IES for In-band Management

In the HSDPA offload application (see [HSDPA Offload](#)), the main uplink out of a typical cell site is over the ATM network using leased lines. Mission-critical traffic such as voice, signaling, and synchronization traffic is carried over the ATM network.

Internet Enhanced Service (IES) provides a reliable means of diverting the node management IP packets from the DSL IP network to the more reliable Layer 2 ATM network. To do this, IES provides an IP address and interworking function between the Layer 3 IP network and the Layer 2 ATM network. Without this capability, the in-band IP management traffic for the 7705 SAR could only be connected to an IP network.

IES can be used for in-band management of the 7705 SAR over the ATM network. IP over an ATM SAP bound to IES is for in-band management purposes only, and IP traffic from the ATM SAP is only extracted to the CSM; it is not forwarded.

IES management service is supported on the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card on the 7705 SAR-8 and 7705 SAR-18, or on the T1/E1 ports on the 7705 SAR-F. The service can be created on an ATM port or on an IMA group.

In the 7705 SAR, all traffic received over IES management SAPs is extracted directly to the control plane (CSM) in the same way as management traffic received over the CSM console port or Ethernet management port, or management traffic destined for the 7705 SAR over an Ethernet or MLPPP encapsulated network port. With IES management, the traffic transported is always IP packets. At the termination point of the ATM link, the IP packets are extracted to the CSM for further processing.

## Setting Up Connections Between the 5620 SAM and the 7705 SAR

IP over ATM is used for in-band management of the 7705 SAR. This requires the use of IP addresses so that the packets can be routed through the network using a routing table to indicate the next hop. Because Apipe interfaces (SAPs) do not have IP addresses, Apipes cannot be used to carry the management traffic.

With IES, the ATM SAP can be used for the forwarding of management IP packets. To set up a connection, IES is enabled on an interface on the 7705 SAR and the IP address for the interface is defined. A PVCC connection is then set up between the 7705 SAR and the remote router (SR) attached to the network manager (5620 SAM).

The IP datagrams are encapsulated into AAL5 for transport over the ATM network.

At the remote SR end, the SAP is bound to a VPRN instance to ensure that LDP signaling to the system IP address of the 7705 SAR flows through the IP/GRE link and not over the ATM link. Within the VPRN, an IP address is assigned at the termination SAP. The IP datagram is extracted from the ATM cell at this termination point and is routed to the 5620 SAM.

Alternatively, manually configured connections can be used instead of signaled pseudowires.



**Note:** The remote IP address must be manually configured and a static route must be set up between the two connections. This configuration is beyond the scope of this document; refer to the 7705 SAR OS Router Configuration Guide for information.

For redundancy, it is recommended that two VCs be configured per ATM port or IMA group. This requires the configuration of two static routes. ECMP must be enabled to allow duplicate routes in the routing table, and BFD can be enabled to trigger a faster handoff to the other route in case of route failure.

## Encapsulation

To run IP traffic over ATM links, the system uses routed VC-mux encapsulation as specified in RFC 2684, *Multiprotocol Encapsulation over ATM Adaptation Layer 5*. Since the only supported Layer 3 protocol over the management VC is IP, the VC mux encapsulation method is implemented to reduce complexity and overhead; likewise, routing mode is preferred over bridged mode.

The maximum MTU size supported is 2048 bytes.

## Layer 2 and Layer 3 Traffic Management

ATM traffic descriptors can be applied at the ingress (policing) and egress (shaping and service category scheduling and prioritization) of the IES SAP in order to provide traffic management functions at Layer 2.

Management IP traffic that is destined for the CSM is classified at Layer 3 and is forwarded into the fabric from one of three of the adapter card control queues:

- high priority
- low priority
- FTP priority

The high-priority and low-priority queues are limited to 1 Mb/s and the FTP queue is rate-limited to 3 Mb/s ingress to the fabric toward the control plane.



**Note:** Proper configuration of the traffic descriptor profiles is essential for proper operation of the IES SAP. If no profile is assigned, the default UBR service category is assumed. All IES 7705 SAR traffic is scheduled; no shaping is supported in this mode. To ensure that IP traffic transported over the IES SAP is prioritized fairly, ATM layer traffic descriptors should be assigned. See [IES Management SAP Commands](#) in the [IES Command Reference](#) section for information.

## Troubleshooting and Fault Detection Services

The IES in-band management service supports ATM OAM F4 (VP level) and F5 (VC level) cell generation and termination. For more information on OAM, refer to the 7705 SAR OS OAM and Diagnostics Guide, “OAM and SAA”.

Bidirectional forwarding detection (BFD) can also be configured on the IES interface. BFD is a simple protocol for detecting failures in a network. BFD uses a “hello” mechanism that sends control messages periodically to the far end and receives periodic control messages from the far end. BFD is implemented for static routes in asynchronous mode only, meaning that neither end responds to control messages; rather, the messages are sent in the time period configured at each end.

To support redundancy, ECMP must be enabled to allow duplicate routes in the routing table, and BFD must be enabled to trigger the handoff to the other route in case of failure.

Due to the lightweight nature of BFD, it can detect failures faster than other detection protocols, making it ideal for use in applications such as mobile transport.

If the configured number of consecutive missed BFD messages is reached, the static route to the peer is declared not active.



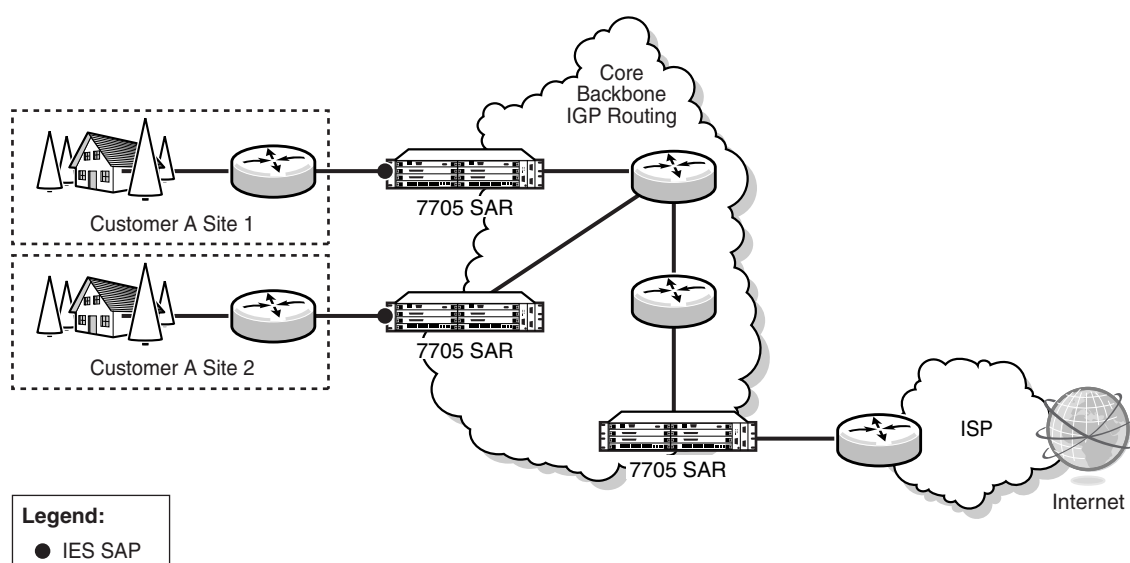
**Note:** Layer 2 AIS/RDI cells that are received on the IES SAP will disable the IP interface. Link failures detected by BFD will also disable the IP interface.

---

## IES for Customer Traffic

IES provides IP connectivity between customer access points. From the customer's perspective, IES provides a direct IP connection and can be used for Internet connectivity, as shown in Figure 54. The customer is assigned an IP interface and a SAP is associated with the IP interface to designate a customer access point to the service — one SAP per interface. SAPs can be MC-MLPPP, PPP/MLPPP or null/dot1q Ethernet. SDPs are not required, because traffic is routed rather than being encapsulated in a tunnel.

**Figure 54: IES for Customer Access to the Internet**



20720

IES supports static routes on customer IP interfaces (that is, SAPs). These routes are redistributed into the global routing table of the 7705 SAR.

IES is supported on any port on the 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card, or on any 7705 SAR-F T1/E1 port. IES is also supported on any port on the 8-port Ethernet Adapter card (version 1 and version 2) or on any 7705 SAR-F Ethernet port. Ports must be in access mode. The encapsulation type for the T1/E1 ports must be ppp/mlppp/mcmlppp, and the encapsulation type for the Ethernet ports must be null or dot1q.

IES IPv6 SAPs are supported on the 8-port Ethernet Adapter card (version 2 only) and on the 7705 SAR-F. For more information on IPv6 addressing, refer to the 7705 SAR OS Router Configuration Guide, "Internet Protocol Versions".

More than one Internet Enhanced Service can be created for a single customer ID, and more than one IP interface can be created within a single IES. All IP interfaces created within an IES belong to the same customer.

The service provider applies billing, ingress/egress shaping and policing to the customer.

**Notes:**



- Internet Enhanced Services require that the fabric mode be set to aggregate mode rather than per-destination mode. IES is only supported with aggregate-mode fabric profiles. If the fabric mode is set to per-destination mode, creation of the Internet Enhanced Service is blocked through the CLI. The fabric mode must be changed to aggregate mode before IES can be configured. As well, if IES is configured, alteration of the fabric mode is blocked.
- For information on configuring fabric mode, refer to the 7705 SAR OS Quality of Service Guide, “Configurable Ingress Shaping to Fabric (Access and Network)”.

## DHCP Relay and DHCPv6 Relay

The 7705 SAR provides DHCP/BOOTP Relay agent services and DHCPv6 Relay agent services for DHCP clients. DHCP is used for IPv4 network addresses and DHCPv6 is used for IPv6 network addresses. Both DHCP and DHCPv6 are known as stateful protocols because they use dedicated servers to maintain parameter information.

Unless stated otherwise, DHCP is equivalent to “DHCP for IPv4”, or DHCPv4.

In the stateful autoconfiguration model, hosts obtain interface addresses and/or configuration information and parameters from a server. The server maintains a database that keeps track of which addresses have been assigned to which hosts.

The 7705 SAR supports DHCP Relay on the base router and on access IP interfaces associated with IES and VPRN. Each DHCP instance supports up to eight DHCP servers.

The 7705 SAR supports DHCPv6 Relay on access IP interfaces associated with IES. Each DHCPv6 instance supports up to eight DHCPv6 servers.



**Note:** The 7705 SAR acts as a relay agent for DHCP and DHCPv6 requests and responses; it does not function as a DHCP or DHCPv6 server.



## DHCP Relay

The 7705 SAR provides DHCP/BOOTP Relay agent services for DHCP clients. DHCP is a configuration protocol used to communicate network information and configuration parameters from a DHCP server to a DHCP-aware client. DHCP is based on the BOOTP protocol, with additional configuration options and the added capability of allocating dynamic network addresses. DHCP-capable devices are also capable of handling BOOTP messages.

A DHCP client is an IP-capable device (typically a computer or base station) that uses DHCP to obtain configuration parameters such as a network address. A DHCP server is an Internet host or router that returns configuration parameters to DHCP clients. A DHCP/BOOTP Relay agent is a host or router (for example, the 7705 SAR) that passes DHCP messages between clients and servers.

Home computers in a residential high-speed Internet application typically use the DHCP protocol to have their IP address assigned by their Internet service provider.

The DHCP protocol requires the client to transmit a request packet with a destination address of 255.255.255.255 (broadcast) that is processed by the DHCP server. Since IP routers do not forward broadcast packets, the DHCP client and server must reside on the same network segment. However, for various reasons, it is sometimes impractical to have the server and client reside in the same IP network. When the 7705 SAR is acting as a DHCP Relay agent, it processes these DHCP broadcast packets and relays them to a preconfigured DHCP server. Therefore, DHCP clients and servers do not need to reside on the same network segment.

## DHCP Options

DHCP options are codes that the 7705 SAR inserts in packets being forwarded from a DHCP client to a DHCP server. Some options have additional information stored in suboptions.

The 7705 SAR supports the Relay Agent Information Option 82 as specified in RFC 3046. The following suboptions are supported:

- circuit ID
- remote ID
- vendor-specific options

## DHCPv6 Relay

DHCPv6 Relay operation is similar to DHCP in that servers send configuration parameters such as IPv6 network addresses to IPv6 nodes, but DHCPv6 Relay is not based on the DHCP or BOOTP protocol. DHCPv6 can be used instead of stateless autoconfiguration (refer to the 7705 SAR OS Router Configuration Guide, “Neighbor Discovery”) or in conjunction with it.

DHCPv6 is also oriented around IPv6 methods of addressing, especially the use of reserved, link-local scoped multicast addresses. DHCPv6 clients transmit messages to these reserved addresses, allowing messages to be sent without the client knowing the address of any DHCP server. This transmission allows efficient communication even before a client has been assigned an IP address. When a client has an address and knows the identity of a server, it can communicate with the server directly using unicast addressing.

Similar to DHCP address allocation, if a client needs to obtain an IPv6 address and other configuration parameters, it sends a Solicit message to locate a DHCPv6 server, then requests an address assignment and other configuration information from the server. Any server that can meet the client’s requirements responds with an Advertise message. The client chooses one of the servers and sends a Request message, and the server sends back a Reply message with the confirmed IPv6 address and configuration information.

If the client already has an IPv6 address, either assigned manually or obtained in some other way, it only needs to obtain configuration information. In this case, exchanges are done using a two-message process. The client sends an Information Request message, requesting only configuration information. A DHCPv6 server that has configuration information for the client sends back a Reply message with the information.

The 7705 SAR supports the DHCPv6 Relay Agent option in the same way that it supports the DHCP Relay Agent option. This means that when the 7705 SAR is acting as a DHCPv6 Relay Agent, it relays messages between clients and servers that are not connected to the same link.

## DHCPv6 Options

DHCPv6 options are codes that the 7705 SAR inserts in packets being forwarded from a DHCPv6 client to a DHCPv6 server. DHCPv6 supports interface ID and remote ID options as defined in RFC 3315, *Dynamic Host Configuration Protocol for IPv6 (DHCPV6)* and RFC 4649, *DHCPv6 Relay Agent Remote-ID Option*.

## IPCP

Similar to DHCP over Ethernet interfaces, Internet Protocol Control Protocol (IPCP) extensions to push IP information over PPP/MLPPP IES SAPs are supported. Within this protocol, extensions can be configured to define the remote IP address and DNS IP address to be signaled via IPCP on the associated PPP interface. The IPCP-based IP and DNS assignment process is similar to DHCP behavior; IPCP-based IP/DNS assignment uses PPP/MLPPP IP layer protocol handshake procedures. PPP/MLPPP connected devices hooked up to IES can benefit from this feature for the assignment of IP and DNS to the associated interface.

## Troubleshooting and Fault Detection Services

Bidirectional forwarding detection (BFD) can be configured on the IES interface. BFD is a simple protocol for detecting failures in a network. BFD uses a “hello” mechanism that sends control messages periodically to the far end and expects to receive periodic control messages from the far end. On the 7705 SAR, BFD is implemented for static routes in asynchronous mode only, meaning that neither end responds to control messages; rather, the messages are sent periodically from each end.

To support redundancy with fast switchover, BFD must be enabled to trigger the handoff to the other route in case of failure.

Due to the lightweight nature of BFD, it can detect failures faster than other detection protocols, making it ideal for use in applications such as mobile transport.

If BFD packets are not received in the configured amount of time, the associated static route is declared “not active”, causing a reroute to an alternative path, if any.



**Note:** Link failures detected by BFD will disable the IP interface.

The 7705 SAR also supports Internet Control Message Protocol (ICMP and ICMPv6). ICMP is a message control and error reporting protocol that also provides information relevant to IP packet processing. For more information on ICMP and ICMPv6, refer to the 7705 SAR OS Router Configuration Guide, “ICMP and ICMPv6”.

## SAPs

### Encapsulations

The following SAP encapsulations are supported on the 7705 SAR Internet Enhanced Service:

- Ethernet null
- Ethernet dot1q
- PPP/MLPPP/MC-MLPPP

### QoS Policies

When applied to an Internet Enhanced Service, service ingress QoS policies only create the unicast queues defined in the policy.

Service egress QoS policies function in the same way as Ethernet and IP pseudowire services, where class-based queues are created based on the QoS policy. Multiple queues are supported. Refer to the 7705 SAR OS Quality of Service Guide, “Creating a Service Egress QoS Policy”.

Both Layer 2 and Layer 3 match criteria can be used in the QoS policies for traffic classification in an IES.

### IP Filter Policies

Only IP filter policies can be applied to an IES.

IP filters are applied to ingress pseudowire SAPs (Epipes and Ipipes), VPRN SAPs, and IES SAPs, as well as to the ingress direction of network interfaces and IES management SAPs.

Both IPv4 and IPv6 filter policies can be applied to an IES SAP (null or dot1q interfaces).

Configuration of filter policies is similar for network interfaces, IES management SAPs, Ethernet and IP pseudowire SAPs, and VPRN and IES SAPs. This guide describes the assignment of filter policies to SAPs. For information on IP filters assigned to SAPs, see [IP Filters](#) under [Epipe Service Overview](#).

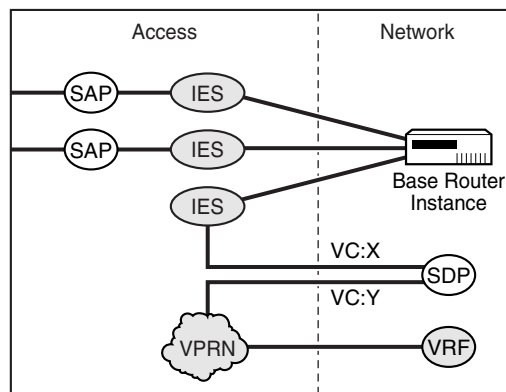
## Spoke SDP Termination to IES

This feature enables a customer to exchange traffic between a VLL or VPLS (Layer 2) service and an IES or VPRN (Layer 3) service. Customer premises traffic coming in from a VLL or VPLS service (SAP to spoke SDP) is forwarded over the IP/MPLS network to the IES or VPRN service, and vice versa. Network QoS policies can be applied to the spoke SDP to control traffic forwarding to the Layer 3 service.

In a Layer 3 spoke-SDP termination to an IES or VPRN service, where the destination IP address resides within the IES or VPRN network, CE device-generated ARP frames must be processed by the Layer 3 interface. When an ARP frame is received over the spoke-SDP at the Layer 3 interface endpoint, the 7705 SAR responds to the ARP frame with its own MAC address. Conversely, when an ARP request is received from the routed network and the ARP entry for the CE device that is connected to the spoke-SDP is not known, the 7705 SAR initiates an ARP frame to resolve the MAC address of the next hop or CE device.

Figure 55 shows traffic terminating on a specific IES or VPRN service that is identified by the SDP ID and VC label present in the service packet.

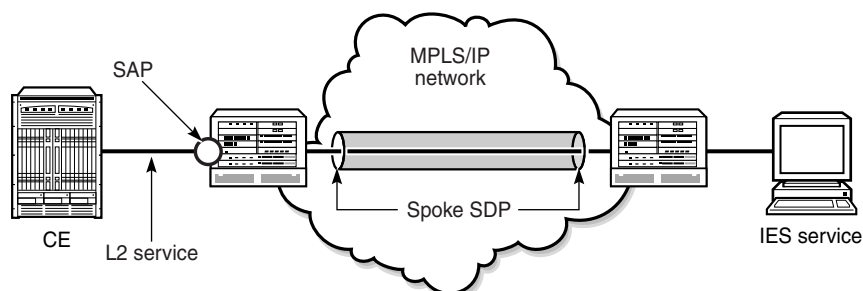
**Figure 55: SDP ID and VC Label Service Identifiers (Conceptual View of the Service)**



21510

Figure 56 shows a spoke SDP terminating directly into an IES. In this case, a spoke SDP could be tied to an Epipe or a hierarchical VPLS service. There is no configuration required on the PE connected to the CE.

**Figure 56: IES Spoke SDP Termination**



21511

Ethernet spoke SDP termination for IES is supported over the following network uplinks:

- Ethernet network ports (null or dot1q encapsulation)
- PPP/MLPPP network ports on a 16-port T1/E1 ASAP Adapter card, 32-port T1/E1 ASAP Adapter card, 2-port OC3/STM1 Channelized Adapter card, and 4-port DS3/E3 Adapter card (PPP only)
- POS ports

Spoke SDP termination for IES supports the following:

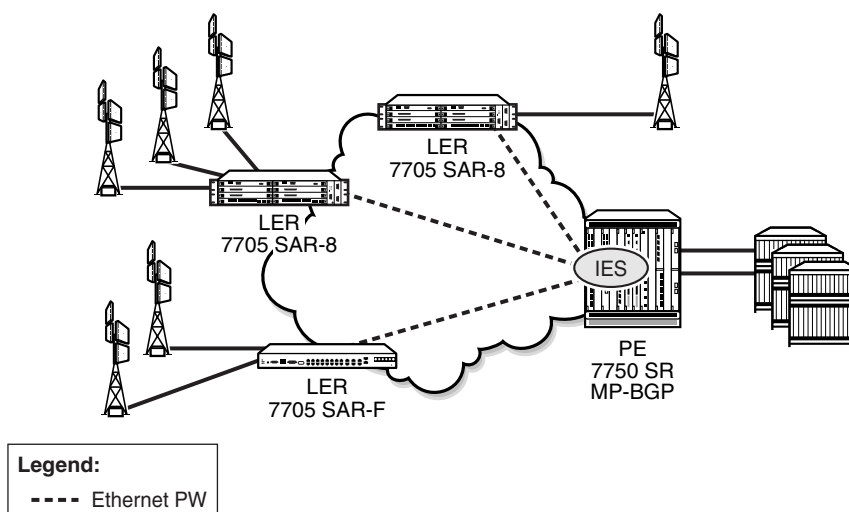
- Ethernet PW to VRF
- interface shutdown based on PW standby signaling
- spoke SDP ingress IP filtering
- label withdrawal for spoke SDPs terminated on IES
- statistics collection
- VCCV ping (type 2)

A spoke SDP on an IES interface can be connected to the following entities:

- Epipe spoke SDP
- Epipe spoke SDP redundancy with standby-signal-master enabled
- IES interface
- VPRN interface
- VPLS spoke SDP
- VPLS spoke SDP redundancy with suppress-standby-signaling disabled

Figure 57 shows an example of backhauling from a given site that uses PW and IES on the 7705 SAR. An individual PW is configured on a per-CE device or a per-service basis. For routing services, this PW can be terminated to an IES at the 7750 SR end. This scenario offers per-service OAM and redundancy capabilities. Because there is no local communication on the remote 7705 SAR, traffic between any two devices connected to the 7705 SAR must traverse through the 7750 SR at the MTSO/CO.

**Figure 57: Pseudowire-Based Backhaul (Spoke SDP Termination at 7750 SR)**



21522





## Configuring IES with CLI

This section provides the information required to configure IP routing services; that is, direct forwarding of IP traffic between CE devices, and to configure IES for in-band management of the 7705 SAR over ATM links.

Topics in this section include:

- [Common Configuration Tasks on page 514](#)
- [Configuring IES Components on page 515](#)
  - [Creating an IES Service on page 515](#)
  - [Configuring Interface Parameters on page 516](#)
  - [Configuring IES SAP Parameters on page 521](#)
  - [Configuring IES Spoke SDP Parameters on page 523](#)
- [Service Management Tasks on page 525](#)
  - [Modifying IES Service Parameters on page 525](#)
  - [Disabling an IES Service on page 525](#)
  - [Re-enabling an IES Service on page 526](#)
  - [Deleting an IES Service on page 526](#)

## Common Configuration Tasks

The following list provides a brief overview of the tasks that must be performed to configure IES.

- Associate the IES service with a customer ID.
- Create an IP interface on the 7705 SAR.
- Specify the IP address of the interface.
- Define interface parameters.
- Define SAP parameters.
- For IES spoke SDP applications only — define spoke SDP parameters.
- For IES management service only — manually configure the remote address of the far-end router to which the 5620 SAM network manager is connected (far-end router must be enabled for IES service).\*
- For IES management service only — create a static route to the remote router and to the 5620 SAM.\*
- Enable the service.



**Note:** \*Remote address and static route configuration is beyond the scope of this document. For information, refer to the 7705 SAR OS Router Configuration Guide.

---

## Configuring IES Components

This section provides configuration examples for components of the IES service. Each component includes some or all of the following: introductory information, CLI syntax, a specific CLI example, and a sample CLI display output. Included are the following components:

- [Creating an IES Service](#)
- [Configuring Interface Parameters](#)
- [Configuring IES SAP Parameters](#)
- [Configuring IES Spoke SDP Parameters](#)

## Creating an IES Service

Use the following CLI syntax to create an IES service.

**CLI Syntax:** `config>service# ies service-id [customer customer-id]  
[create] [vpn vpn-id]  
description description-string  
interface ip-int-name [create]  
no shutdown`

**Example:**

```
A:ALU-41>config>service# ies 5 customer 1 create
A:ALU-41>config>service>ies# description "IES for in-band
management"
A:ALU-41>config>service>ies# interface "ATMoIP
Management" create
A:ALU-41>config>service>ies# no shutdown
A:ALU-41>config>service>ies#
```

The following example displays the IES service creation output.

```
A:ALU-41>config>service# info

...
 ies 5 customer 1 create
 description "IES for in-band management"
 interface "ATMoIP Management"
 no shutdown
 exit
...

```

### Configuring Interface Parameters

Use the following CLI syntax to configure interface parameters for the IES management service.

**CLI Syntax:** `config>service# ies service-id [customer customer-id]  
[create] [vpn vpn-id]  
                  interface ip-int-name  
                  address if-ip-address  
                  bfd transmit-interval [receive receive-interval]  
                  [multiplier multiplier]  
                  description description-string  
                  ip-mtu octets  
                  no shutdown`

**Example:** `A:ALU-41>config>service# ies 5  
A:ALU-41>config>service>ies# interface "ATMoIP  
Management"  
A:ALU-41>config>service>ies>if# address 3.3.3.3/24  
A:ALU-41>config>service>ies>if# ip-mtu 1524  
A:ALU-41>config>service>ies>if# no shutdown  
A:ALU-41>config>service>ies>if#`

The following example displays the IES interface creation output.

```
A:ALU-41>config>service>ies>if# info detail

...
 no description
 address 3.3.3.3/24
 ip-mtu 1524
 no bfd
 exit
 no shutdown
...

```

Use the following CLI syntax to configure interface parameters for the IES service.

**CLI Syntax:** config>service# ies *service-id* [customer *customer-id*]  
 [create] [vpn *vpn-id*]  
     interface *ip-int-name*  
         address *if-ip-address*  
         allow-directed-broadcasts  
         arp-timeout  
         bfd *transmit-interval* [receive *receive-interval*]  
             [multiplier *multiplier*]  
         description *description-string*  
         dhcp  
             description *description-string*  
             option  
                 action {replace | drop | keep}  
                 circuit-id [ascii-tuple | ifindex | sap-id |  
                             vlan-ascii-tuple]  
                 remote-id [mac | string *string*]  
                 vendor-specific option  
                     client-mac-address  
                     sap-id  
                     service-id  
                     string *text*  
                     system-id  
                 server *server1* [*server2*...(up to 8 max)]  
         no shutdown  
         trusted  
     icmp  
         mask-reply  
         ttl-expired [*number seconds*]  
         unreachables  
     ip-mtu *octets*  
     ipcp  
         dns *ip-address* [secondary *ip-address*]  
         dns secondary *ip-address*  
         peer-ip-address *ip-address*  
     mac *ieee-address*  
     no shutdown  
     static-arp *ip-address* *ieee-mac-address*  
     no shutdown

**Example:** A:ALU-41>config>service# ies 4  
 A:ALU-41>config>service>ies\$ interface "to Internet"  
 A:ALU-41>config>service>ies>if\$ address 3.2.3.3/24  
 A:ALU-41>config>service>ies>if\$ dhcp option  
 A:ALU-41>config>service>ies>if>dhcp>option\$ circuit-id  
 ifindex  
 A:ALU-41>config>service>ies>if>dhcp>option\$ exit  
 A:ALU-41>config>service>ies>if\$ ip-mtu 1524

The following example displays the IES interface creation output.

```
A:ALU-41>config>service>ies>if# info detail

...
 no description
 address 3.2.3.3/24 broadcast host-ones
 no mac
 arp-timeout 14400
 no allow-directed-broadcasts
 icmp
 mask-reply
 unreachable 100 10
 ttl-expired 100 10
 exit
 dhcp
 shutdown
 no description
 option
 action keep
 circuit-id ifindex
 no remote-id
 no vendor-specific-option
 exit
 no server
 no trusted
 exit
 ip-mtu 1524
 no bfd
 ipcp
 no peer-ip-address
 no dns
 exit
 no shutdown...

```

Use the following CLI syntax to configure interface parameters for the IES IPv6 service.

**CLI Syntax:** config>service# ies *service-id* [customer *customer-id*]  
 [create] [vpn *vpn-id*]  
     interface *ip-int-name*  
         ipv6  
             address *ipv6-address/prefix-length* [eui-64]  
             dhcp6-relay  
                 description *description-string*  
                 option  
                     interface-id  
                     interface-id ascii-tuple  
                     interface-id ifindex  
                     interface-id sap-id  
                     interface-id string  
                     remote-id  
                 server *ipv6-address* [*ipv6-address...* (up to 8  
                     max)]  
                 no shutdown  
         icmp6  
             packet-too-big [*number seconds*]  
             param-problem [*number seconds*]  
             time-exceeded [*number seconds*]  
             unreachables [*number seconds*]  
         neighbor *ipv6-address mac-address*

**Example:** A:ALU-41>config>service# ies 9  
 A:ALU-41>config>service>ies\$ interface "ies\_interface"  
 A:ALU-41>config>service>ies>if\$ ipv6  
 A:ALU-41>config>service>ies>if>ipv6\$ address  
 1080:6809:8086:6502::/64  
 A:ALU-41>config>service>ies>if>ipv6\$ dhcp6-relay  
 A:ALU-41>config>service>ies>if>ipv6>dhcp6-relay\$ server  
 2001:DB8::  
 A:ALU-41>config>service>ies>if>ipv6>dhcp6-relay\$ option  
 A:ALU-41>config>service>ies>if>ipv6>dhcp6-relay>option\$  
 interface-id ascii-tuple  
 A:ALU-41>config>service>ies>if>ipv6>dhcp6-relay>option\$  
 exit  
 A:ALU-41>config>service>ies>if>ipv6\$ icmp6  
 A:ALU-41>config>service>ies>if>ipv6>icmp6\$ packet-too-big  
 80 10

The following example displays the IES interface IPv6 output.

```
A:ALU-41>config>service>ies>if># info detail

...
 no description
 address 1080:6809:8086:6502::/64
 dhcp6-relay
 no description
 option
 interface-id ascii-tuple
 no remote-id
 server 2001:DB8::
 exit
 icmp6
 packet-too-big 80 10
 param-problem 100 10
 time-exceeded 100 10
 unreachable 100 10
 exit
 exit
 no shutdown...

```



## Configuring IES SAP Parameters

Use the following CLI syntax to configure IES management SAP parameters.



**Note:** The encapsulation type is always aal5mux-ip.

**CLI Syntax:**

```
config>service# ies service-id [customer customer-id]
[create] [vpn vpn-id]
 interface ip-int-name
 sap sap-id [create]
 atm
 encapsulation encap-type
 egress
 traffic-desc traffic-desc-profile-id
 ingress
 traffic-desc traffic-desc-profile-id
 oam
 alarm-cells
 description description-string
 ingress
 filter ip ip-filter-id
 no shutdown
```

**Example:**

```
A:ALU-41>config>service# ies 5
A:ALU-41>config>service>ies# interface "ATMoIP
Management"
A:ALU-41>config>service>ies>if# sap 1/1/1.1:0/32 create
A:ALU-41>config>service>ies>if>sap# ingress
A:ALU-41>config>service>ies>if>sap>ingress# filter ip 3
A:ALU-41>config>service>ies>if>sap>ingress# exit
A:ALU-41>config>service>ies>if>sap# atm
A:ALU-41>config>service>ies>if>sap>atm# encapsulation
aal5mux-ip
A:ALU-41>config>service>ies>if>sap>atm# egress
A:ALU-41>config>service>ies>if>sap>atm>egress# traffic-
desc 3
A:ALU-41>config>service>ies>if>sap>atm>egress# exit
A:ALU-41>config>service>ies>if>sap>atm# ingress
A:ALU-41>config>service>ies>if>sap>atm>ingress# traffic-
desc 2
A:ALU-41>config>service>ies>if>sap>atm>ingress# exit
A:ALU-41>config>service>ies>if>sap>atm# oam
A:ALU-41>config>service>ies>if>sap>atm>oam# alarm-cells
A:ALU-41>config>service>ies>if>sap>atm>oam# exit
A:ALU-41>config>service>ies>if>sap>atm# exit
A:ALU-41>config>service>ies>if>sap# exit
A:ALU-41>config>service>ies>if# exit
```

```
A:ALU-41>config>service>ies#
```

The following example displays the IES SAP creation output.

```
A:ALU-41>config>service>ies>if>sap# info detail
```

```

...
 no description
 ingress
 filter ip 3
 exit
 atm
 encapsulation aal5mux-ip
 ingress
 traffic-desc 2
 exit
 egress
 traffic-desc 3
 exit
 oam
 alarm-cells
 exit
 exit
no shutdown

```

Use the following CLI syntax to configure SAP parameters for the IES service.

**CLI Syntax:** `config>service# ies service-id [customer customer-id]  
[create] [vpn vpn-id]  
 interface ip-int-name  
 sap sap-id [create]  
 accounting policy acct-policy-id  
 collect stats  
 description description-string  
 egress  
 qos policy-id  
 ingress  
 filter ip ip-filter-id  
 filter ipv6 ipv6-filter-id  
 qos policy-id  
 no shutdown`

**Example:**

```
A:ALU-41>config>service# ies 4
A:ALU-41>config>service>ies$ interface "to Internet"
A:ALU-41>config>service>ies>if$ sap 1/4/1 create
A:ALU-41>config>service>ies>if>sap$ egress
A:ALU-41>config>service>ies>if>sap>egress$ qos 3
A:ALU-41>config>service>ies>if>sap$ ingress
A:ALU-41>config>service>ies>if>sap>ingress$ filter ip 3
```

The following example displays the IES SAP creation output.

```
A:ALU-41>config>service>ies>if>sap# info detail

...
 no description
 egress
 qos 3
 ingress
 filter ip 3
 exit
 no shutdown

```

## Configuring IES Spoke SDP Parameters

Use the following CLI syntax to configure spoke SDP parameters for the IES service.

**CLI Syntax:** `config>service# ies service-id [customer customer-id]  
[create] [vpn vpn-id]  
                  interface ip-int-name  
                  spoke-sdp sdp-id:vc-id [create]  
                  egress  
                  vc-label egress-vc-label  
                  ingress  
                  filter ip ip-filter-id  
                  vc-label ingress-vc-label  
                  [no] shutdown`

**Example:** `A:ALU-41>config>service# ies 6  
A:ALU-41>config>service>ies$ interface "ies6_interface"  
A:ALU-41>config>service>ies>if$ spoke-sdp 5:6 create  
A:ALU-41>config>service>ies>if>spoke-sdp$ ingress  
A:ALU-41>config>service>ies>if>spoke-sdp>ingress$ filter  
ip 56  
A:ALU-41>config>service>ies>if>spoke-sdp>ingress$ vc-  
label 5566`

The following example displays the IES spoke SDP creation output.

```
A:ALU-41>config>service>ies>if>spoke SDP# info detail
```

```

```

```
...
```

```
 no description
 egress
 no vc-label
 ingress
 filter ip 56
 vc-label 5566
 exit
 no shutdown
```

```

```

---

## Service Management Tasks

This section discusses the following service management tasks:

- [Modifying IES Service Parameters](#)
- [Disabling an IES Service](#)
- [Re-enabling an IES Service](#)
- [Deleting an IES Service](#)

## Modifying IES Service Parameters

Existing IES service parameters can be modified, added, removed, enabled, or disabled.

To display a list of customer IDs, use the `show>service>customer` command.

Enter the parameters (such as description, interface information, or SAP information), and then enter the new information.

The following is an example of changing the IP MTU size.

**Example:**

```
A:ALU-41>config>service# ies 5
A:ALU-41>config>service>ies# interface "testname"
A:ALU-41>config>service>ies>if# ip-mtu 1517
A:ALU-41>config>service>ies>if# exit
```

## Disabling an IES Service

An IES service can be shut down without deleting the service parameters.

Use the `shutdown` command to shut down an IES service.

**CLI Syntax:**

```
config>service# ies service-id
shutdown
```

**Example:**

```
A:ALU-41>config>service# ies 5
A:ALU-41>config>service>ies# shutdown
A:ALU-41>config>service>ies# exit
```

## Re-enabling an IES Service

Use the `no shutdown` command to re-enable a previously disabled IES service.

**CLI Syntax:** `config>service# ies service-id  
no shutdown`

**Example:** `A:ALU-41>config>service# ies 5  
A:ALU-41>config>service>ies# no shutdown  
A:ALU-41>config>service>ies# exit`

## Deleting an IES Service

An IES service cannot be deleted until SAPs, spoke SDPs, and interfaces are shut down and deleted and the service is shut down on the service level.

Use the following CLI syntax to delete an IES service:

**CLI Syntax:** `config>service#  
ies service-id  
interface ip-int-name  
sap sap-id  
shutdown  
exit  
no sap sap-id  
spoke-sdp sdp-id:vc-id  
shutdown  
exit  
no spoke-sdp sdp-id:vc-id  
interface ip-int-name  
shutdown  
exit  
no interface ip-int-name  
shutdown  
exit  
no ies service-id`

---

---

## IES Command Reference

---

### Command Hierarchies

- [IES Management Configuration Commands](#)
- [IES Service Configuration Commands](#)
- [Show Commands](#)
- [Clear Commands](#)
- [Debug Commands](#)

## IES Management Configuration Commands

```

config
 — service
 — ies service-id [customer customer-id] [create] [vpn vpn-id]
 — no ies service-id
 — description description-string
 — no description
 — interface ip-int-name [create]
 — no interface ip-int-name
 — address {ip-address/mask | ip-address netmask}
 — no address
 — bfd transmit-interval [receive receive-interval] [multiplier multiplier]
 — no bfd
 — description description-string
 — no description
 — ip-mtu octets
 — no ip-mtu
 — sap sap-id [create]
 — no sap sap-id
 — atm
 — encapsulation atm-encap-type
 — egress
 — traffic-desc traffic-desc-profile-id
 — no traffic-desc
 — ingress
 — traffic-desc traffic-desc-profile-id
 — no traffic-desc
 — oam
 — [no] alarm-cells
 — description description-string
 — no description
 — ingress
 — filter ip ip-filter-id
 — no filter ip
 — no filter ip [ip ip-filter-id]
 — [no] shutdown
 — [no] shutdown
 — [no] shutdown

```



## IES Service Configuration Commands

```

config
 — service
 — ies service-id [customer customer-id] [create] [vpn vpn-id]
 — description description-string
 — no description
 — [no] interface ip-int-name [create]
 — address {ip-address/mask | ip-address netmask} [broadcast {all-ones | host-ones}]
 — no address
 — [no] allow-directed broadcasts
 — arp-timeout seconds
 — no arp-timeout
 — bfd transmit-interval [receive receive-interval] [multiplier multiplier]
 — no bfd
 — description description-string
 — no description
 — dhcp
 — description description-string
 — no description
 — [no] option
 — action {replace | drop | keep}
 — no action
 — circuit-id [ascii-tuple | ifindex | sap-id | vlan-ascii-tuple]
 — no circuit-id
 — remote-id [mac | string string]
 — no remote-id
 — [no] vendor-specific option
 — [no] client-mac-address
 — [no] sap-id
 — [no] service-id
 — string text
 — no string
 — [no] system-id
 — server server1 [server2...(up to 8 max)]
 — no server
 — [no] shutdown
 — [no] trusted
 — icmp
 — [no] mask-reply
 — ttl-expired [number seconds]
 — no ttl-expired
 — unreachables [number seconds]
 — no unreachables
 — ip-mtu octets
 — no ip-mtu

```

- [no] **ipcp**
  - **dns** *ip-address* [**secondary** *ip-address*]
  - **dns secondary** *ip-address*
  - **no dns** [*ip-address*] [**secondary** *ip-address*]
  - **peer-ip-address** *ip-address*
  - **no peer-ip-address**
- [no] **ipv6**
  - **address** *ipv6-address/prefix-length* [**eui-64**]
  - **no address** *ipv6-address/prefix-length*
  - [no] **dhcp6-relay**
    - **description** *description-string*
    - [no] **description**
    - [no] **option**
      - **interface-id**
      - **interface-id** *ascii-tuple*
      - **interface-id** *ifindex*
      - **interface-id** *sap-id*
      - **interface-id** *string*
      - **no interface-id**
      - [no] **remote-id**
    - **server** *ipv6-address* [*ipv6-address...*(up to 8 max)]
    - **no server** *ipv6-address* [*ipv6-address...*(up to 8 max)]
    - [no] **shutdown**
  - **icmp6**
    - **packet-too-big** [*number seconds*]
    - **no packet-too-big**
    - **param-problem** [*number seconds*]
    - **no param-problem**
    - **time-exceeded** [*number seconds*]
    - **no time-exceeded** [*number seconds*]
    - **unreachables** [*number seconds*]
    - **no unreachables**
  - **neighbor** *ipv6-address mac-address*
  - **no neighbor** *ipv6-address*
  - [no] **mac** *ieee-address*
  - [no] **sap** *sap-id* [**create**]
    - **accounting-policy** *acct-policy-id*
    - **no accounting-policy** [*acct-policy-id*]
    - [no] **collect-stats**
    - **description** *description-string*
    - **no description**
    - **egress**
      - **qos** *policy-id*
      - **no qos**
    - **ingress**
      - **filter ip** *ip-filter-id*
      - **filter ipv6** *ipv6-filter-id*
      - **no filter** [*ip ip-filter-id* | *ipv6 ipv6-filter-id*]
      - **qos** *policy-id*
      - **no qos**
    - [no] **shutdown**
  - [no] **shutdown**

```

— spoke-sdp sdp-id:vc-id [create]
— no spoke-sdp sdp-id:vc-id
 — egress
 — vc-label egress-vc-label
 — no vc-label [egress-vc-label]
 — ingress
 — filter ip ip-filter-id
 — no filter
 — vc-label ingress-vc-label
 — no vc-label [ingress-vc-label]
 — [no] shutdown
— [no] static-arp ip-address ieee-mac-address
— [no] shutdown

```

## Show Commands

```

show
— service
 — customer [customer-id]
 — egress-label start-label [end-label]
 — id service-id
 — all
 — arp [ip-address] | [mac ieee-address] | [sap sap-id] | [interface ip-int-name]
 — base
 — dhcp
 — statistics [interface interface-name | ip-address]
 — summary [interface interface-name | saps]
 — interface [{[ip-address | ip-int-name] [interface-type] [detail] [family]} | summary]
 — ingress-label start-label [end-label]
 — sap-using [sap sap-id]
 — sap-using interface [ip-address | ip-int-name]
 — sap-using [ingress | egress] atm-td-profile td-profile-id
 — sap-using [ingress] filter filter-id
 — sap-using [ingress | egress] qos-policy qos-policy-id
 — service-using [ies] [customer customer-id]

```

## Clear Commands

```

clear
— service
 — id service-id
 — dhcp
 — statistics [ip-int-name | ip-address]
 — dhcp6
 — statistics [ip-int-name | ip-address]

```

## Debug Commands

```
debug
 — service
 — id service-id
```

---

## Command Descriptions

- [IES Management Configuration Commands on page 534](#)
- [IES Service Configuration Commands on page 546](#)
- [Show Commands on page 574](#)
- [Clear Commands on page 597](#)
- [Debug Commands on page 599](#)

---

## **IES Management Configuration Commands**

- [Generic Commands on page 535](#)
- [IES Global Commands on page 537](#)
- [IES Management Interface Commands on page 538](#)
- [IES Management SAP Commands on page 541](#)

---

## Generic Commands

### description

|                    |                                                                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>description</b> <i>description-string</i><br><b>no description</b>                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>ies<br>config>service>ies>interface<br>config>service>ies>interface>dhcp<br>config>service>ies>interface>ipv6>dhcp6-relay<br>config>service>ies>interface>sap                                                                                                                            |
| <b>Description</b> | This command creates a text description stored in the configuration file for a configuration context.<br><br>The <b>no</b> form of this command removes the string from the context.<br><br>The <b>dhcp</b> and <b>dhcp6-relay</b> commands do not apply to IES when it is used for in-band management. |
| <b>Parameters</b>  | <i>description-string</i> — the description character string. Allowed values are any string up to 80 printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.                                       |

### shutdown

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] shutdown</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>ies<br>config>service>ies>interface<br>config>service>ies>interface>dhcp<br>config>service>ies>interface>ipv6>dhcp6-relay<br>config>service>ies>interface>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command administratively disables an entity. The operational state of the entity is disabled as well as the operational state of any entities contained within. When disabled, an entity does not change, reset, or remove any configuration settings or statistics. Many objects must be shut down before they may be deleted. Many entities must be explicitly enabled using the <b>no shutdown</b> command.<br><br>The <b>no</b> form of this command places the entity into an administratively enabled state.<br><br>The <b>dhcp</b> and <b>dhcp6-relay</b> commands do not apply to IES when it is used for in-band management.<br><br>Services are created in the administratively down ( <b>shutdown</b> ) state. When a <b>no shutdown</b> command is entered, the service becomes administratively up and tries to enter the operationally up state. Default administrative states for services and service entities are described in the following Special Cases. |

### Special Cases

**IES** — the default administrative status of an IES service is down. While the service is down, its associated interface is operationally down.

For example, if 1) An IES service is operational and its associated interface is shut down

2) The IES service is administratively shut down and brought back up

3) The interface that is shut down remains in the administrative shutdown state

A service is regarded as operational provided that one IP interface is operational.

**IES IP Interfaces** — when the IP interface is shut down, it enters the administratively and operationally down states. For a SAP bound to the IP interface, no packets are transmitted out of the SAP and all packets received on the SAP are dropped and the packet discard counter is incremented.



---

## IES Global Commands

### ies

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ies</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ] [ <b>create</b> ] [ <b>vpn</b> <i>vpn-id</i> ]<br><b>no ies</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command enables Internet Enhanced Service (IES). In Release 4.0 of the 7705 SAR, IES is used for direct IP connectivity between customer access points as well as in-band management of the 7705 SAR over ATM links.</p> <p>The <b>no</b> form of this command deletes the IES service instance with the specified <i>service-id</i>.</p> <p>The service cannot be deleted until all the IP interfaces defined within the service ID have been shut down and deleted.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Parameters</b>  | <p><i>service-id</i> — uniquely identifies a service in the service domain. This ID must be unique to this service and may not be used for any other service of any type. The <i>service-id</i> must be the same number used for every 7705 SAR on which this service is defined.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>customer-id</i> — specifies the customer ID number to be associated with the service. This parameter is required on service creation and is optional for service editing or deleting.</p> <p><b>Values</b> 1 to 2147483647</p> <p><i>vpn-id</i> — specifies the VPN ID number, which allows you to identify virtual private networks (VPNs) by a VPN identification number. If this parameter is not specified, the VPN ID uses the service ID number. This parameter is not the same as the VRF ID used with VPRN services.</p> <p><b>Values</b> 1 to 2147483647</p> <p><b>Default</b> null (0)</p> |

---

## IES Management Interface Commands

### interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> <i>ip-int-name</i> [create]<br><b>no interface</b> <i>ip-int-name</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>ies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command creates a logical IP routing interface for an Internet Enhanced Service (IES). Once created, attributes like an IP address and service access point (SAP) can be associated with the IP interface.</p> <p>The <b>interface</b> command, under the context of services, is used to create and maintain IP routing interfaces within IES service IDs. The <b>interface</b> command can be executed in the context of an IES service ID. Two SAPs can be assigned to a single group interface.</p> <p>Interface names are case-sensitive and must be unique within the group of IP interfaces defined for <b>config router interface</b> and <b>config service ies interface</b> (that is, the network core router instance). Interface names cannot be in the dotted-decimal notation of an IP address. For example, the name “1.1.1.1” is not allowed, but “int-1.1.1.1” is allowed. Show commands for router interfaces use either interface names or the IP addresses. Use unique IP address values and IP address names to maintain clarity. It could be unclear to the user if the same IP address and IP address name values are used. Although not recommended, duplicate interface names can exist in different router instances.</p> <p>When a new name is entered, a new logical router interface is created. When an existing interface name is entered, the user enters the router interface context for editing and configuration.</p> <p>There are no default IP interface names defined within the system. All IES IP interfaces must be explicitly defined. Interfaces are created in an enabled state.</p> <p>The <b>no</b> form of this command removes the IP interface and all the associated configurations. The interface must be administratively shut down before issuing the <b>no interface</b> command. The IP interface must be shut down before the SAP on that interface can be removed.</p> |
| <b>Default</b>     | <b>no interface</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><i>ip-int-name</i> — the name of the IP interface. Interface names must be unique within the group of IP interfaces defined for the network core router instance. An interface name cannot be in the form of an IP address. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p> <p><b>Values</b>      1 to 32 characters (must start with a letter)</p> <p>If the <i>ip-int-name</i> already exists, the context is changed to maintain that IP interface. If the <i>ip-int-name</i> already exists as an IP interface defined within the <b>config router</b> commands, an error will occur and the context will not be changed to that IP interface. If the <i>ip-int-name</i> does not exist, the interface is created and the context is changed to that interface for further command processing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## address

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>address</b> <i>{ip-address/mask   ip-address netmask}</i><br><b>no address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command assigns an IP address and IP subnet to an IES IP interface. Only one IP address can be associated with an IP interface.</p> <p>An IP address must be assigned to each IP interface. An IP address and a mask combine to create a local IP prefix. The defined IP prefix must be unique within the context of the routing instance. The IP prefix cannot overlap with other existing IP prefixes defined as local subnets on other IP interfaces in the same routing context within the 7705 SAR.</p> <p>The IP address for the interface can be entered in either CIDR (classless inter-domain routing) notation or traditional dotted-decimal notation. <b>Show</b> commands display CIDR notation and are stored in configuration files.</p> <p>By default, no IP address or subnet association exists on an IP interface until it is explicitly created.</p> <p>The <b>no</b> form of the command removes the IP address assignment from the IP interface. The <b>no</b> form of this command can only be performed when the IP interface is administratively shut down. Shutting down the IP interface brings the interface operationally down.</p>                                                                                                                                                                                                                                                                               |
| <b>Default</b>     | <b>no address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address of the IP interface. The <i>ip-address</i> portion of the <b>address</b> command specifies the IP host address that will be used by the IP interface within the subnet. This address must be unique within the subnet and specified in dotted-decimal notation.</p> <p><b>Values</b> 1.0.0.0 to 223.255.255.255</p> <p><i>/</i> — the forward slash is a parameter delimiter that separates the <i>ip-address</i> portion of the IP address from the mask that defines the scope of the local subnet. No spaces are allowed between the <i>ip-address</i>, the “/”, and the <i>mask</i> parameter. If a forward slash does not immediately follow the <i>ip-address</i>, a dotted-decimal mask must follow the prefix.</p> <p><i>mask</i> — the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the <i>ip-address</i> from the <i>mask</i> parameter. The <i>mask</i> parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.</p> <p><b>Values</b> 1 to 32 (mask length of 32 is reserved for system IP addresses)</p> <p><i>netmask</i> — the subnet mask in dotted-decimal notation</p> <p><b>Values</b> 0.0.0.0 to 255.255.255.255 (network bits all 1 and host bits all 0)</p> |

## bfd

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>bfd</b> <i>transmit-interval</i> [ <b>receive</b> <i>receive-interval</i> ] [ <b>multiplier</b> <i>multiplier</i> ]<br><b>no bfd</b>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | This command configures the time interval in which BFD control messages are transmitted and received on the interface. The <i>multiplier</i> parameter specifies the number of consecutive BFD messages that must be missed by the peer node before the BFD session closes and the upper layer protocols (OSPF, IS-IS, BGP) are notified of the fault.                                                                                                                                                             |
|                    | <b>no bfd</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <i>transmit-interval</i> — the number of milliseconds between consecutive BFD sent messages<br><div> <b>Values</b> 100 to 100000<br/> <b>Default</b> 100 </div> <i>receive-interval</i> — the number of milliseconds between consecutive BFD received messages<br><div> <b>Values</b> 100 to 100000<br/> <b>Default</b> 100 </div> <i>multiplier</i> — the number of consecutive BFD messages that must be missed before the interface is brought down<br><div> <b>Values</b> 3 to 20<br/> <b>Default</b> 3 </div> |

## ip-mtu

|                    |                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ip-mtu</b> <i>octets</i><br><b>no ip-mtu</b>                                                                                                            |
| <b>Context</b>     | config>service>ies>interface                                                                                                                               |
| <b>Description</b> | This command configures the IP maximum transmit unit (packet size) for this interface.<br><br>The <b>no</b> form of the command returns the default value. |
| <b>Parameters</b>  | <i>octets</i> — the MTU for the interface<br><div> <b>Values</b> 512 to 2048 </div>                                                                        |

## IES Management SAP Commands

### sap

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sap</b> <i>sap-id</i> [ <b>create</b> ]<br><b>no sap</b> <i>sap-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command creates a SAP within an IES service. Each SAP must be unique.</p> <p>All SAPs must be explicitly created with the <b>create</b> keyword. If no SAPs are created within a service or on an IP interface, a SAP will not exist on that object.</p> <p>Enter an existing SAP without the <b>create</b> keyword to edit SAP parameters.</p> <p>A SAP can only be associated with a single service. The SAP is owned by the service in which it was created. An IES SAP can only be defined on an ATM port or IMA group that has been configured as an access port in the <b>config&gt;port</b> <i>port-id</i> context using the <b>mode access</b> command. Fractional TDM ports are always access ports. Refer to the 7705 SAR OS Interface Configuration Guide for information on access ports.</p> <p>If a port is shut down, all SAPs on that port become operationally down. When a service is shut down, SAPs for the service are not displayed as operationally down although all traffic traversing the service will be discarded. The operational state of a SAP is relative to the operational state of the port on which the SAP is defined.</p> <p>The <b>no</b> form of this command deletes the SAP with the specified port. When a SAP is deleted, all configuration parameters for the SAP will also be deleted.</p> |
| <b>Default</b>     | <b>no sap</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <p><i>sap-id</i> — specifies the physical port identifier portion of the SAP definition</p> <p>The <i>sap-id</i> can be configured in one of the formats described in <a href="#">Table 60</a>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table 60: SAP ID Configurations**

| Type             | Syntax                                       | Example                                                                                                  |
|------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------|
| port-id          | <i>slot/mda/port[.channel]</i>               | 1/1/5                                                                                                    |
| atm or ima group | <i>[port-id   bundle-id][:vpi/vci   vpi]</i> | <i>port-id:</i> 1/1/1.1<br><i>bundle-id:</i> bundle-ima-1/1.1<br><i>vpi/vci:</i> 16/32<br><i>vpi:</i> 16 |

|               |                |                                 |                                                      |
|---------------|----------------|---------------------------------|------------------------------------------------------|
| <b>Values</b> | <i>sap-id:</i> | atm                             | [ <i>port-id</i> ][: <i>vpi/vci</i>   <i>vpi</i> ]   |
|               |                | IMA group                       | [ <i>bundle-id</i> ][: <i>vpi/vci</i>   <i>vpi</i> ] |
|               |                | port-id                         | <i>slot/mda/port</i> [. <i>channel</i> ]             |
|               |                | bundle-type-slot/mda.bundle-num |                                                      |
|               |                | bundle                          | keyword                                              |
|               |                | type                            | ima                                                  |
|               |                | bundle-num                      | 1 to 10                                              |
|               |                | vpi                             | NNI 0 to 4095                                        |
|               |                |                                 | UNI 0 to 255                                         |
|               |                | vci                             | 1, 2, 5 to 65535                                     |

*port-id* — specifies the physical port ID in the *slot/mda/port* format

If the card slot has a T1/E1 ASAP Adapter card installed, the *port-id* must be in the slot\_number/MDA\_number/port\_number format. For example 1/2/3 specifies port 3 on MDA 2 in slot 1.

The *port-id* must reference a valid port type. When the *port-id* parameter represents TDM channels, the port ID must include the channel ID. A period “.” separates the physical port from the *channel-id*. The port must be configured as an access port.

*bundle-id* — specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter. The command syntax must be configured as follows:

*bundle-id:* **bundle-type-slot-id/mda-slot.bundle-num**  
*bundle-id* value range: 1 to 10

For example:

```
*A:ALU-12>config# port bundle-ppp-5/1.1
*A:ALU-12>config>port# multilink-bundle
```

**create** — keyword used to create a SAP instance. The **create** keyword requirement can be enabled/disabled in the **environment>create** context.

## ingress

|                    |                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                                                       |
| <b>Context</b>     | config>service>ies>interface>sap                                                                                                                                     |
| <b>Description</b> | This command enables access to the context to associate ingress filter policies with the SAP.<br><br>If an ingress filter is not defined, no filtering is performed. |

## filter ip

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>no filter</b><br><b>no filter</b> [ <i>ip ip-filter-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>ies>interface>sap>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command associates an IP filter policy with an ingress SAP. Filter policies control the forwarding and dropping of packets based on the IP match criteria. Only one filter ID can be specified.</p> <p>The filter policy must already be defined before the filter command is executed. If the filter policy does not exist, the operation fails and an error message is returned. Filters applied to the ingress SAP apply to all IP packets on the SAP.</p> <p>The <b>no</b> form of this command removes any configured filter ID association with the SAP.</p> |
| <b>Default</b>     | <b>no filter</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Parameters</b>  | <i>ip-filter-id</i> — the filter name acts as the ID for the IP filter policy expressed as a decimal integer. The filter policy must already exist within the <b>config&gt;filter&gt;ip-filter</b> context.                                                                                                                                                                                                                                                                                                                                                                |
| <b>Values</b>      | 1 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



**Note:** For information on configuring IP filter IDs, refer to the 7705 SAR OS Router Configuration Guide, “Filter Policies”.

## atm

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>atm</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>ies>interface>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | <p>This command enables access to the context to configure ATM-related attributes. This command can only be used when a given context (for example, a channel or SAP) supports ATM functionality such as:</p> <ul style="list-style-type: none"> <li>configuring ATM port or ATM port-related functionality on T1/E1 ASAP Adapter cards on a 7705 SAR-8 or 7705 SAR-18, or T1/E1 ports on a 7705 SAR-F</li> <li>configuring ATM-related configuration for ATM-based SAPs that exist on T1/E1 ASAP Adapter cards or T1/E1 ports on a 7705 SAR-8 or 7705 SAR-18, or T1/E1 ports on a 7705 SAR-F</li> </ul> |

If ATM functionality is not supported for a given context, the command returns an error.

## encapsulation

|                    |                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>encapsulation</b> <i>atm-encap-type</i>                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>ies>interface>sap>atm                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command configures an ATM VC SAP for encapsulation in accordance with RFC 2684, <i>Multiprotocol Encapsulation over ATM Adaptation Layer 5</i>. This command is only supported in the IP over ATM management context.</p> <p>The only supported encapsulation type is aal5mux-ip.</p> <p>Ingress traffic that does not match the configured encapsulation is dropped.</p> |
| <b>Default</b>     | <b>aal5mux-ip</b>                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <i>atm-encap-type</i> — aal5mux-ip (routed IP encapsulation for a VC multiplexed circuit as defined in RFC 2684)                                                                                                                                                                                                                                                                  |

## egress

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                     |
| <b>Context</b>     | config>service>ies>interface>sap>atm                                                              |
| <b>Description</b> | This command provides access to the context to configure egress ATM traffic policies for the SAP. |

## ingress

|                    |                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                     |
| <b>Context</b>     | config>service>ies>interface>sap>atm                                                               |
| <b>Description</b> | This command provides access to the context to configure ingress ATM traffic policies for the SAP. |

## traffic-desc

|                    |                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>traffic-desc</b> <i>traffic-desc-profile-id</i><br><b>no traffic-desc</b>                                                                                                                                                                 |
| <b>Context</b>     | config>service>ies>interface>sap>atm>egress<br>config>service>ies>interface>sap>atm>ingress                                                                                                                                                  |
| <b>Description</b> | <p>This command assigns an ATM traffic descriptor profile to an egress or ingress SAP.</p> <p>When configured under the ingress context, the specified traffic descriptor profile defines the traffic contract in the forward direction.</p> |



When configured under the egress context, the specified traffic descriptor profile defines the traffic contract in the backward direction.



**Note:** Proper configuration of the traffic descriptor profiles is essential for proper operation of the IES SAP. If no profile is assigned, the default UBR service category is assumed. All IES 7705 SAR traffic is scheduled; no shaping is supported in this mode. To ensure that IP traffic transported over the IES SAP is prioritized fairly, ATM layer traffic descriptors should be assigned.

The **no** form of the command reverts the traffic descriptor to the default traffic descriptor profile.

**Default** The default traffic descriptor (trafficDescProfileId. = 1) is associated with newly created ATM VC SAPs.

**Parameters** *traffic-desc-profile-id* — specifies a defined traffic descriptor profile (for information on defining traffic descriptor profiles, see the 7705 SAR OS Quality of Service Guide)

**Values** 1 to 1000

## oam

**Syntax** **oam**

**Context** config>service>ies>interface>sap>atm

**Description** This command enables the context to configure OAM functionality for an IES SAP.

The T1/E1 ASAP Adapter cards supports F4 and F5 end-to-end OAM functionality (AIS, RDI, Loopback).

## alarm-cells

**Syntax** [**no**] **alarm-cells**

**Context** config>service>ies>interface>sap>atm>oam

**Description** This command configures AIS/RDI fault management on a PVCC. Fault management allows PVCC terminations to monitor and report the status of their connection by propagating fault information through the network and by driving the PVCC's operational status.

Layer 2 OAM AIS/RDI cells that are received on the IES SAP will cause the IP interface to be disabled.

The **no** command disables alarm-cells functionality for the SAP. When alarm-cells functionality is disabled, OAM cells are not generated as result of the SAP going into the operationally down state.

**Default** **enabled**

---

## **IES Service Configuration Commands**

- [Generic Commands on page 535](#)
- [IES Global Commands on page 537](#)
- [IES Service Interface Commands on page 547](#)
- [IES Service IPv6 Commands on page 560](#)
- [IES Service SAP Commands on page 565](#)
- [IES Service Spoke SDP Commands on page 571](#)

---

## IES Service Interface Commands

### interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] interface</b> <i>ip-int-name</i> [ <b>create</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>ies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command creates a logical IP routing interface for Internet Enhanced Service (IES). When created, attributes like an IP address and service access point (SAP) can be associated with the IP interface.</p> <p>The <b>interface</b> command, under the context of services, is used to create and maintain IP routing interfaces within IES service IDs. The <b>interface</b> command can be executed in the context of an IES service ID. The IP interface created is associated with the service core network routing instance and the default routing table. Two SAPs can be assigned to a single group interface.</p> <p>Interface names are case-sensitive and must be unique within the group of IP interfaces defined for <b>config router interface</b> and <b>config service ies interface</b> (that is, the network core router instance). Interface names cannot be in the dotted-decimal format of an IP address. For example, the name “1.1.1.1” is not allowed, but “int-1.1.1.1” is allowed. Show commands for router interfaces use either interface names or the IP addresses. Use unique IP address values and IP address names to maintain clarity. It could be unclear to the user if the same IP address and IP address name values are used. Although not recommended, duplicate interface names can exist in different router instances.</p> <p>When a new name is entered, a new logical router interface is created. When an existing interface name is entered, the user enters the router interface context for editing and configuration.</p> <p>There are no default IP interface names defined within the system. All IES IP interfaces must be explicitly defined. Interfaces are created in an enabled state.</p> <p>The <b>no</b> form of this command removes the IP interface and all the associated configurations. The interface must be administratively shut down before issuing the <b>no interface</b> command. The IP interface must be shut down before the SAP on that interface can be removed.</p> |
| <b>Default</b>     | <b>no interface</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><i>ip-int-name</i> — the name of the IP interface. Interface names must be unique within the group of IP interfaces defined for the network core router instance. An interface name cannot be in the form of an IP address. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p> <p><b>Values</b>      1 to 32 characters (must start with a letter)</p> <p>If the <i>ip-int-name</i> already exists, the context is changed to maintain that IP interface. If the <i>ip-int-name</i> already exists as an IP interface defined within the <b>config router</b> commands, an error will occur and the context will not be changed to that IP interface. If the <i>ip-int-name</i> does not exist, the interface is created and the context is changed to that interface for further command processing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## address

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>address</b> <i>{ip-address/mask   ip-address netmask}</i> [ <b>broadcast</b> <b>{all-ones   host-ones}</b> ]<br><b>no address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command assigns an IP address and IP subnet to an IES IP interface. Only one IP address can be associated with an IP interface.</p> <p>An IP address must be assigned to each IES IP interface. An IP address and a mask combine to create a local IP prefix. The defined IP prefix must be unique within the context of the routing instance. The IP prefix cannot overlap with other existing IP prefixes defined as local subnets on other IP interfaces in the same routing context within the 7705 SAR.</p> <p>The IP address for the interface can be entered in either CIDR (classless inter-domain routing) notation or traditional dotted-decimal notation. <b>Show</b> commands display CIDR notation and are stored in configuration files.</p> <p>By default, no IP address or subnet association exists on an IP interface until it is explicitly created.</p> <p>The <b>no</b> form of the command removes the IP address assignment from the IP interface. The <b>no</b> form of this command can only be performed when the IP interface is administratively shut down. Shutting down the IP interface brings the interface operationally down.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Default</b>     | <b>no address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address of the IP interface. The <i>ip-address</i> portion of the <b>address</b> command specifies the IP host address that will be used by the IP interface within the subnet. This address must be unique within the subnet and specified in dotted-decimal notation.</p> <p><b>Values</b> 1.0.0.0 to 223.255.255.255</p> <p><i>/</i> — the forward slash is a parameter delimiter that separates the <i>ip-address</i> portion of the IP address from the mask that defines the scope of the local subnet. No spaces are allowed between the <i>ip-address</i>, the “/”, and the <i>mask</i> parameter. If a forward slash does not immediately follow the <i>ip-address</i>, a dotted-decimal mask must follow the prefix.</p> <p><i>mask</i> — the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash (/) separates the <i>ip-address</i> from the <i>mask</i> parameter. The <i>mask</i> parameter indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.</p> <p><b>Values</b> 1 to 32 (mask length of 32 is reserved for system IP addresses)</p> <p><i>netmask</i> — the subnet mask in dotted-decimal notation</p> <p><b>Values</b> 0.0.0.0 to 255.255.255.255 (network bits all 1 and host bits all 0)</p> <p><b>broadcast</b> — overrides the default broadcast address used by the IP interface when sourcing IP broadcasts on the IP interface. If no broadcast format is specified for the IP address, the default value is <b>host-ones</b>, which indicates a subnet broadcast address. Use this parameter to change the broadcast address to <b>all-ones</b> or revert back to the default broadcast address of <b>host-ones</b>.</p> |


The broadcast format on an IP interface can be specified when the IP address is assigned or changed.

This parameter does not affect the type of broadcasts that can be received by the IP interface. A host sending either the local broadcast (all-ones) or the valid subnet broadcast address (host-ones) will be received by the IP interface.

**all-ones** — specifies that the broadcast address used by the IP interface for this IP address is 255.255.255.255 (also known as the local broadcast)

**host-ones** — specifies that the broadcast address used by the IP interface for this IP address is the subnet broadcast address. This is an IP address that corresponds to the local subnet described by the IP address and mask with all host bits set to 1. This IP address is the default broadcast address used by an IP interface.

## allow-directed broadcasts

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] allow-directed broadcasts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command enables the forwarding of directed broadcasts out of the IP interface.</p> <p>A directed broadcast is a packet received on a local router interface destined for the subnet broadcast address of another IP interface. The <b>allow-directed-broadcasts</b> command on an IP interface enables or disables the transmission of packets destined for the subnet broadcast address of the egress IP interface.</p> <p>When enabled, a frame destined for the local subnet on this IP interface is sent as a subnet broadcast out this interface.</p> <p> <b>Note:</b> Allowing directed broadcasts is a well-known mechanism used for denial-of-service attacks.</p> <p>By default, directed broadcasts are not allowed and are discarded at this egress IP interface.</p> <p>The <b>no</b> form of the command disables directed broadcasts forwarding out of the IP interface.</p> |
| <b>Default</b>     | <b>no allow-directed broadcasts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## arp-timeout

|                |                                                            |
|----------------|------------------------------------------------------------|
| <b>Syntax</b>  | <b>arp-timeout <i>seconds</i></b><br><b>no arp-timeout</b> |
| <b>Context</b> | config>service>ies>interface                               |

**Description** This command configures the minimum interval, in seconds, that an ARP entry learned on the IP interface is stored in the ARP table. ARP entries are automatically refreshed when an ARP request or gratuitous ARP is seen from an IP host. Otherwise, the ARP entry is aged from the ARP table.

If the **arp-timeout** value is set to 0 s, ARP aging is disabled.

The **no** form of the command reverts to the default value.



**Note:** The 7705 SAR will attempt to refresh an ARP entry 30 s prior to its expiry. This refresh attempt occurs only if the ARP timeout is set to 45 s or more.

**Default** **no arp-timeout**

**Parameters** *seconds* — the minimum number of seconds a learned ARP entry is stored in the ARP table, expressed as a decimal integer. A value of 0 specifies that the timer is inoperative and learned ARP entries will not be aged.

**Values** 0 to 65535

**Default** 14400 s (4 h)

## bfd

**Syntax** **bfd** {*transmit-interval*} [**receive** *receive-interval*] [**multiplier** *multiplier*]  
**no bfd**

**Context** config>service>ies>interface

**Description** This command configures the time interval in which BFD control messages are transmitted and received on the interface. The *multiplier* parameter specifies the number of consecutive BFD messages that must be missed by the peer node before the BFD session closes.

**Default** **no bfd**

**Parameters** *transmit-interval* — the number of milliseconds between consecutive BFD sent messages

**Values** 100 to 100000

**Default** 100

*receive-interval* — the number of milliseconds between consecutive BFD received messages

**Values** 100 to 100000

**Default** 100

*multiplier* — the number of consecutive BFD messages that must be missed before the interface is brought down

**Values** 3 to 20

**Default** 3

## dhcp

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                    |
| <b>Context</b>     | config>service>ies>interface                                   |
| <b>Description</b> | This command enables the context to configure DHCP parameters. |

## option

|                    |                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] option</b>                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>ies>interface>dhcp                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command enables DHCP Option 82 (Relay Agent Information Option) parameters processing and enters the context for configuring Option 82 suboptions.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>no option</b>                                                                                                                                                                                                                            |

## action

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>action {replace   drop   keep}</b><br><b>no action</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command configures the Relay Agent Information Option (Option 82) processing.</p> <p>The <b>no</b> form of this command returns the system to the default value.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Default</b>     | <b>keep</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Parameters</b>  | <p><b>replace</b> — in the upstream direction (from the user), the Option 82 field from the router is inserted in the packet (overwriting any existing Option 82 field). In the downstream direction (toward the user), the Option 82 field is stripped (in accordance with RFC 3046).</p> <p><b>drop</b> — the DHCP packet is dropped if an Option 82 field is present, and a counter is incremented</p> <p><b>keep</b> — the existing information is kept in the packet and the router does not add any additional information. In the downstream direction, the Option 82 field is not stripped and is forwarded toward the client.</p> <p>The behavior is slightly different in the case of Vendor Specific Options (VSOs). When the <b>keep</b> parameter is specified, the router will insert its own VSO into the Option 82 field. This will only be done if the incoming message already has an Option 82 field.</p> <p>If no Option 82 field is present, the router will not create the Option 82 field. In this case, no VSO will be added to the message.</p> |

## circuit-id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>circuit-id</b> [ascii-tuple   ifindex   sap-id   vlan-ascii-tuple]<br><b>no circuit-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command sends either an ASCII tuple or the interface index (If Index) on the specified SAP ID in the <b>circuit-id</b> suboption of the DHCP packet.</p> <p>If disabled, the <b>circuit-id</b> suboption of the DHCP packet is left empty.</p> <p>The <b>no</b> form of the command returns the system to the default.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Default</b>     | <b>ascii-tuple</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Parameters</b>  | <p><b>ascii-tuple</b> — specifies that the ASCII-encoded concatenated tuple, which consists of the access node identifier, service ID, and interface name, separated by “/”, will be used</p> <p><b>ifindex</b> — specifies that the interface index will be used. The If Index of a router interface can be displayed using the command <b>show&gt;router&gt;interface&gt;detail</b>.</p> <p><b>sap-id</b> — specifies that the SAP ID will be used</p> <p><b>vlan-ascii-tuple</b> — specifies that the format will include VLAN ID and dot1p bits in addition to what is already included in <b>ascii-tuple</b>. The format is supported on dot1q ports only. Therefore, when the Option 82 bits are stripped, dot1p bits will be copied to the Ethernet header of an outgoing packet.</p> |

## remote-id

|                    |                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>remote-id</b> [mac   string <i>string</i> ]<br><b>no remote-id</b>                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command sends the MAC address of the remote end (typically the DHCP client) in the <b>remote-id</b> suboption of the DHCP packet. This command identifies the host at the other end of the circuit.</p> <p>If disabled, the <b>remote-id</b> suboption of the DHCP packet is left empty.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>remote-id</b>                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Parameters</b>  | <p><b>mac</b> — specifies that the MAC address of the remote end is encoded in the suboption</p> <p><i>string</i> — the remote ID</p>                                                                                                                                                                                                                                             |



## vendor-specific option

|                    |                                                                                 |
|--------------------|---------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] vendor-specific-option</b>                                              |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                        |
| <b>Description</b> | This command configures the vendor-specific suboption of the DHCP relay packet. |

## client-mac-address

|                    |                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] client-mac-address</b>                                                                                                                                                                          |
| <b>Context</b>     | config>service>ies>interface>dhcp>option>vendor-specific-option                                                                                                                                         |
| <b>Description</b> | <p>This command enables the sending of the MAC address in the vendor-specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command disables the sending of the MAC address.</p> |

## sap-id

|                    |                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap-id</b>                                                                                                                                                                            |
| <b>Context</b>     | config>service>ies>interface>dhcp>option>vendor-specific-option                                                                                                                               |
| <b>Description</b> | <p>This command enables the sending of the SAP ID in the vendor-specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command disables the sending of the SAP ID.</p> |

## service-id

|                    |                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] service-id</b>                                                                                                                                                                                |
| <b>Context</b>     | config>service>ies>interface>dhcp>option>vendor-specific-option                                                                                                                                       |
| <b>Description</b> | <p>This command enables the sending of the service ID in the vendor-specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command disables the sending of the service ID.</p> |

### string

|                    |                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>string</b> <i>text</i><br><b>no string</b>                                                                                                                               |
| <b>Context</b>     | config>service>ies>interface>dhcp>option>vendor-specific-option                                                                                                             |
| <b>Description</b> | <p>This command specifies the string in the vendor-specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command reverts to the default value.</p>  |
| <b>Default</b>     | <b>no string</b>                                                                                                                                                            |
| <b>Parameters</b>  | <i>text</i> — any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, the entire string must be enclosed within double quotes. |

### system-id

|                    |                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] system-id</b>                                                                                                     |
| <b>Context</b>     | config>service>ies>interface>dhcp>option>vendor-specific-option                                                           |
| <b>Description</b> | <p>This command specifies whether the system ID is encoded in the vendor-specific suboption of the DHCP relay packet.</p> |

### server

|                    |                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>server</b> <i>server1</i> [ <i>server2</i> ...(up to 8 max)]<br><b>no server</b>                                                                                                                                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command specifies a list of servers where requests will be forwarded. The list of servers can be entered either as IP addresses or fully qualified domain names. There must be at least one server specified for DHCP relay to work. If there are multiple servers, the request is forwarded to all of the servers in the list.</p> <p>There can be a maximum of 8 DHCP servers configured.</p> |
| <b>Default</b>     | <b>no server</b>                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Parameters</b>  | <i>server</i> — the DHCP server IP address                                                                                                                                                                                                                                                                                                                                                              |

## trusted

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] trusted</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>ies>interface>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>As specified in RFC 3046, <i>DHCP Relay Agent Information Option</i>, a DHCP request where the giaddr is 0.0.0.0 and that contains a Option 82 field in the packet, should be discarded unless it arrives on a “trusted” circuit. If trusted mode is enabled on an IP interface, the Relay Agent (the router) will modify the request's giaddr to be equal to the ingress interface and forward the request.</p> <p>This behavior only applies when the action in the Relay Agent Information Option is “<b>keep</b>”. In the case where the Option 82 field is being replaced by the Relay Agent (action = “<b>replace</b>”), the original Option 82 information is lost, and therefore there is no reason to enable the <b>trusted</b> option.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>not enabled</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## icmp

|                    |                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>icmp</b>                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command enables access to the context to configure Internet Control Message Protocol (ICMP) parameters on a network IP interface. ICMP is a message control and error reporting protocol that also provides information relevant to IP packet processing.</p> |

## mask-reply

|                    |                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mask-reply</b>                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>ies>interface>icmp                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command enables or disables responses to ICMP mask requests on the router interface.</p> <p>If a local node sends an ICMP mask request to the router interface, the <b>mask-reply</b> command configures the router interface to reply to the request.</p> <p>The <b>no</b> form of the command disables replies to ICMP mask requests on the router interface.</p> |
| <b>Default</b>     | <b>mask-reply</b>                                                                                                                                                                                                                                                                                                                                                           |

## ttl-expired

|                    |                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ttl-expired</b> [ <i>number seconds</i> ]<br><b>no ttl-expired</b>                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>ies>interface>icmp                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command configures the rate that ICMP Time To Live (TTL) expired messages are issued by the IP interface.</p> <p>By default, generation of ICMP TTL expired messages is enabled at a maximum rate of 100 per 10-s time interval.</p> <p>The <b>no</b> form of the command disables the generation of TTL expired messages.</p>                                                        |
| <b>Default</b>     | <b>ttl-expired 100 10</b> — maximum of 100 TTL expired message in 10 s                                                                                                                                                                                                                                                                                                                        |
| <b>Parameters</b>  | <p><i>number</i> — the maximum number of ICMP TTL expired messages to send, expressed as a decimal integer. The <i>seconds</i> parameter must also be specified.</p> <p><b>Values</b> 10 to 100</p> <p><i>seconds</i> — the time frame, in seconds, used to limit the number of ICMP TTL expired messages that can be issued, expressed as a decimal integer</p> <p><b>Values</b> 1 to 60</p> |

## unreachables

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>unreachables</b> [ <i>number seconds</i> ]<br><b>no unreachables</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ies>interface>icmp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command enables and configures the rate for ICMP host and network destination unreachable messages issued on the router interface.</p> <p>The <b>unreachables</b> command enables the generation of ICMP destination unreachable messages on the router interface. The rate at which ICMP unreachable messages are issued can be controlled with the optional <i>number</i> and <i>seconds</i> parameters by indicating the maximum number of destination unreachable messages that can be issued on the interface for a specified time interval.</p> <p>By default, generation of ICMP destination unreachable messages is enabled at a maximum rate of 100 per 10-s time interval.</p> <p>The <b>no</b> form of the command disables the generation of ICMP destination unreachable messages on the router interface.</p> |
| <b>Default</b>     | <b>unreachables 100 10</b> — maximum of 100 unreachable messages in 10 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

- Parameters** *number* — the maximum number of ICMP unreachable messages to send, expressed as a decimal integer. The *seconds* parameter must also be specified.
- Values** 10 to 100
- seconds* — the time frame, in seconds, used to limit the number of ICMP unreachable messages that can be issued, expressed as a decimal integer
- Values** 1 to 60

## ip-mtu

- Syntax** **ip-mtu** *octets*  
**no ip-mtu**
- Context** config>service>ies>interface
- Description** This command configures the IP maximum transmit unit (packet size) for this interface. The **no** form of the command returns the default value.
- Parameters** *octets* — the MTU for the interface
- Values** 512 to 2048

## ipcp

- Syntax** [**no**] **ipcp**
- Context** config>service>ies>interface
- Description** This command enables the context to configure IPCP. Within this context, IPCP extensions can be used to signal the remote IP address and DNS IP address to the PPP peer over the PPP/MLPPP interface.
- This command is only applicable if the associated SAP is a PPP/MLPPP interface.

## dns

- Syntax** **dns** *ip-address* [**secondary** *ip-address*]  
**dns secondary** *ip-address*  
**no dns** [*ip-address*] [**secondary** *ip-address*]
- Context** config>service>ies>interface>ipcp
- Description** This command defines the DNS address(es) to be assigned to the far end of the associated PPP/MLPPP link via IPCP extensions. This command is only applicable if the associated SAP or port is a PPP/MLPPP interface with an IPCP encapsulation.

The **no** form of the command deletes the specified primary DNS address, secondary DNS address, or both addresses from the IPCP extension **peer-ip-address** configuration.

|                   |                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b>    | <b>no dns</b>                                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b> | <p><i>ip-address</i> — specifies a unicast IPv4 address for the primary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> <p><b>secondary</b> <i>ip-address</i> — specifies a unicast IPv4 address for the secondary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> |

### peer-ip-address

|                    |                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>peer-ip-address</b> <i>ip-address</i><br><b>no peer-ip-address</b>                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>ies>interface>ipcp                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command defines the remote IP address to be assigned to the far end of the associated PPP/MLPPP link via IPCP extensions. This command is only applicable if the associated SAP or port is a PPP/MLPPP interface with an IPCP encapsulation.</p> <p>The <b>no</b> form of the command deletes the IPCP extension <b>peer-ip-address</b> configuration.</p> |
| <b>Default</b>     | <b>no peer-ip-address (0.0.0.0)</b>                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <i>ip-address</i> — a unicast IPv4 address to be signaled to the far end of the associated PPP/MLPPP link by IPCP extensions                                                                                                                                                                                                                                       |

### mac

|                    |                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mac</b> <i>ieee-address</i>                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command assigns a specific MAC address to an IES IP interface.</p> <p>The <b>no</b> form of the command returns the MAC address to the default value.</p>                                                                                                                                                                         |
| <b>Default</b>     | the physical MAC address associated with the Ethernet interface on which the SAP is configured (default MAC address assigned to the interface by the system)                                                                                                                                                                              |
| <b>Parameters</b>  | <i>ieee-address</i> — the 48-bit MAC address for the static ARP in the form <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i> , where <i>aa</i> , <i>bb</i> , <i>cc</i> , <i>dd</i> , <i>ee</i> , and <i>ff</i> are hexadecimal numbers. Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses. |

## static-arp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] static-arp</b> <i>ip-address</i> <i>ieee-mac-address</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command configures a static ARP entry associating an IP address with a MAC address for the core router instance. This static ARP appears in the core routing ARP table. A static ARP can only be configured if it exists on the network attached to the IP interface.</p> <p>If an entry for a particular IP address already exists and a new MAC address is configured for the IP address, the existing MAC address is replaced by the new MAC address.</p> <p>A router interface can only have one static ARP entry configured for it. The number of <b>static-arp</b> entries that can be configured on a single node is limited to 8.</p> <p>Static ARP is used when a 7705 SAR needs to know about a device on an interface that cannot or does not respond to ARP requests. Therefore, the 7705 SAR OS configuration can specify to send a packet with a particular IP address to the corresponding ARP address.</p> <p>The <b>no</b> form of the command removes a static ARP entry.</p> |
| <b>Default</b>     | <b>no static-arp</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address for the static ARP in dotted-decimal notation</p> <p><i>ieee-mac-address</i> — the 48-bit MAC address for the static ARP in the form <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i>, where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i>, and <i>ff</i> are hexadecimal numbers. Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

---

## IES Service IPv6 Commands

### ipv6

|                    |                                                                          |
|--------------------|--------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] ipv6</b>                                                         |
| <b>Context</b>     | configure>service>ies>interface                                          |
| <b>Description</b> | This command enables the context to configure IPv6 for an IES interface. |

### address

|                    |                                                                                                                                                                                                                                                  |                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>address</b> <i>ipv6-address/prefix-length</i> [ <b>eui-64</b> ]<br><b>no address</b> <i>ipv6-address/prefix-length</i>                                                                                                                        |                                                                                                                                                        |
| <b>Context</b>     | configure>service>ies>interface>ipv6                                                                                                                                                                                                             |                                                                                                                                                        |
| <b>Description</b> | This command assigns an IPv6 address to the IES interface.                                                                                                                                                                                       |                                                                                                                                                        |
| <b>Default</b>     | n/a                                                                                                                                                                                                                                              |                                                                                                                                                        |
| <b>Parameters</b>  | <i>ipv6-address/prefix-length</i> — the IPv6 address on the interface                                                                                                                                                                            |                                                                                                                                                        |
|                    | <b>Values</b>                                                                                                                                                                                                                                    | <i>ipv6-address</i> x:x:x:x:x:x:x (eight 16-bit pieces)<br>x:x:x:x:x:d.d.d.d<br>x: [0 to FFFF]H<br>d: [0 to 255]D<br><br><i>prefix-length</i> 1 to 128 |
|                    | <b>eui-64</b> — when the <b>eui-64</b> keyword is specified, a complete IPv6 address from the supplied prefix and 64-bit interface identifier is formed. The 64-bit interface identifier is derived from the MAC address on Ethernet interfaces. |                                                                                                                                                        |

### dhcp6-relay

|                    |                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] dhcp6-relay</b>                                                                      |
| <b>Context</b>     | configure>service>ies>interface>ipv6                                                         |
| <b>Description</b> | This command enables the context to configure DHCPv6 Relay parameters for the IES interface. |



## option

|                    |                                                                                 |
|--------------------|---------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] option</b>                                                              |
| <b>Context</b>     | configure>service>ies>interface>ipv6>dhcp6-relay                                |
| <b>Description</b> | This command enables the context to configure DHCPv6 Relay information options. |

## interface-id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface-id</b><br><b>interface-id ascii-tuple</b><br><b>interface-id ifindex</b><br><b>interface-id sap-id</b><br><b>interface-id string</b><br><b>no interface-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | configure>service>ies>interface>ipv6>dhcp6-relay>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | This command enables the sending of interface ID options in the DHCPv6 Relay packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Default</b>     | <b>ascii-tuple</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><b>ascii-tuple</b> — specifies that the ASCII-encoded concatenated tuple, which consists of the access node identifier, service ID, and interface name, separated by “/”, will be used</p> <p><b>ifindex</b> — specifies that the interface index will be used. The If Index of a router interface can be displayed using the command <b>show&gt;router&gt;interface&gt;detail</b>.</p> <p><b>sap-id</b> — specifies that the SAP ID will be used</p> <p><b>string</b> — specifies that a string of up to 32 printable, 7-bit ASCII characters, will be used. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p> |

## remote-id

|                    |                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] remote-id</b>                                                                                                                                   |
| <b>Context</b>     | configure>service>ies>interface>ipv6>dhcp6-relay>option                                                                                                 |
| <b>Description</b> | This command enables the sending of the remote ID option in the DHCPv6 Relay packet. The client DHCP Unique Identifier (DUID) is used as the remote ID. |

## server

|                    |                                                                                                                                                                                                                                                                                                                                                                             |               |                                                                                                    |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>server</b> <i>ipv6-address</i> [ <i>ipv6-address...</i> (up to 8 max)]<br><b>no server</b> <i>ipv6-address</i> [ <i>ipv6-address...</i> (up to 8 max)]                                                                                                                                                                                                                   |               |                                                                                                    |
| <b>Context</b>     | configure>service>ies>interface>ipv6>dhcp6-relay                                                                                                                                                                                                                                                                                                                            |               |                                                                                                    |
| <b>Description</b> | This command specifies a list of servers where DHCPv6 requests will be forwarded. The list of servers can be entered either as IP addresses or fully qualified domain names. At least one server must be specified in order for DHCPv6 Relay to work. If there are multiple servers, the request is forwarded to all of them. A maximum of eight servers can be configured. |               |                                                                                                    |
| <b>Default</b>     | n/a                                                                                                                                                                                                                                                                                                                                                                         |               |                                                                                                    |
| <b>Parameters</b>  | <i>ipv6-address</i> — the IPv6 addresses of the DHCP servers <table> <tr> <td><b>Values</b></td><td>x::x::x::x::x::x (eight 16-bit pieces)<br/>x::x::x::x::d.d.d.d<br/>x: [0 to FFFF]H<br/>d: [0 to 255]D</td></tr> </table>                                                                                                                                                | <b>Values</b> | x::x::x::x::x::x (eight 16-bit pieces)<br>x::x::x::x::d.d.d.d<br>x: [0 to FFFF]H<br>d: [0 to 255]D |
| <b>Values</b>      | x::x::x::x::x::x (eight 16-bit pieces)<br>x::x::x::x::d.d.d.d<br>x: [0 to FFFF]H<br>d: [0 to 255]D                                                                                                                                                                                                                                                                          |               |                                                                                                    |

## icmp6

|                    |                                                                                       |
|--------------------|---------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>icmp6</b>                                                                          |
| <b>Context</b>     | config>service>ies>interface>ipv6                                                     |
| <b>Description</b> | This command enables the context to configure ICMPv6 parameters on the IES interface. |

## packet-too-big

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |            |               |         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|---------------|---------|
| <b>Syntax</b>      | <b>packet-too-big</b> [ <i>number seconds</i> ]<br><b>no packet-too-big</b>                                                                                                                                                                                                                                                                                                                                                                                   |               |            |               |         |
| <b>Context</b>     | config>service>ies>interface>ipv6>icmp6                                                                                                                                                                                                                                                                                                                                                                                                                       |               |            |               |         |
| <b>Description</b> | This command configures the rate for ICMPv6 packet-too-big messages.<br><br>The <b>no</b> form of the command disables the sending of ICMPv6 packet-too-big messages.                                                                                                                                                                                                                                                                                         |               |            |               |         |
| <b>Default</b>     | 100 10                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |            |               |         |
| <b>Parameters</b>  | <i>number</i> — the maximum number of packet-too-big messages to send, expressed as a decimal integer, in the time frame specified by the <i>seconds</i> parameter <table> <tr> <td><b>Values</b></td><td>10 to 1000</td></tr> </table> <i>seconds</i> — the time frame, in seconds, used to limit the number of packet-too-big messages that can be issued, expressed as a decimal integer <table> <tr> <td><b>Values</b></td><td>1 to 60</td></tr> </table> | <b>Values</b> | 10 to 1000 | <b>Values</b> | 1 to 60 |
| <b>Values</b>      | 10 to 1000                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |            |               |         |
| <b>Values</b>      | 1 to 60                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |            |               |         |

## param-problem

|                    |                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>param-problem</b> [ <i>number seconds</i> ]<br><b>no param-problem</b>                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>ies>interface>ipv6>icmp6                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | This command configures the rate for ICMPv6 param-problem messages.<br><br>The <b>no</b> form of the command disables the sending of ICMPv6 param-problem messages.                                                                                                                                                                                                                      |
| <b>Default</b>     | <b>100 10</b>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>  | <i>number</i> — the maximum number of param-problem messages to send, expressed as a decimal integer, in the time frame specified by the <i>seconds</i> parameter<br><br><b>Values</b> 10 to 1000<br><br><i>seconds</i> — the time frame, in seconds, used to limit the number of param-problem messages that can be issued, expressed as a decimal integer<br><br><b>Values</b> 1 to 60 |

## time-exceeded

|                    |                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>time-exceeded</b> [ <i>number seconds</i> ]<br><b>no time-exceeded</b>                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>ies>interface>ipv6>icmp6                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | This command configures the rate for ICMPv6 time-exceeded messages.<br><br>The <b>no</b> form of the command disables the sending of ICMPv6 time-exceeded messages.                                                                                                                                                                                                                      |
| <b>Default</b>     | <b>100 10</b>                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>  | <i>number</i> — the maximum number of time-exceeded messages to send, expressed as a decimal integer, in the time frame specified by the <i>seconds</i> parameter<br><br><b>Values</b> 10 to 1000<br><br><i>seconds</i> — the time frame, in seconds, used to limit the number of time-exceeded messages that can be issued, expressed as a decimal integer<br><br><b>Values</b> 1 to 60 |

## unreachables

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>unreachables</b> [ <i>number seconds</i> ]<br><b>no unreachables</b>                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ies>interface>ipv6>icmp6                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command enables and configures the rate for ICMPv6 host and network destination unreachable messages issued on the router interface.</p> <p>The <b>no</b> form of the command disables the generation of ICMPv6 destination unreachables on the router interface.</p>                                                                                                                                       |
| <b>Default</b>     | <b>100 10</b>                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Parameters</b>  | <p><i>number</i> — the maximum number of destination unreachable messages to send, expressed as a decimal integer, in the time frame specified by the <i>seconds</i> parameter</p> <p><b>Values</b> 10 to 1000</p> <p><i>seconds</i> — the time frame, in seconds, used to limit the number of destination unreachable messages that can be issued, expressed as a decimal integer</p> <p><b>Values</b> 1 to 60</p> |

## neighbor

|                    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>neighbor</b> <i>ipv6-address mac-address</i><br><b>no neighbor</b> <i>ipv6-address</i>                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>ies>interface>ipv6                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command configures an IPv6-to-MAC address mapping on the IES interface. Use this command if a directly attached IPv6 node does not support ICMPv6 neighbor discovery or a static address must be used. This command can only be used on Ethernet interfaces. The <i>ipv6-address</i> must be on the subnet that was configured from the IPv6 address command or a link-local address.</p> |
| <b>Parameters</b>  | <p><i>ipv6-address</i> — the IPv6 address on the interface</p> <p><b>Values</b> x:x:x:x:x:x:x (eight 16-bit pieces)<br/>x:x:x:x:x:d.d.d.d<br/>x: [0 to FFFF]H<br/>d: [0 to 255]D</p> <p><i>mac-address</i> — the MAC address for the neighbor in the form of xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx</p>                                                                                           |

---

## IES Service SAP Commands

### sap

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap <i>sap-id</i> [create]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command creates a SAP within an IES service. Each SAP must be unique.</p> <p>All SAPs must be explicitly created with the <b>create</b> keyword. If no SAPs are created within a service or an IP interface, a SAP will not exist on that object.</p> <p>To edit SAP parameters, enter an existing SAP without the <b>create</b> keyword.</p> <p>A SAP can only be associated with a single service. The SAP is owned by the service in which it was created. A SAP can only be defined on a port that has been configured as an access port in the <b>config&gt;port <i>port-id</i></b> context using the <b>mode access</b> command. Refer to the 7705 SAR OS Interface Configuration Guide, “Access Ports”.</p> <p>If a port is shut down, all SAPs on that port become operationally down. When a service is shut down, SAPs for the service are not displayed as operationally down although all traffic traversing the service will be discarded. The operational state of a SAP is relative to the operational state of the port on which the SAP is defined.</p> <p>The following SAP types are supported:</p> <ul style="list-style-type: none"> <li>• PPP IPCP encapsulation of an IPv4 packet for IES (RFC 1332)</li> <li>• MLPPP bundle</li> <li>• Ethernet SAPs supporting null and dot1q</li> </ul> <p>The <b>no</b> form of this command deletes the SAP with the specified port. When a SAP is deleted, all configuration parameters for the SAP will also be deleted.</p> |
| <b>Default</b>     | <b>no sap</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <i>sap-id</i> — specifies the physical port identifier portion of the SAP definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

The *sap-id* can be configured in one of the formats described in [Table 61](#).

**Table 61: SAP ID Configurations**

| Type          | Syntax                                                                                                                                                                                                                                                                | Example                          |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| port-id       | <i>slot/mda/port[.channel]</i>                                                                                                                                                                                                                                        | 1/1/5                            |
| null          | <i>port-id</i>                                                                                                                                                                                                                                                        | <i>port-id</i> : 1/1/3           |
| dot1q         | <i>port-id:qtag1</i>                                                                                                                                                                                                                                                  | <i>port-id:qtag1</i> : 1/1/3:100 |
| ipcp          | <i>slot/mda/port.channel</i>                                                                                                                                                                                                                                          | 1/2/2.4                          |
| bundle        | <i>bundle-type-slot/mda.bundle-num</i>                                                                                                                                                                                                                                | bundle-ppp-1/1.1                 |
| <b>Values</b> | <i>sap-id</i> :<br>port-id <i>slot/mda/port[.channel]</i><br>null <i>port-id</i><br>dot1q <i>port-id:qtag1</i><br>ipcp <i>slot/mda/port.channel</i><br>bundle-type-slot/mda.bundle-num<br>bundle keyword<br>type     ppp<br>bundle-num 1 to 10<br>qtag1     0 to 4094 |                                  |

*port-id* — specifies the physical port ID in the *slot/mda/port* format

If the card slot has an adapter card installed, the *port-id* must be in the slot\_number/MDA\_number/port\_number format. For example, 1/2/3 specifies port 3 on MDA 2 in slot 1.

The *port-id* must reference a valid port type. When the *port-id* parameter represents TDM channels, the port ID must include the channel ID. A period “.” separates the physical port from the *channel-id*. The port must be configured as an access port.

*bundle-id* — specifies the multilink bundle to be associated with this IP interface. The **bundle** keyword must be entered at the beginning of the parameter. The command syntax must be configured as follows:

*bundle-id*:                               **bundle-type-slot-id/mda-slot.bundle-num**  
*bundle-id* value range:               1 to 10

For example:

```
*A:ALU-12>config# port bundle-ppp-5/1.1
*A:ALU-12>config>port# multilink-bundle
```

*qtag1* — specifies the encapsulation value used to identify the SAP on the port or subport. If this parameter is not specifically defined, the default value is 0.

**Values**      qtag1:               0 to 4094

The values depend on the encapsulation type configured for the interface. [Table 62](#) describes the allowed values for the port and encapsulation types.

**Table 62: Port and Encapsulation Values**

| Port Type | Encap-Type | Allowed Values | Comments                                                                                                                        |
|-----------|------------|----------------|---------------------------------------------------------------------------------------------------------------------------------|
| Ethernet  | Null       | —              | The SAP is identified by the port.                                                                                              |
| Ethernet  | Dot1q      | 0 to 4094      | The SAP is identified by the 802.1q tag on the port. Note that a 0 qtag1 value also accepts untagged packets on the dot1q port. |

**create** — keyword used to create a SAP instance. The **create** keyword requirement can be enabled/disabled in the **environment>create** context.

## accounting-policy

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>accounting-policy</b> <i>acct-policy-id</i><br><b>no accounting-policy</b> [ <i>acct-policy-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>ies>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command creates the accounting policy context that can be applied to a SAP. An accounting policy must be defined before it can be associated with a SAP. If the policy ID does not exist, an error message is generated.</p> <p>A maximum of one accounting policy can be associated with a SAP at one time. Accounting policies are configured in the <b>config&gt;log</b> context.</p> <p>The <b>no</b> form of this command removes the accounting policy association from the SAP, and the accounting policy reverts to the default.</p> |
| <b>Default</b>     | <b>no accounting-policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Parameters</b>  | <p><i>acct-policy-id</i> — the accounting policy ID as configured in the <b>config&gt;log&gt;accounting-policy</b> context</p> <p><b>Values</b> 1 to 99</p>                                                                                                                                                                                                                                                                                                                                                                                          |

### collect-stats

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>ies>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command enables accounting and statistical data collection for the SAP. When applying accounting policies, the data, by default, is collected in the appropriate records and written to the designated billing file.</p> <p>When the <b>no collect-stats</b> command is issued, the statistics are still accumulated by the CSM. However, the CPU will not obtain the results and write them to the billing file. If a subsequent <b>collect-stats</b> command is issued, the counters written to the billing file include all the traffic while the <b>no collect-stats</b> command was in effect.</p> |
| <b>Default</b>     | <b>collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

### egress

|                    |                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>ies>sap                                                                                                                                                                                                    |
| <b>Description</b> | <p>This command enables the context to configure egress SAP Quality of Service (QoS) policies.</p> <p>If no sap-egress QoS policy is defined, the system default sap-egress QoS policy is used for egress processing.</p> |

### ingress

|                    |                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                                                                                           |
| <b>Context</b>     | config>service>ies>sap                                                                                                                                                                                   |
| <b>Description</b> | <p>This command enables the context to configure ingress SAP QoS policies.</p> <p>If no sap-ingress QoS policy is defined, the system default sap-ingress QoS policy is used for ingress processing.</p> |



## qos

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>qos</b> <i>policy-id</i><br><b>no qos</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>ies>sap>egress<br>config>service>ies>sap>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command associates a QoS policy with an ingress or egress IES SAP.</p> <p>QoS ingress and egress policies are important for the enforcement of SLA agreements. The policy ID must be defined prior to associating the policy with a SAP. If the <i>policy-id</i> does not exist, an error will be returned.</p> <p>The <b>qos</b> command is used to associate both ingress and egress QoS policies. The <b>qos</b> command allows only ingress policies to be associated on the SAP ingress and only egress policies to be associated on the SAP egress. Attempts to associate a QoS policy of the wrong type returns an error.</p> <p>Only one ingress and one egress QoS policy can be associated with an IES SAP at one time. Attempts to associate a second QoS policy of a given type will return an error.</p> <p>By default, no specific QoS policy is associated with the SAP for ingress or egress; therefore, the default QoS policy is used.</p> <p>The <b>no</b> form of this command removes the QoS policy association from the SAP, and the QoS policy reverts to the default.</p> |
| <b>Parameters</b>  | <i>policy-id</i> — associates the ingress or egress policy ID with the SAP. The policy ID must already exist.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Values</b>      | 1 to 65535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>filter ipv6</b> <i>ip-filter-id</i><br><b>no filter</b> [ <b>ip</b> <i>ip-filter-id</i>   <b>ipv6</b> <i>ipv6-filter-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>ies>sap>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command associates an IPv4 or IPv6 filter policy with an ingress IES SAP.</p> <p>Filter policies control the forwarding and dropping of packets based on IP matching criteria. Only one filter can be applied to a SAP at a time.</p> <p>The <i>ip-filter-id</i> or <i>ipv6-filter-id</i> must already be defined before the <b>filter</b> command is executed. If the filter policy does not exist, the operation will fail and an error message will be displayed.</p> <p>The <b>no</b> form of the command removes any configured filter ID association with the SAP. The filter policy cannot be deleted until it is removed from all SAPs where it is applied.</p> |
| <b>Default</b>     | <b>no filter</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Parameters**    *ip-filter-id* — the IPv4 filter policy ID number

**Values**        1 to 65535

*ipv6-filter-id* — the IPv6 filter policy ID number

**Values**        1 to 65535



**Note:** For information on configuring IP filter IDs, refer to the 7705 SAR OS Router Configuration Guide, “Filter Policies”.

---

## IES Service Spoke SDP Commands

### spoke-sdp

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>        | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>create</b> ]<br><b>no spoke-sdp</b> <i>sdp-id:vc-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>       | config>service>ies>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>   | <p>This command binds a service to an existing Service Distribution Point (SDP).</p> <p>A spoke SDP is treated like the equivalent of a traditional bridge “port”, where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke SDPs or SAPs) and not transmitted on the port it was received on.</p> <p>The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service is down.</p> <p>The SDP must already be defined in the <b>config&gt;service&gt;sdp</b> context in order to associate it with a service. If the <b>sdp</b> <i>sdp-id</i> is not already configured, an error message is generated. If the <i>sdp-id</i> does exist, a binding between that <i>sdp-id</i> and the service is created.</p> <p>SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end devices can participate in the service.</p> <p>Class-based forwarding is not supported on a spoke SDP used for termination on an IES or VPRN service. All packets are forwarded over the default LSP.</p> <p>The <b>no</b> form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to the service. Once the binding is removed, no packets are forwarded to the far-end router. The spoke SDP must be shut down first before it can be deleted from the configuration.</p> |
| <b>Default</b>       | <b>no sdp-id is bound to a service</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Special Cases</b> | <b>IES</b> — only one <i>sdp-id</i> can be bound to an IES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Parameters</b>    | <p><i>sdp-id</i> — the SDP identifier</p> <p><b>Values</b> 1 to 17407</p> <p><i>vc-id</i> — the virtual circuit identifier</p> <p><b>Values</b> 1 to 4294967295</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## egress

|                    |                                                                      |
|--------------------|----------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                        |
| <b>Context</b>     | config>service>ies>interface>spoke-sdp                               |
| <b>Description</b> | This command enables the context to configure egress SDP parameters. |

## vc-label

|                    |                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label</b> <i>egress-vc-label</i><br><b>no vc-label</b> [ <i>egress-vc-label</i> ]                                                   |
| <b>Context</b>     | config>service>ies>interface>spoke-sdp>egress                                                                                             |
| <b>Description</b> | This command configures the static MPLS VC label used by the 7705 SAR to send packets to the far-end device in this service via this SDP. |
| <b>Parameters</b>  | <i>egress-vc-label</i> — a VC egress value that indicates a specific connection                                                           |
| <b>Values</b>      | 16 to 1048575                                                                                                                             |

## ingress

|                    |                                                                       |
|--------------------|-----------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                        |
| <b>Context</b>     | config>service>ies>interface>spoke-sdp                                |
| <b>Description</b> | This command enables the context to configure ingress SDP parameters. |

## filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>no filter</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>ies>interface>spoke-sdp>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command associates an IP filter policy with an ingress spoke SDP. Filter policies control the forwarding and dropping of packets based on IP or MAC matching criteria.</p> <p>The filter policy must already be defined before the filter command is executed. If the filter policy does not exist, the operation will fail and an error message will be returned.</p> <p>In general, filters applied to ingress spoke SDPs apply to all packets on the spoke SDP. One exception is that non-IP packets are not applied to IP match criteria, so the default action in the filter policy applies to these packets.</p> |

The **no** form of this command removes any configured filter ID association with the spoke SDP.

**Parameters** *ip-filter-id* — specifies the IP filter policy. The filter ID must already exist within the created IP filters.

**Values** Values 1 to 65535

## vc-label

**Syntax** **vc-label** *ingress-vc-label*  
**no vc-label** [*ingress-vc-label*]

**Context** config>service>ies>interface>spoke-sdp>ingress

**Description** This command configures the static MPLS VC label used by the far-end device to send packets to the 7705 SAR in this service via this SDP.

**Parameters** *ingress-vc-label* — a VC ingress value that indicates a specific connection

**Values** 2048 to 18431

## Show Commands

### customer

|                    |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>customer</b> [ <i>customer-id</i> ]                                                                                 |
| <b>Context</b>     | show>service                                                                                                           |
| <b>Description</b> | This command displays service customer information.                                                                    |
| <b>Parameters</b>  | <i>customer-id</i> — specifies the customer ID number to be displayed                                                  |
|                    | <b>Values</b> 1 to 2147483647                                                                                          |
| <b>Output</b>      | The following output is an example of service customer information, and <a href="#">Table 63</a> describes the fields. |

#### Sample Output

```
A:ALU-2# show service customer 1

=====
Customer 1
=====
Customer-ID : 1
Contact : Tech Support
Description : Default customer
Phone : (613) 555-1122
=====
```

**Table 63: Show Service Customer Output Fields**

| Label       | Description                                       |
|-------------|---------------------------------------------------|
| Customer-ID | ID that uniquely identifies the customer          |
| Contact     | Name or title of the primary contact person       |
| Description | Generic information about the customer            |
| Phone       | Phone number by which to reach the contact person |

## egress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command displays service information using the range of egress labels.</p> <p>If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed.</p> <p>If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using the labels in the specified range are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>     |
| <b>Parameters</b>  | <p><i>end-label</i> — the ending egress label value for which to display services using the label range</p> <p><b>Values</b> 2049 to 131071</p> <p><b>Default</b> the <i>start-label</i> value</p> <p><i>start-label</i> — the starting egress label value for which to display services using the label range. If only <i>start-label</i> is specified, only services using <i>start-label</i> are displayed.</p> <p><b>Values</b> 0, or 2048 to 131071</p> |
| <b>Output</b>      | The following output is an example of service egress label information, and <a href="#">Table 64</a> describes the fields.                                                                                                                                                                                                                                                                                                                                   |

**Sample Output**

In the sample below, services 3, 5 and 6 are IES, and services 5000 and 5001 are VPLS services.

```
*A:ALU-12>show>service# egress-label 0 131071
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

3 15:15 Spok 0 0
5 5:5 Spok 0 0
6 5:6 Spok 0 0
5000 15:5000 Mesh 0 0
5000 15:5001 Spok 0 0
5001 5001:100 Spok 0 0

Number of Bindings Found : 6
=====
*A:ALU-12#
```

**Table 64: Show Service Egress Output Fields**

| Label                    | Description                                                                                    |
|--------------------------|------------------------------------------------------------------------------------------------|
| Svc Id                   | The ID that identifies a service                                                               |
| Sdp Binding              | The ID that identifies an SDP                                                                  |
| Type                     | Indicates whether the SDP binding is a spoke or a mesh                                         |
| I. Lbl                   | The VC label used by the far-end device to send packets to 7705 SAR in this service by the SDP |
| E. Lbl                   | The VC label used by 7705 SAR to send packets to the far-end device in this service by the SDP |
| Number of Bindings Found | The total number of SDP bindings that exist within the specified label range                   |

id

**Syntax** `id service-id`

**Context** `show>service`

**Description** This command displays information for a particular service ID

**Parameters** *service-id* — identifies the service in the domain

all

**Syntax** `all`

**Context** `show>service>id`

**Description** This command displays detailed information for all aspects of the service.

**Output** The following output is an example of service ID all information, and [Table 65](#) describes the fields.



**Sample Output (IES Management Service)**

A:ALU-2# show service id 751 all

```

=====
Service Detailed Information
=====
Service Id : 751
Service Type : IES
Description : ATM_Backhaul_SAM_Mgmt
Customer Id : 10
Last Status Change: 09/09/2008 16:26:25
Last Mgmt Change : 09/09/2008 16:25:04
Admin State : Up Oper State : Up
SAP Count : 2

Service Access Points

SAP bundle-ima-1/3.1:0/75

Service Id : 751
SAP : bundle-ima-1/3.1:0/75 Encap : atm
Admin State : Up Oper State : Up
Flags : None
Multi Svc Site : None
Last Status Change: 09/09/2008 16:26:25
Last Mgmt Change : 09/09/2008 16:25:04
Sub Type : regular

Admin MTU : 1572 Oper MTU : 1572
Ingr IP Fltr-Id : 1 Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max

Acct. Pol : None Collect Stats : Disabled
Anti Spoofing : None Nbr Static Hosts : 0

QoS

Ingress qos-policy : 1 Egress qos-policy : 1
Shared Q plcy : n/a Multipoint shared : Disabled

Sap Statistics

Last Cleared Time : N/A

Packets Octets
Forwarding Engine Stats
Dropped : 0 n/a
Off. HiPrio : 802789 n/a
Off. LowPrio : n/a n/a

Queueing Stats(Ingress QoS Policy 1)
Dro. HiPrio : 0 n/a

```

```
Dro. LowPrio : n/a n/a
For. InProf : 802789 69039854
For. OutProf : 0 0
```

## Queueing Stats (Egress QoS Policy 1)

```
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a
For. InProf : 802829 41753273
For. OutProf : n/a n/a
```

## Sap per Queue stats

|                                      | Packets  | Octets   |
|--------------------------------------|----------|----------|
| Ingress Queue 1 (Unicast) (Priority) |          |          |
| Off. HiPrio                          | : 802789 | n/a      |
| Off. LoPrio                          | : n/a    | n/a      |
| Dro. HiPrio                          | : 0      | n/a      |
| Dro. LoPrio                          | : n/a    | n/a      |
| For. InProf                          | : 802789 | 69039854 |
| For. OutProf                         | : 0      | 0        |

## Egress Queue 1

```
For. InProf : 802829 41753273
For. OutProf : n/a n/a
Dro. InProf : 0 n/a
Dro. OutProf : n/a n/a
```

## ATM SAP Configuration Information

|                              |                              |
|------------------------------|------------------------------|
| Ingress TD Profile : 32      | Egress TD Profile : 32       |
| Alarm Cell Handling: Enabled | AAL-5 Encap : mux-ip         |
| OAM Termination : Enabled    | Periodic Loopback : Disabled |

## Service Interfaces

### Interface

|              |                    |                   |             |
|--------------|--------------------|-------------------|-------------|
| If Name      | : IP_10.75.11.0/24 | Oper State        | : Up        |
| Admin State  | : Up               |                   |             |
| Protocols    | : None             |                   |             |
| IP Addr/mask | : 10.75.11.2/24    | Address Type      | : Primary   |
| IGP Inhibit  | : Disabled         | Broadcast Address | : Host-ones |

### Details

|               |                         |                  |            |
|---------------|-------------------------|------------------|------------|
| If Index      | : 3                     | Virt. If Index   | : 3        |
| Last Oper Chg | : 09/09/2008 16:26:25   | Global If Index  | : 32       |
| SAP Id        | : bundle-ima-1/3.1:0/75 |                  |            |
| TOS Marking   | : Untrusted             | If Type          | : IES      |
| SNTP B.Cast   | : False                 | IES ID           | : 751      |
| MAC Address   | : 00:00:00:00:00:10     | Arp Timeout      | : 14400    |
| IP MTU        | : 1524                  | ICMP Mask Reply  | : True     |
| Arp Populate  | : Disabled              | Host Conn Verify | : Disabled |
| LdpSyncTimer  | : None                  |                  |            |

```

Proxy ARP Details
Rem Proxy ARP : Disabled Local Proxy ARP : Disabled
Policies : none

```

```

ICMP Details
Unreachables : Number - 100 Time (seconds) - 10
TTL Expired : Number - 100 Time (seconds) - 10

```

```

IPCP Address Extension Details
Peer IP Addr : Not configured
Peer Pri DNS Addr : Not configured
Peer Sec DNS Addr : Not configured

```

```

=====
*A:ALU-2#

```

**Table 65: Show Service ID All Output Fields**

| Label                               | Description                                                                  |
|-------------------------------------|------------------------------------------------------------------------------|
| <b>Service Detailed Information</b> |                                                                              |
| Service Id                          | Service ID number                                                            |
| VPN Id                              | VPN ID number                                                                |
| Service Type                        | Type of service (IES)                                                        |
| Description                         | Generic information about the service                                        |
| Customer Id                         | Customer ID number                                                           |
| Last Status Change                  | Date and time of the most recent status change to this service               |
| Last Mgmt Change                    | Date and time of the most recent management-initiated change to this service |
| Admin State                         | Desired state of the service                                                 |
| Oper State                          | Operating state of the service                                               |
| MTU                                 | Service MTU                                                                  |
| SAP Count                           | Number of SAPs specified for this service                                    |
| <b>Service Access Points</b>        |                                                                              |
| Service Id                          | Service Identifier                                                           |
| SAP                                 | ID of the access port where this SAP is defined                              |
| Encap                               | Encapsulation type for this SAP on the access port                           |
| Admin State                         | Desired state of the SAP                                                     |
| Oper State                          | Operating state of the SAP                                                   |

**Table 65: Show Service ID All Output Fields (Continued)**

| Label                          | Description                                                                                                                                                  |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flags                          | Conditions that affect the operating status of this SAP. Display output includes ServiceAdminDown, PortOperDown, and so on.                                  |
| Last Status Change             | Date and time of the most recent status change to this SAP                                                                                                   |
| Last Mgmt Change               | Date and time of the most recent management-initiated change to this SAP                                                                                     |
| Admin MTU                      | Desired largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented |
| Oper MTU                       | Actual largest service frame size (in octets) that can be transmitted through this SAP to the far-end router, without requiring the packet to be fragmented  |
| Ingr IP Fltr-Id                | Ingress IP filter policy ID assigned to the SAP                                                                                                              |
| Egr IP Fltr-Id                 | Egress IP filter policy ID assigned to the SAP (not applicable)                                                                                              |
| Ingr Mac Fltr-Id               | Ingress MAC filter policy ID assigned to the SAP (not applicable)                                                                                            |
| Egr Mac Fltr-Id                | Egress MAC filter policy ID assigned to the SAP (not applicable)                                                                                             |
| Acct. Pol                      | Accounting policy applied to the SAP                                                                                                                         |
| Collect Stats                  | Specifies whether accounting statistics are collected on the SAP                                                                                             |
| <b>QoS</b>                     |                                                                                                                                                              |
| Ingress qos-policy             | SAP ingress QoS policy ID                                                                                                                                    |
| Egress qos-policy              | SAP egress QoS policy ID                                                                                                                                     |
| <b>Sap Statistics</b>          |                                                                                                                                                              |
| Last Cleared Time              | Date and time that a clear command was issued on statistics                                                                                                  |
| <b>Forwarding Engine Stats</b> |                                                                                                                                                              |
| Dropped                        | Number of packets or octets dropped by the forwarding engine                                                                                                 |
| Off. HiPrio                    | Number of high-priority packets or octets offered to the forwarding engine                                                                                   |
| Off. LowPrio                   | Number of low-priority packets offered to the forwarding engine                                                                                              |

**Table 65: Show Service ID All Output Fields (Continued)**

| Label                                      | Description                                                                                                        |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Queueing Stats (Ingress QoS Policy)</b> |                                                                                                                    |
| Dro. HiPrio                                | Number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy                   |
| Dro. LowPrio                               | Number of low-priority packets discarded, as determined by the SAP ingress QoS policy                              |
| For. InProf                                | Number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy     |
| For. OutProf                               | Number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy |
| <b>Queueing Stats (Egress QoS Policy)</b>  |                                                                                                                    |
| Dro. InProf                                | Number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy                       |
| Dro. OutProf                               | Number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy                   |
| For. InProf                                | Number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy      |
| For. OutProf                               | Number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy  |
| <b>Sap per Queue stats</b>                 |                                                                                                                    |
| Ingress Queue <i>n</i>                     | Index of the ingress QoS queue of this SAP, where <i>n</i> is the index number                                     |
| Off. HiPrio                                | Number of packets or octets of high-priority traffic for the SAP (offered)                                         |
| Off. LoPrio                                | Number of packets or octets count of low-priority traffic for the SAP (offered)                                    |
| Dro. HiPrio                                | Number of high-priority traffic packets or octets dropped                                                          |
| Dro. LoPrio                                | Number of low-priority traffic packets or octets dropped                                                           |
| For. InProf                                | Number of in-profile packets or octets (rate below CIR) forwarded                                                  |
| For. OutProf                               | Number of out-of-profile packets or octets (rate above CIR) forwarded                                              |
| Egress Queue <i>n</i>                      | Index of the egress QoS queue of the SAP, where <i>n</i> is the index number                                       |

**Table 65: Show Service ID All Output Fields (Continued)**

| <b>Label</b>                             | <b>Description</b>                                                                                                                               |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| For. InProf                              | Number of in-profile packets or octets (rate below CIR) forwarded                                                                                |
| For. OutProf                             | Number of out-of-profile packets or octets (rate above CIR) forwarded                                                                            |
| Dro. InProf                              | Number of in-profile packets or octets dropped for the SAP                                                                                       |
| Dro. OutProf                             | Number of out-of-profile packets or octets discarded                                                                                             |
| <b>ATM SAP Configuration Information</b> |                                                                                                                                                  |
| Ingress TD Profile                       | Profile ID of the traffic descriptor applied to the ingress SAP                                                                                  |
| Egress TD Profile                        | Profile ID of the traffic descriptor applied to the egress SAP                                                                                   |
| Alarm Cell Handling                      | Indicates that OAM cells are being processed                                                                                                     |
| AAL-5 Encap                              | AAL-5 encapsulation type — for Release 4.0, this is always mux-ip                                                                                |
| OAM Termination                          | Indicates whether this SAP is an OAM termination point                                                                                           |
| <b>Services Interfaces</b>               |                                                                                                                                                  |
| If Name                                  | Name used to refer to the IES interface                                                                                                          |
| Admin State                              | Administrative state of the interface                                                                                                            |
| Oper State                               | Operational state of the interface                                                                                                               |
| IP Addr/mask                             | IP address and subnet mask length of the interface                                                                                               |
| Address Type                             | Specifies whether the IP address for the interface is the primary or secondary address on the interface (in Release 4.0, this is always primary) |
| Broadcast Address                        | Broadcast address of the interface                                                                                                               |
| If Index                                 | Interface index corresponding to the IES interface                                                                                               |
| Virt. If Index                           | Virtual interface index of the IES interface                                                                                                     |
| Last Oper Chg                            | Date and time of the last operating state change on the interface                                                                                |
| Global IF Index                          | Global interface index of the IES interface                                                                                                      |
| SAP Id                                   | SAP identifier                                                                                                                                   |
| TOS Marking                              | Specifies whether the ToS marking state is trusted or untrusted for the IP interface                                                             |

**Table 65: Show Service ID All Output Fields (Continued)**

| <b>Label</b>        | <b>Description</b>                                                                                                                                                                                                                   |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| If Type             | Type of interface: IES                                                                                                                                                                                                               |
| IES ID              | Service identifier                                                                                                                                                                                                                   |
| MAC Address         | IEEE 802.3 MAC address                                                                                                                                                                                                               |
| Arp Timeout         | Timeout for an ARP entry learned on the interface                                                                                                                                                                                    |
| IP MTU              | IP maximum transmit unit for the interface                                                                                                                                                                                           |
| ICMP Mask Reply     | Specifies whether the IP interface replies to a received ICMP mask request                                                                                                                                                           |
| ARP Populate        | Specifies if ARP is enabled or disabled                                                                                                                                                                                              |
| <b>ICMP Details</b> |                                                                                                                                                                                                                                      |
| Unreachables        | Maximum number of ICMP destination unreachable messages that the IP interface will issue in a given period of time, in seconds<br>Disabled — indicates that the IP interface will not generate ICMP destination unreachable messages |
| TTL Expired         | Maximum number of ICMP TTL expired messages that the IP interface will issue in a given period of time, in seconds<br>Disabled — indicates that the IP interface will not generate ICMP TTL expired messages                         |

## arp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------|---------------------------------------|--|-------|-----------------------------------------------------|--|-----|------------------------------------------------------------------------------------------|--|---------|------------------------------------------|--|---------------------------------|--|--|--------|---------|--|------|-----|--|------------|---------|--|-------|-----------|--|-----|---------------|--|--|--------------|--|-----|------------------|
| <b>Syntax</b>      | <b>arp</b> [ <i>ip-address</i> ]   [ <b>mac</b> <i>ieee-address</i> ]   <b>sap</b> <i>sap-id</i> ]   [ <b>interface</b> <i>ip-int-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
| <b>Description</b> | This command displays the ARP table for the IES instance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address for which ARP entries will be displayed</p> <p><b>Default</b> all IP addresses</p> <p><i>ieee-address</i> — the 48-bit MAC address for which ARP entries will be displayed. The MAC address can be expressed in the form <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i>, where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i>, and <i>ff</i> are hexadecimal numbers.</p> <p><b>Default</b> all MAC addresses</p> <p><i>sap-id</i> — the SAP ID for which ARP entries will be displayed</p> <p><b>Values</b></p> <table><tr><td><i>sap-id</i>:</td><td>null</td><td>[<i>port-id</i>   <i>bundle-id</i>]</td></tr><tr><td></td><td>dot1q</td><td>[<i>port-id</i>   <i>bundle-id</i>]:<i>qtag1</i></td></tr><tr><td></td><td>atm</td><td>[<i>port-id</i>   <i>bundle-id</i>][:<i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i>]</td></tr><tr><td></td><td>port-id</td><td><i>slot/mda/port</i>[.<i>channel</i>]</td></tr><tr><td></td><td>bundle-type-slot/mda.bundle-num</td><td></td></tr><tr><td></td><td>bundle</td><td>keyword</td></tr><tr><td></td><td>type</td><td>ppp</td></tr><tr><td></td><td>bundle-num</td><td>1 to 10</td></tr><tr><td></td><td>qtag1</td><td>0 to 4094</td></tr><tr><td></td><td>vpi</td><td>NNI 0 to 4095</td></tr><tr><td></td><td></td><td>UNI 0 to 255</td></tr><tr><td></td><td>vci</td><td>1, 2, 5 to 65535</td></tr></table> <p><i>ip-int-name</i> — the interface name for which ARP entries will be displayed</p> | <i>sap-id</i> :                                                                          | null | [ <i>port-id</i>   <i>bundle-id</i> ] |  | dot1q | [ <i>port-id</i>   <i>bundle-id</i> ]: <i>qtag1</i> |  | atm | [ <i>port-id</i>   <i>bundle-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |  | port-id | <i>slot/mda/port</i> [. <i>channel</i> ] |  | bundle-type-slot/mda.bundle-num |  |  | bundle | keyword |  | type | ppp |  | bundle-num | 1 to 10 |  | qtag1 | 0 to 4094 |  | vpi | NNI 0 to 4095 |  |  | UNI 0 to 255 |  | vci | 1, 2, 5 to 65535 |
| <i>sap-id</i> :    | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [ <i>port-id</i>   <i>bundle-id</i> ]                                                    |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | dot1q                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | [ <i>port-id</i>   <i>bundle-id</i> ]: <i>qtag1</i>                                      |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | atm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | [ <i>port-id</i>   <i>bundle-id</i> ][: <i>vpi/vci</i>   <i>vpi</i>   <i>vpi1.vpi2</i> ] |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | port-id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <i>slot/mda/port</i> [. <i>channel</i> ]                                                 |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | bundle-type-slot/mda.bundle-num                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | bundle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | keyword                                                                                  |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ppp                                                                                      |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | bundle-num                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1 to 10                                                                                  |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | qtag1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0 to 4094                                                                                |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | vpi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NNI 0 to 4095                                                                            |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | UNI 0 to 255                                                                             |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
|                    | vci                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1, 2, 5 to 65535                                                                         |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |
| <b>Output</b>      | The following output is an example of service ID ARP information, and <a href="#">Table 66</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                          |      |                                       |  |       |                                                     |  |     |                                                                                          |  |         |                                          |  |                                 |  |  |        |         |  |      |     |  |            |         |  |       |           |  |     |               |  |  |              |  |     |                  |

### Sample Output

```
*A:ALU-2# show service id 4 arp

=====
ARP Table
=====
IP Address MAC Address Type Expiry Interface SAP

3.2.3.3 Other 00h00m00s to Internet n/a
=====
*A:ALU-2#
```



**Table 66: Show Service ID ARP Output Fields**

| Label            | Description                                               |
|------------------|-----------------------------------------------------------|
| <b>ARP Table</b> |                                                           |
| IP Address       | Specified IP address                                      |
| MAC Address      | Specified MAC address                                     |
| Type             | Static — FDB entries created by management                |
|                  | Learned — dynamic entries created by the learning process |
|                  | OAM — entries created by the OAM process                  |
|                  | Other — local entries created for the IP interfaces       |
| Expiry           | Age of the ARP entry                                      |
| Interface        | Interface applied to the service                          |
| SAP              | SAP ID                                                    |

## base

**Syntax**     **base**

**Context**    show>service>id

**Description**    This command displays basic information about the service specified by the ID.

**Output**        The following output is an example of service ID base information, and [Table 67](#) describes the fields.

### Sample Output

```
*A:ALU-2# show service id 4 base
```

```
=====
Service Basic Information
=====
```

```
Service Id : 4 Vpn Id : 4
Service Type : IES
Description : Default IES description for service ID 4
Customer Id : 1
Last Status Change: 01/07/2010 21:58:44
Last Mgmt Change : 01/07/2010 22:14:40
Admin State : Up Oper State : Up
SAP Count : 2
```

```

Service Access & Destination Points

Identifier Type AdmMTU OprMTU Adm Opr

sap:1/1/3 null 1514 1514 Up Up
=====

```

**Table 67: Show Service ID Base Output Fields**

| Label                                          | Description                                                                                                                                |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Service Basic Information</b>               |                                                                                                                                            |
| Service Id                                     | Service ID number                                                                                                                          |
| Vpn Id                                         | VPN ID number                                                                                                                              |
| Service Type                                   | Type of service                                                                                                                            |
| Description                                    | Generic information about the service                                                                                                      |
| Customer Id                                    | Customer ID number                                                                                                                         |
| Last Status Change                             | Date and time of the most recent status change to this service                                                                             |
| Last Mgmt Change                               | Date and time of the most recent management-initiated change to this service                                                               |
| Admin State                                    | Desired state of the service                                                                                                               |
| Oper State                                     | Operating state of the service                                                                                                             |
| SAP Count                                      | Number of SAPs specified for this service                                                                                                  |
| <b>Service Access &amp; Destination Points</b> |                                                                                                                                            |
| Identifier                                     | SAP ID                                                                                                                                     |
| Type                                           | Signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received                                    |
| AdmMTU                                         | Desired largest service frame size (in octets) that can be transmitted to the far-end router without requiring the packet to be fragmented |
| OprMTU                                         | Actual largest service frame size (in octets) that can be transmitted to the far-end router without requiring the packet to be fragmented  |
| Adm                                            | Administrative state of the SAP                                                                                                            |
| Opr                                            | Operating state of the SAP                                                                                                                 |

## dhcp

|                    |                                                                                   |
|--------------------|-----------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                                       |
| <b>Context</b>     | show>service>id                                                                   |
| <b>Description</b> | This command enables the context to display DHCP information for the IES service. |

## statistics

|                    |                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [ <b>interface</b> { <i>interface-name</i>   <i>ip-address</i> }]                                                                                                                                           |
| <b>Context</b>     | show>service>id>dhcp                                                                                                                                                                                                          |
| <b>Description</b> | This command displays DHCP statistics information.                                                                                                                                                                            |
| <b>Parameters</b>  | <i>interface-name</i> — the interface name for which DHCP statistics will be displayed<br><i>ip-address</i> — the IP address of the interface for which to display information<br><b>Values</b> a.b.c.d (host bits must be 0) |
| <b>Output</b>      | The following output is an example of service ID DHCP statistics information, and <a href="#">Table 68</a> describes the fields.                                                                                              |

**Sample Output**

```
*A:ALU-2# show service id 4 dhcp statistics

=====
DHCP Global Statistics, service 4
=====
Rx Packets : 0
Tx Packets : 0
Rx Malformed Packets : 0
Rx Untrusted Packets : 0
Client Packets Discarded : 0
Client Packets Relayed : 0
Server Packets Discarded : 0
Server Packets Relayed : 0
=====
```

**Table 68: Show Service ID DHCP Statistics Output Fields**

| Label                                    | Description                   |
|------------------------------------------|-------------------------------|
| <b>DHCP Global Statistics, service 4</b> |                               |
| Rx Packets                               | Number of packets received    |
| Tx Packets                               | Number of packets transmitted |

**Table 68: Show Service ID DHCP Statistics Output Fields (Continued)**

| Label                    | Description                                                |
|--------------------------|------------------------------------------------------------|
| Rx Malformed Packets     | Number of malformed packets received                       |
| Rx Untrusted Packets     | Number of untrusted packets received                       |
| Client Packets Discarded | Number of packets from the DHCP client that were discarded |
| Client Packets Relayed   | Number of packets from the DHCP client that were forwarded |
| Server Packets Discarded | Number of packets from the DHCP server that were discarded |
| Server Packets Relayed   | Number of packets from the DHCP server that were forwarded |

## summary

**Syntax** **summary** [**interface** *interface-name* | **saps**]

**Context** show>service>id>dhcp

**Description** This command displays a summary of DHCP configuration.

**Parameters** *interface-name* — the interface name for which DHCP summary information will be displayed  
**saps** — displays SAPs per interface

**Output** The following output is an example of service ID DHCP summary information, and [Table 69](#) describes the fields.

### Sample Output

```
*A:ALU-2 show service id 4 dhcp summary
```

```
=====
DHCP Summary, service 4
=====
Interface Name Arp Used/ Info Admin
 SapId/Sdp Populate Provided Option State

to Internet No 0/0 Keep Down

Interfaces: 1
=====
*A:ALU-2
```

**Table 69: Show Service ID DHCP Summary Output Fields**

| Label                          | Description                                                                                                                                                                                                                           |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DHCP Summary, service 4</b> |                                                                                                                                                                                                                                       |
| Interface Name<br>SapID/Sdp    | Name of the interface                                                                                                                                                                                                                 |
| Arp Populate                   | Specifies whether ARP populate is enabled                                                                                                                                                                                             |
| Used/Provided                  | Used — number of lease-states that are currently in use on the specified interface; that is, the number of clients on the interface that got an IP address by DHCP. This number is always less than or equal to the “Provided” field. |
|                                | Provided — lease-populate value configured for the specified interface                                                                                                                                                                |
| Info Option                    | Specifies whether Option 82 processing is enabled on the interface                                                                                                                                                                    |
| Admin State                    | Administrative state                                                                                                                                                                                                                  |

## interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> <i>[[ip-address   ip-int-name] [interface-type] [detail] [family]]   summary</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command displays information for the IP interfaces associated with the IES service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>ip-address</i> — only displays the interface information associated with the specified IP address</p> <p><b>Values</b></p> <p><i>ipv4-address</i>      a.b.c.d (host bits must be 0)</p> <p><i>ipv6-address</i>      x:x:x:x:x:x:x (eight 16-bit pieces)<br/> x:x:x:x:x:x:d.d.d.d<br/> x: [0 to FFFF]H<br/> d: [0 to 255]D</p> <p><i>ip-int-name</i> — the IP interface name for which to display information</p> <p><i>interface-type</i> — displays either group or subscriber interfaces</p> <p><b>detail</b> — displays detailed IP interface information</p> <p><i>family</i> — displays the specified router IP interface family</p> <p><b>Values</b></p> <p><b>ipv4</b> — displays only those peers that have the IPv4 family enabled</p> <p><b>ipv6</b> — displays the peers that are IPv6-capable</p> |

**summary** — displays summary IP interface information

**Output** The following output is an example of service ID interface information, and [Table 70](#) describes the fields.

### Sample Output

```
*A:ALU-2 show service id 4 interface
=====
Interface Table
=====
Interface-Name Adm Opr (v4/v6) Type Port/SapId
IP-Address PfxState

to Internet Up Down/Down IES n/a
3.2.3.3/24 n/a

Interfaces : 1
=====
*A:ALU-2
```

**Table 70: Show Service ID Interface Output Fields**

| Label                  | Description                               |
|------------------------|-------------------------------------------|
| <b>Interface Table</b> |                                           |
| Interface-Name         | Name of the interface                     |
| IP-Address             | IP address of the interface               |
| Adm                    | Administrative state of the interface     |
| Opr (v4/v6)            | Operational state of the interface        |
| Type                   | Service type                              |
| Port/SapId<br>PfxState | Port or SAP associated with the interface |

## ingress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command displays service information using the range of ingress labels.</p> <p>If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed.</p> <p>If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using the labels in the specified range are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>      |
| <b>Parameters</b>  | <p><i>end-label</i> — the ending ingress label value for which to display services using the label range</p> <p><b>Values</b> 2049 to 131071</p> <p><b>Default</b> the <i>start-label</i> value</p> <p><i>start-label</i> — the starting ingress label value for which to display services using the label range. If only <i>start-label</i> is specified, only services using <i>start-label</i> are displayed.</p> <p><b>Values</b> 0, or 2048 to 131071</p> |
| <b>Output</b>      | The following output is an example of service ingress label information, and <a href="#">Table 71</a> describes the fields.                                                                                                                                                                                                                                                                                                                                    |

**Sample Output**

In the sample below, services 3, 5 and 6 are IES, and services 5000 and 5001 are VPLS services.

```
*A:ALU-12>show>service# ingress-label 0 131071
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

3 15:15 Spok 0 0
5 5:5 Spok 0 0
6 5:6 Spok 0 0
5000 15:5000 Mesh 0 0
5000 15:5001 Spok 0 0
5001 5001:100 Spok 0 0

Number of Bindings Found : 6
=====
*A:ALU-12#
```

**Table 71: Show Service ingress Output Field**

| <b>Label</b>             | <b>Description</b>                                                                                 |
|--------------------------|----------------------------------------------------------------------------------------------------|
| Svc Id                   | The ID that identifies a service                                                                   |
| Sdp Binding              | The ID that identifies an SDP                                                                      |
| Type                     | Indicates whether the SDP binding is a spoke or a mesh                                             |
| I. Lbl                   | The VC label used by the far-end device to send packets to the 7705 SAR in this service by the SDP |
| E. Lbl                   | The VC label used by the 7705 SAR to send packets to the far-end device in this service by the SDP |
| Number of Bindings Found | The total number of SDP bindings that exist within the specified label range                       |



## sap-using

**Syntax**    **sap-using** [**sap** *sap-id*]  
**sap-using** **interface** [*ip-address* | *ip-int-name*]  
**sap-using** [**ingress** | **egress**] **atm-td-profile** *td-profile-id*  
**sap-using** [**ingress** | **egress**] **filter** *filter-id*  
**sap-using** [**ingress** | **egress**] **qos-policy** *qos-policy-id*

**Context**    show>service

**Description**    This command displays SAP information.

If no optional parameters are specified, the command displays a summary of all defined SAPs.

The **atm-td-profile** command applies only to HSDPA offload (that is, IES management service).

**Parameters**    *sap-id* — the SAP ID for which SAP information will be displayed

**Values**    *sap-id*:    null            [*port-id* | *bundle-id*]  
              dot1q        [*port-id* | *bundle-id*]:*qtag1*  
              atm        [*port-id* | *bundle-id*][:*vpi/vci* | *vpi* | *vpi1.vpi2*]  
              *port-id*    *slot/mda/port*[.*channel*]  
              *bundle-type-slot/mda.bundle-num*  
                          bundle       keyword  
                          type        ppp  
                          *bundle-num*    1 to 10  
              *qtag1*       0 to 4094  
              *vpi*        NNI        0 to 4095  
                          UNI        0 to 255  
              *vci*        1, 2, 5 to 65535

*ip-address* — only displays the interface information associated with the specified IP address

**Values**    *ipv4-address*    a.b.c.d (host bits must be 0)  
              *ipv6-address*    x:x:x:x:x:x:x:x (eight 16-bit pieces)  
                                  x:x:x:x:x:x:d.d.d.d  
                                  x: [0 to FFFF]H  
                                  d: [0 to 255]D

*ip-int-name* — the IP interface name for which to display information

**ingress** — specifies matching an ingress policy

**egress** — specifies matching an egress policy

*td-profile-id* — displays SAPs using this traffic description

*filter-id* — the ingress filter policy ID for which to display matching SAPs

**Values**        1 to 65535

*qos-policy-id* — the ingress or egress QoS policy for which to display matching SAPs

**Values**        1 to 65535

**Output** The following output is an example of service SAP-using information, and [Table 72](#) describes the fields.

## Sample Output

```
*A:ALU-48# show service sap-using
=====
Service Access Points
=====
```

| PortId        | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|---------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/2/7:1       | 103   | 1           | none         | 1           | none         | Up  | Up   |
| 1/2/7:2       | 104   | 1           | none         | 1           | none         | Up  | Up   |
| 1/2/7:3       | 105   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.1       | 303   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.2       | 304   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.3       | 305   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/9.1:10/50 | 701   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:20    | 702   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/51 | 703   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:30    | 704   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:10/52 | 705   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:40    | 706   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:11/50 | 805   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:21    | 806   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:12/52 | 807   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/9.1:41    | 808   | 1           | none         | 1           | none         | Up  | Down |
| 1/1/1.9       | 903   | 1           | none         | 1           | none         | Up  | Up   |
| 1/1/1.10      | 904   | 1           | none         | 1           | none         | Up  | Up   |

```

Number of SAPs : 18

*A:ALU-48#

*A:ALU-48# show service sap-using sap 1/1/21:0
=====
Service Access Points Using Port 1/1/21:0
=====
```

| PortId   | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|----------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/1/21:0 | 1     | 1           | none         | 1           | none         | Up  | Down |

```

Number of SAPs : 1

*A:ALU-48#

*A:ALU-48# show service sap-using egress atm-td-profile 1
=====
Service Access Point Using ATM Traffic Profile 1
=====
```

| PortId        | SvcId | Ing.<br>QoS | Ing.<br>Fltr | Egr.<br>QoS | Egr.<br>Fltr | Adm | Opr  |
|---------------|-------|-------------|--------------|-------------|--------------|-----|------|
| 1/1/9.1:10/50 | 701   | 1           | none         | 1           | none         | Up  | Down |

```

1/1/9.1:20 702 1 none 1 none Up Down
1/1/9.1:10/51 703 1 none 1 none Up Down
1/1/9.1:30 704 1 none 1 none Up Down
1/1/9.1:10/52 705 1 none 1 none Up Down
1/1/9.1:40 706 1 none 1 none Up Down
1/1/9.1:11/50 805 1 none 1 none Up Down
1/1/9.1:21 806 1 none 1 none Up Down
1/1/9.1:12/52 807 1 none 1 none Up Down
1/1/9.1:41 808 1 none 1 none Up Down

```

```

Saps : 10
=====

```

```

*A:ALU-12#

```

**Table 72: Show Service SAP-Using Output Fields**

| Label                                | Description                                                 |
|--------------------------------------|-------------------------------------------------------------|
| <b>Service Access Point Using...</b> |                                                             |
| PortID                               | ID of the access port where the SAP is defined              |
| SvcID                                | Service identifier                                          |
| Ing.QoS                              | SAP ingress QoS policy number specified on the ingress SAP  |
| Ing. Fltr                            | IP filter policy applied to the ingress SAP                 |
| Egr.QoS                              | SAP egress QoS policy number specified on the egress SAP    |
| Egr. Fltr                            | IP filter policy applied to the egress SAP (not applicable) |
| Adm                                  | Desired state of the SAP                                    |
| Opr                                  | Actual state of the SAP                                     |
| Number of<br>SAPs/Saps               | Number of SAPs using this service                           |

## service-using

|                    |                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>service-using</b> [ies] [customer <i>customer-id</i> ]                                                                                                        |
| <b>Context</b>     | show>service                                                                                                                                                     |
| <b>Description</b> | This command displays the services matching certain usage properties. If no optional parameters are specified, all services defined on the system are displayed. |
| <b>Parameters</b>  | <p><b>ies</b> — displays matching IES services</p> <p><i>customer-id</i> — displays only those services associated with the specified customer ID</p>            |
| <b>Values</b>      | 1 to 2147483647                                                                                                                                                  |
| <b>Output</b>      | The following output is an example of service-using information, and <a href="#">Table 73</a> describes the fields.                                              |

### Sample Output

```
*A:ALU-2# show service service-using ies

=====
Services [ies]
=====
ServiceId Type Adm Opr CustomerId Last Mgmt Change

4 IES Down Down 1 01/07/2010 22:14:40
23 IES Down Down 1 01/07/2010 21:58:44

Matching Services : 2

=====
*A:ALU-2#
```

**Table 73: Show Service Service-Using Output Fields**

| Label             | Description                                                                  |
|-------------------|------------------------------------------------------------------------------|
| ServiceID         | ID that defines the service                                                  |
| Type              | Service type configured for the service ID                                   |
| Adm               | Administrative state of the service                                          |
| Opr               | Operational state of the service                                             |
| CustomerId        | ID of the customer owning the service                                        |
| Last Mgmt Change  | Date and time of the most recent management-initiated change to this service |
| Matching Services | Number of services of the same type                                          |

---

## Clear Commands

### id

|                    |                                                      |
|--------------------|------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                          |
| <b>Context</b>     | clear>service                                        |
| <b>Description</b> | This command clears commands for a specific service. |
| <b>Parameters</b>  | <i>service-id</i> — uniquely identifies a service    |

### dhcp

|                    |                                                            |
|--------------------|------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                |
| <b>Context</b>     | clear>service>id                                           |
| <b>Description</b> | This command enables the context to clear DHCP parameters. |

### dhcp6

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp6</b>                                                 |
| <b>Context</b>     | clear>service>id                                             |
| <b>Description</b> | This command enables the context to clear DHCPv6 parameters. |

### statistics

|                    |                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [ <i>ip-int-name</i>   <i>ip-address</i> ]                                                                                                                                                                                                                           |
| <b>Context</b>     | clear>service>id>dhcp<br>clear>service>id>dhcp6                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command clears statistics for DHCP and DHCPv6 Relay.</p> <p>If no interface name or IP address is specified, statistics are cleared for all configured interfaces.</p> <p>If an interface name or IP address is specified, statistics are cleared only for that interface.</p> |

|                   |                                            |                                                                                                 |
|-------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>ip-int-name</i> — 32 characters maximum |                                                                                                 |
|                   | <i>ip-address</i> — IPv4 or IPv6 address   |                                                                                                 |
|                   | <b>Values</b>                              |                                                                                                 |
|                   | <i>ipv4-address</i>                        | a.b.c.d                                                                                         |
|                   | <i>ipv6-address</i>                        | x:x:x:x:x:x:x (eight 16-bit pieces)<br>x:x:x:x:x:x:d.d.d.d<br>x: [0 to FFFF]H<br>d: [0 to 255]D |

---

## Debug Commands

id

|                    |                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                                                                |
| <b>Context</b>     | debug>service                                                                                              |
| <b>Description</b> | This command debugs commands for a specific service. The <b>no</b> form of the command disables debugging. |
| <b>Parameters</b>  | <i>service-id</i> — the ID that uniquely identifies an IES service                                         |





## In This Chapter

This chapter provides information about the Virtual Private Routed Network (VPRN) service and implementation notes.

Topics in this chapter include:

- [VPRN Service Overview on page 602](#)
  - [Routing Prerequisites on page 603](#)
  - [BGP Support on page 604](#)
  - [Route Distinguishers on page 604](#)
- [VPRN Features on page 608](#)
  - [IP Interfaces on page 608](#)
  - [SAPs on page 611](#)
  - [QoS Policies on page 611](#)
  - [Filter Policies on page 612](#)
  - [CE to PE Routing Protocols on page 612](#)
  - [PE to PE Tunneling Mechanisms on page 612](#)
  - [Per-VRF Route Limiting on page 612](#)
  - [Spoke SDPs on page 613](#)
  - [Spoke SDP Termination to VPRN on page 613](#)
- [Configuring a VPRN Service with CLI on page 619](#)
- [VPRN Services Command Reference on page 635](#)

## VPRN Service Overview

RFC 2547bis, an extension of RFC 2547, details a method of distributing routing information and forwarding data to provide a Layer 3 Virtual Private Network (VPN) service to end customers.

Each Virtual Private Routed Network (VPRN) consists of a set of customer sites connected to one or more PE routers. Each associated PE router maintains a separate IP forwarding table for each VPRN. Additionally, the PE routers exchange the routing information configured or learned from all customer sites via MP-BGP peering. Each route exchanged via the MP-BGP protocol includes a route distinguisher (RD), which identifies the VPRN association.

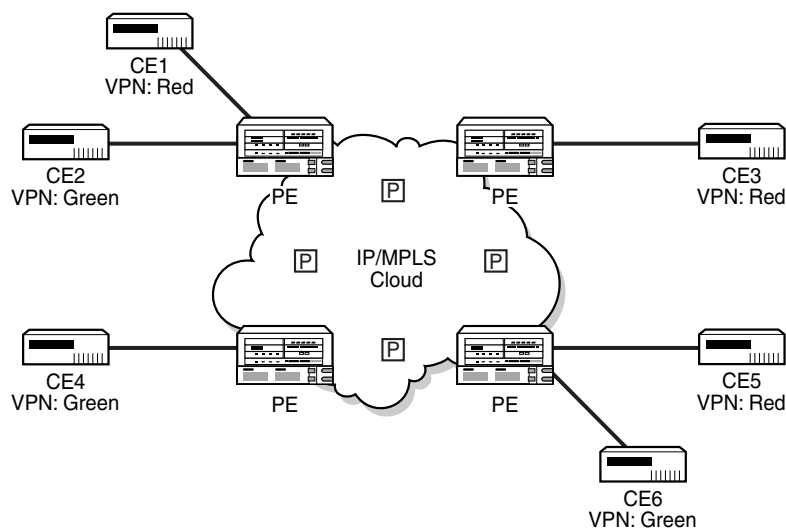
The service provider uses BGP to exchange the routes of a particular VPN among the PE routers that are attached to that VPN. This is done in a way that ensures that routes from different VPNs remain distinct and separate, even if two VPNs have an overlapping address space. Within a particular VPN, the PE routers distribute route information from and to the CE routers. Since the CE routers do not peer with each other, there is no overlay visible to the VPN's routing algorithm.

When BGP distributes a VPN route, it also distributes an MPLS label for that route. On an individual 7705 SAR, a single label is assigned to (advertised for) all routes in a VPN. A VRF lookup is used to determine the egress interface for a packet.

Before a customer data packet travels across the service provider's backbone network, it is encapsulated with the MPLS label that corresponds, in the customer's VPN, to the route that best matches the packet's destination address. That label (called the inner label) is the label that was advertised from the destination 7705 SAR, as described in the previous paragraph. The MPLS packet is further encapsulated with either another MPLS label or GRE tunnel header, so that it gets tunneled across the backbone to the proper PE router.

Each route exchanged by the MP-BGP protocol includes a route distinguisher (RD), which identifies its VPRN association. Thus, the backbone core routers do not need to know the VPN routes.

[Figure 58](#) shows an example of a VPRN network diagram, showing two VPNs (labeled "Red" and "Green") attached to PEs. The core routers are labeled "P".

**Figure 58: Virtual Private Routed Network**

20949

## Routing Prerequisites

RFC 2547bis requires the following features:

- multiprotocol extensions
- LDP support
- extended BGP community support
- BGP capability negotiation
- parameters defined in RFC 2918, *BGP Route Refresh*, and RFC 2796, *Route Reflector*
- a 4-byte autonomous system (AS) number


Tunneling protocol requirements are as follows:

- RFC 2547bis, *BGP/MPLS VPNs*, recommends implementing Label Distribution Protocol (LDP) to set up a full mesh of LSPs based on the IGP
- MPLS RSVP-TE tunnels can be used instead of LDP
- alternatively, Generic Routing Encapsulation (GRE) tunnels can also be used

# BGP Support

BGP is used with BGP extensions, as mentioned in [Routing Prerequisites](#), to distribute VPRN routing information across the service provider’s network.

BGP was initially designed to distribute IPv4 routing information. Therefore, multiprotocol extensions and the use of a VPN-IPv4 address were created to extend BGP’s ability to carry overlapping routing information. A VPN-IPv4 address is a 12-byte value consisting of the 8-byte route distinguisher (RD) and the 4-byte IPv4 IP address prefix. The RD must be unique within the scope of the VPRN. This allows the IP address prefixes within different VRFs to overlap.



**Note:** In Release 4.0, the numeric range for AS numbers has been extended to provide BGP support for 4-byte AS numbers, as defined in RFC 4893, *BGP Support for Four-octet AS Number Space*. This allows up to 4 294 967 295 unique AS numbers, a substantial increase from the original 2-byte AS number, which allowed up to 65 535 unique numbers.

BGP is configured through the `config>router>bgp` context.

# Route Distinguishers

The route distinguisher (RD) is an 8-byte value consisting of two major fields: the Type field and Value field. The Type field determines how the value field should be interpreted. The 7705 SAR OS implementation supports the three (3) Type-Value combinations, as defined in RFC 2547bis. [Figure 59](#) illustrates the RD structure.

**Figure 59: Route Distinguisher Structure**



20950

The three Type-Value combinations supported are described in [Table 74](#).

**Table 74: Route Distinguisher Type-Value Fields**

| Type Field | Value Field                        | Notes                                                                                              |
|------------|------------------------------------|----------------------------------------------------------------------------------------------------|
| Type 0     | Administrator subfield (2 bytes)   | The Administrator field must contain an AS number (using private AS numbers is discouraged)        |
|            | Assigned number subfield (4 bytes) | The Assigned field contains a number assigned by the service provider                              |
| Type 1     | Administrator subfield (4 bytes)   | The Administrator field must contain an IP address (using private IP address space is discouraged) |
|            | Assigned number subfield (2 bytes) | The Assigned field contains a number assigned by the service provider                              |
| Type 2     | Administrator subfield (4 bytes)   | The Administrator field must contain a 4-byte AS number (using private AS numbers is discouraged)  |
|            | Assigned number subfield (2 bytes) | The Assigned field contains a number assigned by the service provider                              |

## Route Reflector

As defined in RFC 2547bis, the use of route reflectors is supported in the service provider core. The support uses multiple sets of route reflectors for different types of BGP data, including IPv4 and VPN-IPv4.

## CE to PE Route Exchange

Routing information between the Customer Edge (CE) and Provider Edge (PE) can be exchanged by static routes that are configured on the PE.

## Route Redistribution

Routing information learned from the configured static routes is injected in the associated local VPN routing/forwarding table (VRF). In the case of dynamic routing protocols, there may be protocol-specific route policies that modify or reject certain routes before they are injected into the local VRF.

The advertisement or redistribution of routing information from the local VRF to or from the MP-BGP instance is specified per VRF and is controlled by VRF route target associations or by VRF route policies.

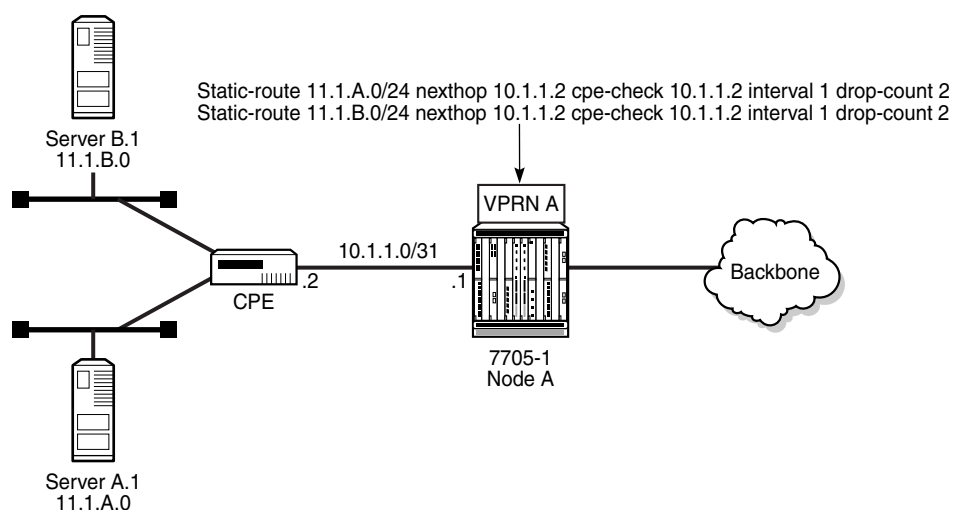
A route belonging to a VPRN must use the protocol owner, VPN-IPv4, to denote that it is a VPRN route. This can be used within the route policy match criteria.

## CPE Connectivity Check

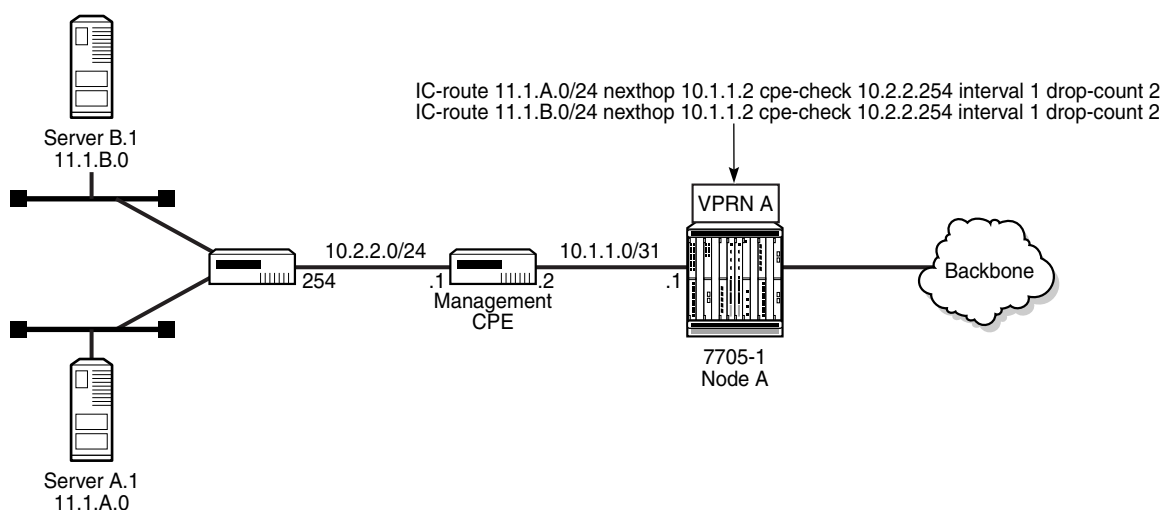
Static routes are used within many IES and VPRN services. Unlike dynamic routing protocols, there is no way to change the state of routes based on availability information for the associated CPE. CPE connectivity check adds flexibility so that unavailable destinations are removed from the service provider's routing tables dynamically, and wasted bandwidth is minimized.

Figure 60 and Figure 61 illustrate the use of CPE connectivity check in directly connected and multiple-hop connected routes.

**Figure 60: Directly Connected IP Target**



20951

**Figure 61: Multiple Hops to IP Target**

20952

The availability of the far-end static route is monitored through periodic polling. The polling period is configured. If the poll fails a specified number of sequential polls, the static route is marked as inactive.

Either ICMP ping or unicast ARP mechanism can be used to test the connectivity. ICMP ping is preferred.

If the connectivity check fails and the static route is deactivated, the 7705 SAR router will continue to send polls and reactivate any routes that are restored.

## VPRN Features

This section describes the 7705 SAR service features and any special capabilities or considerations as they relate to VPRN services:

- [IP Interfaces](#)
  - [DHCP Relay](#)
  - [IPCP](#)
  - [Troubleshooting and Fault Detection Services](#)
- [SAPs](#)
  - [Encapsulations](#)
- [QoS Policies](#)
  - [CoS Marking for Self-generated Traffic](#)
- [Filter Policies](#)
- [CE to PE Routing Protocols](#)
- [PE to PE Tunneling Mechanisms](#)
- [Per-VRF Route Limiting](#)
- [Spoke SDPs](#)
- [Spoke SDP Termination to VPRN](#)

## IP Interfaces

VPRN customer IP interfaces can be configured with most of the same options found on the core IP interfaces. The advanced configuration options supported are:

- DHCP options
- IPCP options
- ICMP options

Configuration options found on core IP interfaces not supported on VPRN IP interfaces are:

- unnumbered interfaces
- NTP broadcast receipt



## DHCP Relay

The 7705 SAR provides DHCP/BOOTP Relay agent services for DHCP clients. DHCP is a configuration protocol used to communicate network information and configuration parameters from a DHCP server to a DHCP-aware client. DHCP is based on the BOOTP protocol, with additional configuration options and the added capability of allocating dynamic network addresses. DHCP-capable devices are also capable of handling BOOTP messages.

A DHCP client is an IP-capable device (typically a computer or base station) that uses DHCP to obtain configuration parameters such as a network address. A DHCP server is an Internet host or router that returns configuration parameters to DHCP clients. A DHCP/BOOTP Relay agent is a host or router (for example, the 7705 SAR) that passes DHCP messages between clients and servers.

Home computers in a residential high-speed Internet application typically use the DHCP protocol to have their IP address assigned by their Internet service provider.

The DHCP protocol requires the client to transmit a request packet with a destination address of 255.255.255.255 (broadcast) that is processed by the DHCP server. Since IP routers do not forward broadcast packets, the DHCP client and server must reside on the same network segment. However, for various reasons, it is sometimes impractical to have the server and client reside in the same IP network. When the 7705 SAR is acting as a DHCP Relay agent, it processes these DHCP broadcast packets and relays them to a preconfigured DHCP server. Therefore, DHCP clients and servers do not need to reside on the same network segment.

The 7705 SAR supports up to 8 DHCP servers. DHCP Relay is supported on access IP interfaces associated with VPRN and IES and on network IP interfaces.

## DHCP Options

DHCP options are codes that the 7705 SAR inserts in packets being forwarded from a DHCP client to a DHCP server. Some options have additional information stored in suboptions.

The 7705 SAR supports the Relay Agent Information Option 82 as specified in RFC 3046. The following suboptions are supported:

- circuit ID
- remote ID
- vendor-specific options

### IPCP

Similar to DHCP over Ethernet interfaces, Internet Protocol Control Protocol (IPCP) extensions to push IP information over PPP/MLPPP VPRN (and IES) SAPs are supported. Within this protocol, extensions can be configured to define the remote IP address and DNS IP address to be signaled via IPCP on the associated PPP interface. The IPCP-based IP and DNS assignment process is similar to DHCP behavior; IPCP-based IP/DNS assignment is a natural use of PPP/MLPPP IP layer protocol handshake procedures. PPP/MLPPP connected devices hooked up to VPRN (and IES) can benefit from this feature for the assignment of IP and DNS to the associated interface.

### Troubleshooting and Fault Detection Services

Bidirectional forwarding detection (BFD) can be configured on the VPRN interface. BFD is a simple protocol for detecting failures in a network. BFD uses a “hello” mechanism that sends control messages periodically to the far end and expects to receive periodic control messages from the far end. On the 7705 SAR, BFD is implemented for static routes in asynchronous mode only, meaning that neither end responds to control messages; rather, the messages are sent periodically from each end.

To support redundancy with fast switchover, BFD must be enabled to trigger the handoff to the other route in case of failure.

Due to the lightweight nature of BFD, it can detect failures faster than other detection protocols, making it ideal for use in applications such as mobile transport.

If BFD packets are not received in the configured amount of time, the associated static route is declared “not active”, causing a reroute to an alternative path, if any.



**Note:** Link failures detected by BFD will disable the IP interface.

The 7705 SAR also supports Internet Control Message Protocol (ICMP). ICMP is a message control and error reporting protocol that also provides information relevant to IP packet processing.

## SAPs

## Encapsulations

The following SAP encapsulations are supported on the 7705 SAR VPRN service:

- Ethernet null
- Ethernet dot1q
- PPP
- MLPPP
- MC-MLPPP

## QoS Policies

For each instance of VPRN service, QoS policies can be applied to the ingress and egress VPRN interface SAPs.

VPRN service ingress QoS policies only create the unicast queues defined in the policy. VPRN service egress QoS policies function in the same way as the do for other services, where the class-based queues are created as defined in the policy. Both the Layer 2 and Layer 3 criteria can be used in the QoS policies for traffic classification in a VPRN.

For VPRN services, the fabric mode needs to be set to aggregate mode as opposed to per-destination mode. VPRN services are only supported with aggregate-mode fabric profiles. When the fabric mode is set to per-destination mode, creation of VPRN service is blocked through the CLI. The user must change the fabric mode to aggregate mode before being able to configure VPRN services. As well, when a VPRN service is configured, changing from aggregate mode is blocked. The fabric mode is configured under the `configure>qos>fabric-profile` context. For more information, see the 7705 SAR OS Quality of Service Guide.

## CoS Marking for Self-generated Traffic

For each instance of VPRN service, DSCP marking and dot1p marking for self-generated traffic QoS can be configured for the applications supported by the 7705 SAR.

For VPRN service, DSCP marking is configured in the `vprn>sgt-qos>application` context. For more information about DSCP marking and self-generated QoS traffic, see “CoS Marking for Self-generated Traffic” in the 7705 SAR OS Quality of Service Guide.

## Filter Policies

In Release 4.0 of the 7705 SAR, IP filters are applied to ingress pseudowire SAPs (Epipes and Ipipes), VPRN SAPs, and IES SAPs, as well as to ingress network interfaces and IES management SAPs.

Configuration of filter policies is similar for network interfaces, IES management SAPs, Ethernet and IP pseudowire SAPs, and VPRN and IES SAPs. This guide describes the assignment of filter policies to SAPs. For information on IP filters assigned to SAPs, see [IP Filters](#) under [Epipe Service Overview](#).

## CE to PE Routing Protocols

The 7705 SAR VPRN supports static PE to CE routing protocol.

## PE to PE Tunneling Mechanisms

The 7705 SAR supports multiple mechanisms to provide transport tunnels for the forwarding of traffic between PE routers within the RFC 2547bis network.

The 7705 SAR VPRN implementation supports the use of:

- RSVP-TE protocol to create tunnel LSPs between PE routers
- LDP protocol to create tunnel LSPs between PE routers
- GRE tunnels between PE routers

These transport tunnel mechanisms provide the flexibility of using dynamically created LSPs, where the service tunnels are automatically bound (the “auto-bind” feature) and there is the ability to provide certain VPN services with their own transport tunnels by explicitly binding SDPs, if desired. When the `autobind` command is used, all services traverse the same LSPs and do not allow alternate tunneling mechanisms (like GRE) or the ability to craft sets of LSPs with bandwidth reservations for specific customers, as is available with explicit SDPs for the service.

## Per-VRF Route Limiting

The 7705 SAR allows setting the maximum number of routes that can be accepted in the VRF for a VPRN service. There are options to specify a percentage threshold at which to generate an event that the VRF table is nearly full and an option to disable additional route learning when the VRF is full or only generate an event.

## Spoke SDPs

For VPRN service, spoke SDPs can be used only for providing network connectivity between the PE routers.

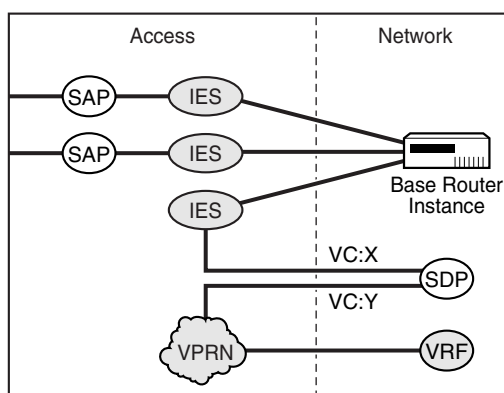
## Spoke SDP Termination to VPRN

This feature enables a customer to exchange traffic between a VLL or VPLS (Layer 2) service and an IES or VPRN (Layer 3) service. Customer premises traffic coming in from a VLL or VPLS service (SAP to spoke SDP) is forwarded over the IP/MPLS network to the IES or VPRN service, and vice versa. Network QoS policies can be applied to the spoke SDP to control traffic forwarding to the Layer 3 service.

In a Layer 3 spoke-SDP termination to an IES or VPRN service, where the destination IP address resides within the IES or VPRN network, CE device-generated ARP frames must be processed by the Layer 3 interface. When an ARP frame is received over the spoke-SDP at the Layer 3 interface endpoint, the 7705 SAR responds to the ARP frame with its own MAC address. Conversely, when an ARP request is received from the routed network and the ARP entry for the CE device that is connected to the spoke-SDP is not known, the 7705 SAR initiates an ARP frame to resolve the MAC address of the next hop or CE device.

Figure 62 shows traffic terminating on a specific IES or VPRN service that is identified by the SDP ID and VC label present in the service packet.

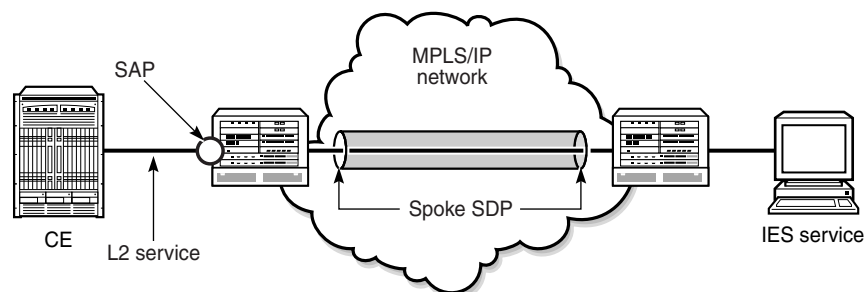
**Figure 62: SDP ID and VC Label Service Identifiers (Conceptual View of the Service)**



21510

Figure 63 shows a spoke SDP terminating directly into a VPRN. In this case, a spoke SDP could be tied to an Epipe or a hierarchical VPLS service. There is no configuration required on the PE connected to the CE.

**Figure 63: VPRN Spoke SDP Termination**



21511

Ethernet spoke SDP termination for VPRN service is supported over the following network uplinks:

- Ethernet network ports (null or dot1q encapsulation)
- PPP/MLPPP network ports on a 16-port T1/E1 ASAP Adapter card, a 32-port T1/E1 ASAP Adapter card, a 2-port OC3/STM1 Channelized Adapter card, and a 4-port DS3/E3 Adapter Card (PPP only)
- POS ports

Spoke SDP termination for VPRN supports the following:

- Ethernet PW to VRF
- interface shutdown based on PW standby signaling
- spoke SDP ingress IP filtering
- label withdrawal for spoke SDPs terminated on VPRN
- statistics collection
- VCCV ping (type 2)

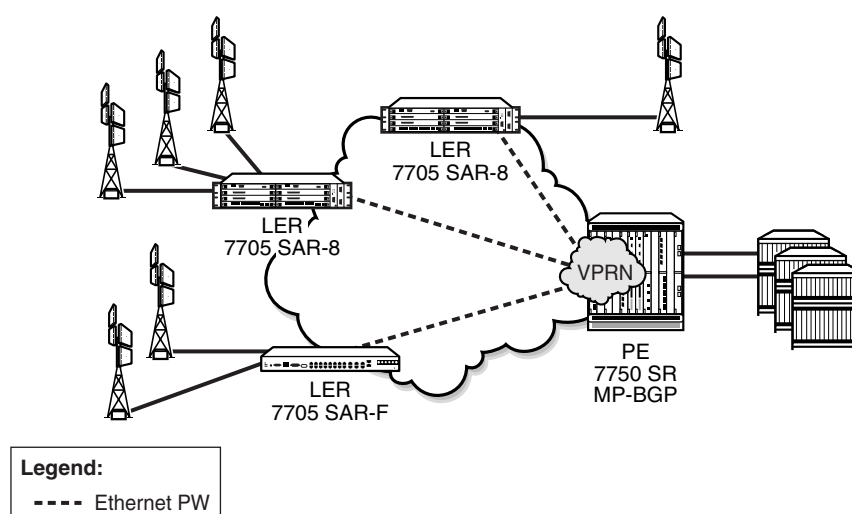
A spoke SDP on a VPRN interface service can be connected to the following entities:

- Epipe spoke SDP
- Epipe spoke SDP redundancy with standby-signal-master enabled
- IES interface
- VPRN interface
- VPLS spoke SDP
- VPLS spoke SDP redundancy with suppress-standby-signaling disabled

There are three scenarios to backhaul traffic from a given site that uses PWs and VPRN on a 7705 SAR.

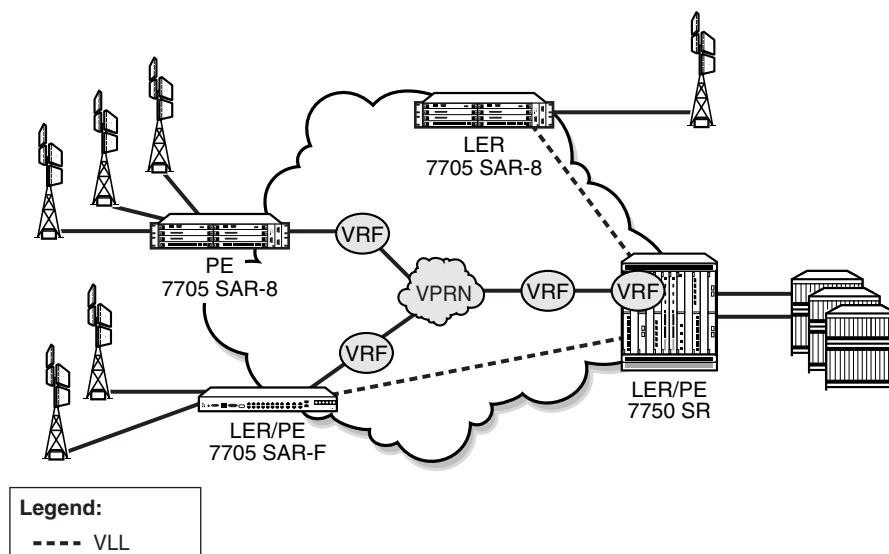
- Scenario 1 ([Figure 64](#)): An individual PW is configured on a per-CE device or a per-service basis. For routing services, this PW can be terminated to a VPRN at the 7750 SR end. This scenario offers per-service OAM and redundancy capabilities. Also, because there is no local communication on the remote 7705 SAR, traffic between any two devices connected to the 7705 SAR must traverse through the 7750 SR at the MTSO/CO.

**Figure 64: Pseudowire-Based Backhaul (Spoke SDP Termination at 7750 SR)**



21512

- Scenario 2 ([Figure 65](#)): An MP-BGP-based solution can provide a fully routed scenario.

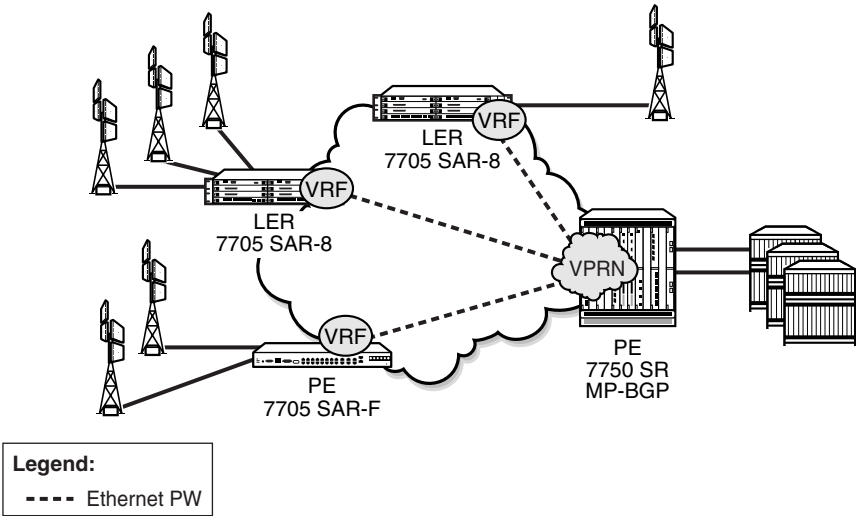
**Figure 65: VPRN in Mobile Backhaul Application**

21513

- Scenario 3 (Figure 66): In the hybrid scenario, IP forwarding among locally connected devices is handled by the 7750 SR directly, but instead of using MP-BGP to backhaul traffic, a PW is used to backhaul traffic to the MTSO/CO 7750 SR or possibly to a 7705 SAR-18 node.



Figure 66: Spoke-SDP Termination to VPRN



21514



## Configuring a VPRN Service with CLI

This section provides information to configure Virtual Private Routed Network (VPRN) services using the command line interface.

Topics in this section include:

- [Basic Configuration on page 620](#)
- [Common Configuration Tasks on page 621](#)
- [Configuring VPRN Components on page 622](#)
  - [Creating a VPRN Service on page 622](#)
  - [Configuring Global VPRN Parameters on page 623](#)
  - [Configuring Router Interfaces on page 623](#)
  - [Configuring BGP for VPRN on page 624](#)
  - [Configuring a VPRN Interface on page 624](#)
  - [Configuring VPRN Interface SAP Parameters on page 627](#)
  - [Configuring VPRN Interface Spoke SDP Parameters on page 629](#)
- [Service Management Tasks on page 631](#)
  - [Modifying VPRN Service Parameters on page 631](#)
  - [Deleting a VPRN Service on page 632](#)
  - [Disabling a VPRN Service on page 632](#)
  - [Re-enabling a VPRN Service on page 633](#)

## Basic Configuration

The following fields require specific input (there are no defaults) to configure a basic VPRN service:

- customer ID (refer to [Configuring Customer Accounts](#))
- interface parameters
- spoke SDP parameters (at VPRN service level)

The following example displays a sample configuration of a VPRN service.

```
*A:ALU-1>config>service>vprn# info

vrf-import "vrfImpPolCust1"
vrf-export "vrfExpPolCust1"
route-distinguisher 10001:1
auto-bind ldp
vrf-target target:10001:1
interface "to-cel" create
 address 11.1.0.1/24
 exit
 sap 1/1/10:1 create
 ingress
 qos 100
 filter ip 10
 exit
 egress
 qos 1010
 exit
 exit
 dhcp
 description "DHCP test"
 exit
exit
static-route 6.5.0.0/24 next-hop 10.1.1.2
no shutdown

*A:ALU-1>config>service>vprn#
```

---

## Common Configuration Tasks

This section provides a brief overview of the tasks that must be performed to configure a VPRN service and provides the CLI commands.

1. Define BGP parameters and enable BGP in the `config>router>bgp` context. To configure BGP for the router, refer to the “BGP” section in the 7705 SAR OS Routing Protocols Guide.
  2. Associate a VPRN service with a customer ID.
  3. Define a route distinguisher (RD) (mandatory).
  4. Set the auto-bind parameter. Alternatively, define a VPRN spoke SDP. When using the spoke SDP command, you must enter the command for each peer PE router.
  5. Define VRF route-target associations or VRF import/export policies.
  6. Create a VPRN interface.
  7. Define SAP parameters on the VPRN interface:
    - select node(s) and port(s)
    - optional - select QoS policies other than the default (configured in `config>qos` context)
    - optional - select filter policies (configured in `config>filter` context)
    - optional - select accounting policy (configured in `config>log` context)
    - optional - configure DHCP features
  8. Define spoke SDP parameters on the VPRN interface.
  9. Enable the service.
-

## Configuring VPRN Components

This section provides VPRN configuration examples for the following entities:

- [Creating a VPRN Service](#)
- [Configuring Global VPRN Parameters](#)
- [Configuring Router Interfaces](#)
- [Configuring BGP for VPRN](#)
- [Configuring a VPRN Interface](#)
- [Configuring VPRN Interface SAP Parameters](#)
- [Configuring VPRN Interface Spoke SDP Parameters](#)

### Creating a VPRN Service

Use the following CLI syntax to create a VPRN service. A route distinguisher must be defined in order for VPRN to be operationally active.

**CLI Syntax:** `config>service# vprn service-id [customer customer-id]  
route-distinguisher rd  
description description-string  
no shutdown`

where *rd* is:

|                                                                                                |                 |
|------------------------------------------------------------------------------------------------|-----------------|
| <i>ip-addr:comm-val</i>   <i>2byte-asnumber:ext-comm-val</i>   <i>4-byte-asnumber:comm-val</i> |                 |
| <i>ip-addr</i>                                                                                 | a.b.c.d         |
| <i>comm-val</i>                                                                                | 0 to 65535      |
| <i>2-byte-asnumber</i>                                                                         | 1 to 65535      |
| <i>ext-comm-val</i>                                                                            | 0 to 4294967295 |
| <i>4-byte-asnumber:</i>                                                                        | 1 to 4294967295 |

The following example displays a VPRN service configuration.

```
*A:ALU-1>config>service# info

...
 vprn 1 customer 1 create
 route-distinguisher 100:76525
 no shutdown
 exit
...

*A:ALU-1>config>service>vprn#
```

## Configuring Global VPRN Parameters

Refer to [VPRN Services Command Reference](#) for the CLI syntax to configure VPRN parameters.

The autonomous system (AS) number is configured in the `config>router>bgp` context.

A spoke SDP can be bound to the VPRN service using the `auto-bind` command or the `spoke-sdp sdp-id` command. However, when using the `spoke-sdp` command, you must create a spoke SDP for each peer PE router.

A VPRN spoke SDP can be any of the supported SDPs, except the IP SDP.

The following example displays a VPRN service with configured parameters.

```
*A:ALU-1>config>service# info

...
 vprn 1 customer 1 create
 vrf-import "vrfImpPolCust1"
 vrf-export "vrfExpPolCust1"
 router-id 2000
 route-distinguisher 10001:1
 spoke-sdp 2 create
 exit
 no shutdown
 exit
...

*A:ALU-1>config>service#
```

## Configuring Router Interfaces

Refer to the 7705 SAR OS Router Configuration Guide for command descriptions and syntax information to configure router interfaces.

The following example displays a router interface configuration:

```
ALU48>config>router# info
#-----
echo "IP Configuration"
#-----
...
 interface "if1"
 address 2.2.2.1/24
 port 1/1/33
 exit
 interface "if2"
 address 10.49.1.46/24
 port 1/1/34
 exit
```

```
interface "if3"
 address 11.11.11.1/24
 port 1/1/35
exit
...
#-----
ALU48>config>router#
```

## Configuring BGP for VPRN

Configuring BGP between the PE routers allows the PE routers to exchange information about routes originating and terminating in the VPRN. The PE routers use the information to determine which labels are used for traffic intended for remote sites.

BGP is configured under the `config>router>bgp` context. For more information about the BGP protocol, refer to the “BGP” section in the 7705 SAR OS Routing Protocols Guide.

## Configuring Route Reflection

Route reflection can be implemented in autonomous systems with a large internal BGP mesh to reduce the number of IBGP sessions required. One or more routers can be selected to act as focal points for internal BGP sessions. Several BGP-speaking routers can peer with a route reflector. A route reflector forms peer connections to other route reflectors. A router assumes the role as a route reflector by configuring the `cluster cluster-id` command. No other command is required unless you want to disable reflection to specific peers.

If you configure the `cluster` command at the global level, then all subordinate groups and neighbors are members of the cluster. The route reflector cluster ID is expressed in dotted-decimal notation. The ID should be a significant topology-specific value.

If a route reflector client is fully meshed, the `disable-client-reflect` command can be enabled to stop the route reflector from reflecting redundant route updates to a client.

## Configuring a VPRN Interface

Interface names associate an IP address with the interface, and then associate the IP interface with a physical port. The logical interface can associate attributes like an IP address, port, or the system. There are no default interfaces.

Refer to [VPRN Services Command Reference](#) for CLI commands and syntax.



The following example displays a VPRN interface configuration:

```
*A:ALU-1>config>service>vprn# info

...
 vprn 1 customer 1 create
 vrf-import "vrfImpPolCust1"
 vrf-export "vrfExpPolCust1"
 route-distinguisher 10001:1
 auto-bind ldp
 vrf-target target:10001:1
 interface "to-cel" create
 address 11.1.0.1/24
 exit
 exit
 static-route 6.5.0.0/24 next-hop 10.1.1.2
 spoke-sdp 2 create
 exit
 no shutdown
 exit
...

*A:ALU-1>config>service#
```

Use the following CLI syntax to configure interface parameters for the VPRN service.

**CLI Syntax:** config>service# vprn *service-id* [customer *customer-id*] [create] [vpn *vpn-id*]

```

 interface ip-int-name
 address if-ip-address
 allow-directed-broadcasts
 arp-timeout
 bfd transmit-interval [receive receive-interval]
 [multiplier multiplier]
 description description-string
 dhcp
 description description-string
 option
 action {replace | drop | keep}
 circuit-id [ascii-tuple | ifindex | sap-id |
 vlan-ascii-tuple]
 remote-id [mac | string string]
 vendor-specific-option
 client-mac-address
 sap-id
 service-id
 string text
 system-id
 server server1 [server2...(up to 8 max)]
 no shutdown
 trusted
 icmp
 mask-reply
```

```
 ttl-expired [number seconds]
 unreachable
 ip-mtu octets
 ipcp
 dns ip-address [secondary ip-address]
 dns secondary ip-address
 peer-ip-address ip-address
 mac ieee-address
 no shutdown
 static-arp ip-address ieee-mac-address
no shutdown
```

**Example:**

```
A:ALU-41>config>service# vprn 4
A:ALU-41>config>service>vprn$ interface "vprn_interface"
A:ALU-41>config>service>vprn>if$ address 10.10.3.3/24
A:ALU-41>config>service>vprn>if$ dhcp option
A:ALU-41>config>service>vprn>if>dhcp>option$ circuit-id
ifindex
A:ALU-41>config>service>vprn>if>dhcp>option$ exit
A:ALU-41>config>service>vprn>if$ ip-mtu 1524
```

The following example displays the VPRN interface creation output.

```
A:ALU-41>config>service>vprn>if# info detail

...
 no description
 address 10.10.3.3/24 broadcast host-ones
 no mac
 arp-timeout 14400
 no allow-directed-broadcasts
 icmp
 mask-reply
 unreachable 100 10
 ttl-expired 100 10
 exit
 dhcp
 shutdown
 no description
 option
 action keep
 circuit-id ifindex
 no remote-id
 no vendor-specific-option
 exit
 no server
 no trusted
 exit
 ip-mtu 1524
 no bfd
 ipcp
 no peer-ip-address
 no dns
 exit
no shutdown...
```

## Configuring VPRN Interface SAP Parameters

A SAP is a combination of a port and encapsulation parameters that identify the service access point on the interface and within the 7705 SAR. Each SAP must be unique within a router.

When configuring VPRN interface SAP parameters, a default QoS policy is applied to each ingress and egress SAP. Additional QoS policies must be configured in the `config>qos` context. Filter policies are configured in the `config>filter` context and must be explicitly applied to a SAP. There are no default filter policies.

A VPRN interface SAP is supported on the following ports and adapter cards:

- port in access mode with PPP or MLPPP encapsulation (by setting the port's channel-group encap-type to be ipcp):
  - any T1/E1 ASAP port or bundle on a 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card on a 7705 SAR-8 or 7705 SAR-18:
    - fractional T1/E1
    - clear channel T1/E1
  - any T1/E1 ASAP port or bundle on a 7705 SAR-F:
    - fractional T1/E1
    - clear channel T1/E1
- port in access mode
  - any Ethernet port (null or tagged) on an 8-port Ethernet Adapter card version 1 and version 2 on a 7705 SAR-8, or any Ethernet port (null or tagged) on an 8-port Ethernet Adapter card version 2 on a 7705 SAR-18
  - any Ethernet port (null or tagged) on a 7705 SAR-F

Refer to [VPRN Services Command Reference](#) for CLI commands and syntax.

The following examples show the configuration of a VPRN interface SAP for:

- an access port on a 16-port T1/E1 ASAP Adapter card
- an MLPPP bundle on an access port on a 16-port T1/E1 ASAP Adapter card

## Configuring VPRN Components

```
*A:ALU-1>config>service# info

...
 vprn 1 customer 1 create
 vrf-import "vrfImpPolCust1"
 vrf-export "vrfExpPolCust1"
 route-distinguisher 10001:1
 auto-bind ldp
 vrf-target target:10001:1
 interface "to-ce1" create
 address 11.1.0.1/24
 sap 1/1/10:1 create
 ingress
 qos 100
 filter ip 6
 exit
 egress
 qos 1010
 exit
 exit
 static-route 6.5.0.0/24 next-hop 10.1.1.2
 spoke-sdp 2 create
 exit
 no shutdown
 exit
...

*A:ALU-1>config>service#

*A:ALU-1>config>service>vprn# info

 description "Sasha's test VPRN for PPP SAPs"
 route-distinguisher 65101:25
 vrf-target target:65101:25
 interface "int_to_ixia" create
 address 210.177.253.1/24
 sap 1/2/4:25 create
 exit
 exit
 interface "to_ce2_ppp" create
 address 11.25.1.1/30
 bfd 100 receive 100 multiplier 3
 ipcp
 peer-ip-address 11.25.1.2
 exit
 sap 1/1/2.24 create
 exit
 exit
 interface "to_ce2_mlppp" create
 address 11.25.2.1/24
 bfd 100 receive 100 multiplier 3
 ipcp
 peer-ip-address 11.25.2.11
 dns 2.2.2.2 secondary 3.3.3.3
 exit
 sap bundle-ppp-1/1.1 create
 exit
```

```

exit
interface "to_ce2_eth" create
 address 11.25.3.1/24
 sap 1/2/1:25 create
exit
exit
static-route 210.177.35.0/24 next-hop 210.177.253.100
static-route 210.177.36.0/24 next-hop 210.177.253.100
static-route 210.177.45.0/24 next-hop 11.25.1.2
static-route 210.177.46.0/24 next-hop 11.25.2.2
static-route 210.177.46.0/24 next-hop 11.25.3.2 disable
no shutdown

*A:ALU-1>config>service>vprn#

```

## Configuring VPRN Interface Spoke SDP Parameters

Use the following CLI syntax to configure spoke SDP parameters for a VPRN interface.

**CLI Syntax:** config>service# vprn *service-id* [customer *customer-id*]  
[create] [vpn *vpn-id*]  
    interface *ip-int-name*  
        spoke-sdp *sdp-id:vc-id* [create]  
        egress  
            vc-label *egress-vc-label*  
        ingress  
            filter ip *ip-filter-id*  
            vc-label *ingress-vc-label*  
        [no] shutdown

**Example:** A:ALU-41>config>service# vprn 6  
A:ALU-41>config>service>vprn\$ interface "vprn6\_interface"  
A:ALU-41>config>service>vprn>if\$ spoke-sdp 7:8 create  
A:ALU-41>config>service>vprn>if>spoke-sdp\$ ingress  
A:ALU-41>config>service>vprn>if>spoke-sdp>ingress\$ filter  
ip 78  
A:ALU-41>config>service>vprn>if>spoke-sdp>ingress\$ vc-  
label 7788

The following example displays the VPRN interface spoke SDP creation output.

```
A:ALU-41>config>service>vprn>if>spoke SDP# info detail
```

```

```

```
...
```

```
 no description
 egress
 no vc-label
 ingress
 filter ip 78
 vc-label 7788
 exit
 no shutdown
```

```

```

## Service Management Tasks

This section discusses the following service management tasks:

- [Modifying VPRN Service Parameters](#)
- [Deleting a VPRN Service](#)
- [Disabling a VPRN Service](#)
- [Re-enabling a VPRN Service](#)

## Modifying VPRN Service Parameters

Use the CLI syntax to modify VPRN parameters ([VPRN Services Command Reference](#)).

The following example displays the VPRN service creation output.

```
*A:ALU-1>config>service# info

...
 vprn 1 customer 1 create
 shutdown
 vrf-import "vrfImpPolCust1"
 vrf-export "vrfExpPolCust1"
 route-distinguisher 10001:1
 interface "to-cel" create
 address 10.1.1.1/24
 sap 1/1/10:1 create
 exit
 exit
 static-route 6.5.0.0/24 next-hop 10.1.1.2
 spoke-sdp 2 create
 exit
 exit
...

*A:ALU-1>config>service>vprn#
```

## Deleting a VPRN Service

A VPRN service cannot be deleted until SAPs, interface spoke SDPs, and interfaces are shut down and deleted. If protocols and/or a service spoke SDP are defined, they must be shut down and removed from the configuration as well.

Use the following CLI syntax to delete a VPRN service:

**CLI Syntax:**

```
config>service#
[no] vprn service-id [customer customer-id]
shutdown
[no] interface ip-int-name
[no] sap sap-id
[no] spoke-sdp sdp-id:vc-id
shutdown
[no] spoke-sdp sdp-id
[no] shutdown
```

## Disabling a VPRN Service

A VPRN service can be shut down without deleting any service parameters.

**CLI Syntax:**

```
config>service#
vprn service-id [customer customer-id]
shutdown
```

**Example:**

```
config>service# vprn 1
config>service>vprn# shutdown
config>service>vprn# exit
```

```
*A:ALU-1>config>service# info

...
vprn 1 customer 1 create
shutdown
vrf-import "vrfImpPolCust1"
vrf-export "vrfExpPolCust1"
route-distinguisher 10001:1
auto-bind ldp
vrf-target target:10001:1
interface "to-cel" create
address 11.1.0.1/24
sap 1/1/10:1 create
ingress
qos 100
filter ip 6
exit
egress
qos 1010
exit
```



```
 exit
 exit
 static-route 6.5.0.0/24 next-hop 10.1.1.2
 spoke-sdp 2 create
 exit
exit
...

*A:ALU-1>config>service#
```

## Re-enabling a VPRN Service

To re-enable a VPRN service that was shut down:

**CLI Syntax:** `config>service#`  
                  `vprn service-id [customer customer-id]`  
                  `no shutdown`

---



---

## VPRN Services Command Reference

---

### Command Hierarchies

- [Configuration Commands](#)
  - [VPRN Service Configuration Commands](#)
  - [Interface Commands](#)
  - [Interface DHCP Commands](#)
  - [Interface ICMP Commands](#)
  - [Interface SAP Commands](#)
  - [Interface SAP Filter and QoS Policy Commands](#)
  - [Interface Spoke SDP Commands](#)
- [Show Commands](#)
- [Clear Commands](#)
- [Debug Commands](#)

## Configuration Commands

### VPRN Service Configuration Commands

```

config
 — service
 — vprn service-id [customer customer-id]
 — no vprn service-id
 — auto-bind {ldp | gre}
 — no auto-bind
 — description description-string
 — no description
 — maximum-routes number [log-only] [threshold percent]
 — no maximum-routes
 — route-distinguisher [rd]
 — no route-distinguisher
 — router-id ip-address
 — no router-id
 — sgt-qos
 — application dscp-app-name dscp {dscp-value | dscp-name}
 — application dot1p-app-name dot1p dot1p-priority
 — no application {dscp-app-name | dot1p-app-name}
 — dscp dscp-name fc fc-name
 — no dscp dscp-name
 — [no] shutdown
 — snmp-community community-name [hash | hash2] [version SNMP-version]
 — no snmp-community community-name [hash | hash2]
 — source-address
 — application app [ip-int-name | ip-address]
 — no application app
 — [no] spoke-sdp sdp-id
 — [no] shutdown
 — [no] static-route {ip-prefix/prefix-length | ip-prefix netmask}
 [preference preference] [metric metric] [tag tag] [enable | disable]
 {next-hop ip-int-name | ip-address | [bfd-enable | {cpe-check cpe-ip-address
 [interval seconds] [drop-count count] [log]}}
 — [no] static-route {ip-prefix/prefix-length | ip-prefix netmask}
 [preference preference] [metric metric] [tag tag] [enable | disable]
 [cpe-check cpe-ip-address] [interval seconds] [drop-count count] [log]]
 — [no] static-route {ip-prefix/prefix-length | ip-prefix netmask}
 [preference preference] [metric metric] [tag tag] [enable | disable] black-hole
 — type hub
 — no type
 — vrf-export policy-name [policy-name...(up to 5 max)]
 — no vrf-export
 — vrf-import policy-name [policy-name...(up to 5 max)]
 — no vrf-import
 — vrf-target {ext-community | {[export ext-community] [import ext-community]}}
 — no vrf-target

```

## Interface Commands

```

config
 — service
 — vprn
 — interface ip-int-name
 — no interface ip-int-name
 — address {ip-address/mask | ip-address netmask} [broadcast {all-ones | host-ones}]
 — no address
 — allow-directed-broadcasts
 — no allow-directed-broadcasts
 — arp-timeout seconds
 — no arp-timeout
 — bfd transmit-interval [receive receive-interval] [multiplier multiplier] [echo-receive echo-interval]
 — no bfd
 — description description-string
 — no description
 — dhcp
 — icmp
 — ip-mtu octets
 — no ip-mtu
 — ipcp
 — dns ip-address [secondary ip-address]
 — dns secondary ip-address
 — no dns [ip-address] [secondary ip-address]
 — peer-ip-address ip-address
 — no peer-ip-address
 — mac ieee-address
 — no mac [ieee-address]
 — sap
 — no shutdown
 — static-arp ip-address ieee-address
 — no static-arp ip-address [ieee-address]

```

## Interface DHCP Commands

```

config
 — service
 — vprn
 — interface
 — dhcp
 — description description-string
 — no description
 — [no] option
 — action {replace | drop | keep}
 — no action
 — circuit-id [ascii-tuple | ifindex | sap-id | vlan-ascii-tuple]
 — no circuit-id
 — remote-id [mac | string string]

```

- **no remote-id**
- **[no] vendor-specific-option**
- **[no] client-mac-address**
- **[no] sap-id**
- **[no] service-id**
- **string text**
- **no string**
- **[no] system-id**
- **server server1** [server2...(up to 8 max)]
- **no server**
- **[no] shutdown**
- **[no] trusted**

## Interface ICMP Commands

- config
  - service
    - vprn
      - interface
        - **icmp**
          - **[no] mask-reply**
          - **ttl-expired** *number seconds*
          - **no ttl-expired** [*number seconds*]
          - **unreachables** *number seconds*
          - **no unreachables** [*number seconds*]

## Interface SAP Commands

- config
  - service
    - vprn
      - interface
        - **[no] sap sap-id** [**create**]
          - **accounting-policy** *acct-policy-id*
          - **no accounting-policy** [*acct-policy-id*]
          - **[no] collect-stats**
          - **description** *description-string*
          - **no description**
          - **[no] shutdown**

## Interface SAP Filter and QoS Policy Commands

- config
  - service
    - vprn
      - interface
        - sap
          - **egress**
            - **qos** *policy-id*
            - **no qos** [*policy-id*]

- **ingress**
  - **filter ip** *ip-filter-id*
  - **no filter** [*ip ip-filter-id*]
  - **qos** *policy-id*
  - **no qos** [*policy-id*]

## Interface Spoke SDP Commands

- ```

config
  — service
    — vprn
      — interface
        — spoke-sdp sdp-id:vc-id [create]
          — [no] collect-stats
          — egress
            — vc-label egress-vc-label
            — no vc-label [egress-vc-label]
          — ingress
            — filter ip ip-filter-id
            — no filter
            — vc-label ingress-vc-label
            — no vc-label [ingress-vc-label]
          — [no] shutdown

```

Show Commands

- ```

show
 — service
 — egress-label start-label [end-label]
 — id service-id
 — all
 — arp [ip-address] | [mac ieee-address] | [sap sap-id] | [interface ip-int-name]
 — base
 — dhcp
 — statistics [interface ip-int-name | ip-address]
 — summary [interface interface-name | saps]
 — interface [ip-address | ip-int-name] [interface-type] [detail] [summary]
 — sap [sap-id] [detail]
 — sdp {[sdp-id[:vc-id] | far-end ip-address]} [detail]
 — sdp [sdp-id[:vc-id]]
 — ingress-label start-label [end-label]
 — service-using vprn [sdp sdp-id] [customer customer-id]

```

```

show
 — router [service-id]
 — arp [ip-address | ip-int-name | mac ieee-mac-address] [sdp sdp-id:vc-id] [summary]
 — dhcp
 — statistics [interface ip-int-name | ip-address]
 — summary
 — interface [{ip-address | ip-int-name} [detail]] | summary | exclude-services
 — route-table [ip-address | mask] [longer | best] [protocol protocol] [summary]
 — sgt-qos [service-id]
 — application [app-name] [dscp | dot1p]
 — dscp-map dscp-map [dscp-name]
 — static-arp [ip-address | ip-int-name | mac ieee-mac-address]
 — static-route [ip-prefix /mask] | [preference preference] | [next-hop ip-address] [detail]
 — tunnel-table [ip-address[/mask]] [protocol protocol | sdp sdp-id]
 — tunnel-table [summary]

```

## Clear Commands

```

clear
 — service
 — id service-id
 — spoke-sdp sdp-id:vc-id ingress-vc-label
 — statistics
 — id service-id

clear
 — router
 — arp [all | ip-address]
 — dhcp
 — statistics [interface ip-int-name | ip-address]
 — forwarding-table [slot-number]
 — interface [ip-int-name | ip-address] [icmp]

```

## Debug Commands

```

debug
 — service
 — id service-id
 — [no] event-type {config-change | svc-oper-status-change | sap-oper-status-change | sdpbind-oper-status-change}
 — [no] sap sap-id
 — event-type {config-change | oper-status-change}
 — [no] sdp sdp-id:vc-id
 — event-type {config-change | oper-status-change}

```



```
debug
— router [router-instance]
— ip
— dhcp
— detail-level detail-level {low| medium | high}
— no detail-level
— mode {dropped-only | ingr-and-dropped | egr-ingr-and-dropped}
— no mode
```

---

## Command Descriptions

- [VPRN Service Configuration Commands on page 643](#)
- [Show Service Commands on page 681](#)
- [Show Router Commands on page 720](#)
- [Clear Service Commands on page 736](#)
- [Clear Router Commands on page 737](#)
- [Debug Service Commands on page 739](#)
- [Debug Router Commands on page 741](#)

---

## **VPRN Service Configuration Commands**

- [Generic Commands on page 644](#)
- [Global Commands on page 646](#)
- [Interface Commands on page 659](#)
- [Interface DHCP Commands on page 667](#)
- [Interface ICMP Commands on page 672](#)
- [Interface SAP Commands on page 674](#)
- [Interface SAP Filter and QoS Policy Commands on page 676](#)
- [Interface Spoke SDP Commands on page 678](#)

---

## Generic Commands

### shutdown

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] shutdown</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>vprn<br>config>service>vprn>spoke-sdp<br>config>service>vprn>interface<br>config>service>vprn>if>dhcp<br>config>service>vprn>if>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command administratively disables an entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.</p> <p>The operational state of the entity is disabled as well as the operational state of any entities contained within. Many objects must be shut down before they can be deleted.</p> <p>Services are created in the administratively down (<b>shutdown</b>) state. When a <b>no shutdown</b> command is entered, the service becomes administratively up and then tries to enter the operationally up state. Default administrative states for services and service entities are described below in <b>Special Cases</b>.</p> <p>The <b>no</b> form of this command places the entity into an administratively enabled state.</p> |

### Special Cases

**Service Admin State** — bindings to an SDP within the service will be put into the out-of-service state when the service is shut down. While the service is shut down, all customer packets are dropped and counted as discards for billing and debugging purposes.

A service is regarded as operational providing that one IP Interface SAP and one SDP is operational.

### description

|                    |                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>description</b> <i>description-string</i><br><b>no description</b>                                                                                                                                                                                                     |
| <b>Context</b>     | config>service>vprn<br>config>service>vprn>interface<br>config>service>vprn>if>dhcp<br>config>service>vprn>if>sap                                                                                                                                                         |
| <b>Description</b> | <p>This command creates a text description that is stored in the configuration file for a configuration context.</p> <p>The <b>description</b> command associates a text string with a configuration context to help identify the contents in the configuration file.</p> |

The **no** form of this command removes the string from the configuration.

**Default**     **no description**

**Parameters**     *description-string* — the description character string. Allowed values are any string up to 80 characters long composed of printable, 7-bit ASCII characters. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.

---

## Global Commands

### vprn

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vprn</b> <i>service-id</i> [ <b>customer</b> <i>customer-id</i> ]<br><b>no vprn</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | <p>This command creates or edits a Virtual Private Routed Network (VPRN) service instance.</p> <p>If the <i>service-id</i> does not exist, a context for the service is created. If the <i>service-id</i> exists, the context for editing the service is entered.</p> <p>VPRN services allow the creation of customer-facing IP interfaces in a separate routing instance from the one used for service network core routing connectivity. VPRN services allow the IP addressing scheme used by the subscriber to overlap with other addressing schemes used by other VPRN services or by the provider and, potentially, the entire Internet.</p> <p>IP interfaces defined within the context of a VPRN service ID must have a SAP created as the access point to the subscriber network.</p> <p>When a service is created, the <b>customer</b> keyword and <i>customer-id</i> must be specified, which associates the service with a customer. The <i>customer-id</i> must already exist, having been created using the <b>customer</b> command in the service context. When a service is created with a customer association, it is not possible to edit the customer association. To change the association between service and customer, the service must be deleted and recreated with a new customer association.</p> <p>Once a service is created, the use of <b>customer</b> <i>customer-id</i> is optional to navigate into the service configuration context. Attempting to edit a service with an incorrect <i>customer-id</i> results in an error.</p> <p>Multiple VPRN services are created in order to separate customer-owned IP interfaces. More than one VPRN service can be created for a single customer ID. More than one IP interface can be created within a single VPRN service ID. All IP interfaces created within a VPRN service ID belong to the same customer.</p> <p>The <b>no</b> form of the command deletes the VPRN service instance with the specified <i>service-id</i>. The service cannot be deleted until all the IP interfaces and all routing protocol configurations defined within the service ID have been shut down and deleted.</p> |
| <b>Default</b>     | <b>none</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><i>service-id</i> — the unique service identification number that identifies the service in the service domain. The ID must be unique to this service and cannot be used for any other service of any type (such as Epipe, Cpipe, IES). However, a VPRN instance in the service provider network can include different <i>service-id</i> numbers on the routers in the network.</p> <p><b>Values</b>      1 to 2147483647</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

*customer-id* — an existing customer identification number to be associated with the service. This parameter is required during service creation and is optional for service editing or deleting.

**Values** 1 to 2147483647

## auto-bind

|                    |                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>auto-bind {ldp   gre}</b><br><b>no auto-bind</b>                                                                                                                                   |
| <b>Context</b>     | config>service>vpn                                                                                                                                                                    |
| <b>Description</b> | This command specifies the type of automatic binding for the SDP assigned to this service. When auto-bind is used, it is not required that a spoke-SDP be configured for the service. |
| <b>Default</b>     | <b>no auto-bind</b>                                                                                                                                                                   |
| <b>Parameters</b>  | <b>ldp</b> — specifies LDP as the automatic binding for the SDP assigned to the service<br><b>gre</b> — specifies GRE as the automatic binding for the SDP assigned to the service    |

## maximum-routes

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>maximum-routes</b> <i>number</i> [ <b>log-only</b> ] [ <b>threshold percent</b> ]<br><b>no maximum-routes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vpn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | <p>This command specifies the maximum number of routes that can be held within a VPN routing/forwarding (VRF) context.</p> <p>The VPRN service ID must be in a shutdown state in order to modify <b>maximum-routes</b> command parameters.</p> <p>If the <b>log-only</b> parameter is not specified and the <b>maximum-routes</b> value is set to a value below the existing number of routes in a VRF, then the exceeding (extra) routes will not be added to the VRF.</p> <p>The maximum route threshold can dynamically change to increase the number of supported routes even when the maximum has already been reached. Protocols will resubmit the routes that were initially rejected.</p> <p>The <b>no</b> form of the command disables any limit on the number of routes within a VRF context. Issue the <b>no</b> form of the command only when the VPRN instance is shut down.</p> |
| <b>Default</b>     | <b>no maximum-routes (0 or disabled)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <i>number</i> — an integer that specifies the maximum number of routes to be held in a VRF context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Values</b>      | 1 to 2147483647                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

**log-only** — specifies that if the maximum limit is reached, only log the event. The **log-only** parameter does not disable the learning of new routes.

**percent** — the percentage at which a warning log message and SNMP trap should be set. There are two warning levels: mid-level and high-level. A mid-level warning occurs at the value defined by the **threshold percent**, and a high-level warning occurs at the level between the maximum number of routes and the mid-level value  $([mid+max] / 2)$ . For example, if the **maximum-routes** number is 100, and **percent** is 60, then the mid-level warning occurs at 60 routes, and the high-level warning occurs at 80 routes.

**Values** 0 to 100

## route-distinguisher

|                    |                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>route-distinguisher</b> <i>[rd]</i><br><b>no route-distinguisher</b>                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>vpn                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> | This command sets the identifier that gets attached to routes to which the VPN belongs. Each routing instance must have a unique (within the carrier's domain) route distinguisher associated with it. A route distinguisher must be defined for a VPRN to be operationally active.<br><br>AS numbers can be either 2-byte or 4-byte values.                                                                  |
| <b>Default</b>     | <b>no route-distinguisher</b>                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <i>rd</i> — the route distinguisher value<br><br><div style="margin-left: 40px;"> <b>Values</b> <i>ip-addr:comm-val   2byte-asnumber:ext-comm-val   4-byte-asnumber:comm-val</i><br/>           where<br/> <i>ip-addr</i> a.b.c.d<br/> <i>comm-val</i> 0 to 65535<br/> <i>2-byte-asnumber</i> 1 to 65535<br/> <i>ext-comm-val</i> 0 to 4294967295<br/> <i>4-byte-asnumber</i>: 1 to 4294967295         </div> |

## router-id

|                    |                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>router-id</b> <i>ip-address</i><br><b>no router-id</b>                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vpn                                                                                                                                                                                                                                                                             |
| <b>Description</b> | This command sets the router ID for a specific VPRN context.<br><br>If neither the router ID nor system interface are defined, the router ID from the base router context is inherited.<br><br>The <b>no</b> form of the command removes the router ID definition from the given VPRN context. |



|                   |                                                                |
|-------------------|----------------------------------------------------------------|
| <b>Default</b>    | <b>no router-id</b>                                            |
| <b>Parameters</b> | <i>ip-address</i> — the IP address, in dotted-decimal notation |
| <b>Values</b>     | a.b.c.d                                                        |

## sgt-qos

|                    |                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sgt-qos</b>                                                                                  |
| <b>Context</b>     | config>service>vprn                                                                             |
| <b>Description</b> | This command enables the context to configure DSCP/dot1p re-marking for self-generated traffic. |

## application

|                    |                                                                                                                                                                                                                                                                                       |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>application</b> <i>dscp-app-name</i> <b>dscp</b> { <i>dscp-value</i>   <i>dscp-name</i> }<br><b>application</b> <i>dot1p-app-name</i> <b>dot1p</b> <i>dot1p-priority</i><br><b>no application</b> { <i>dscp-app-name</i>   <i>dot1p-app-name</i> }                                 |
| <b>Context</b>     | config>service>vprn>sgt-qos                                                                                                                                                                                                                                                           |
| <b>Description</b> | This command configures DSCP or dot1p re-marking for self-generated traffic. When an application is configured using this command, then the specified DSCP name or DSCP value is used for all packets generated by this application within the router instance that it is configured. |

Using the value configured in this command has the following effects:

- sets the DSCP bits in the IP packet
- maps the value to the FC. This value will be signaled from the CSM to the egress forwarding complex.
- the dot1p and the LSP EXP bits are set by the egress complex for all packets based on the signaled FC. This includes ARP and IS-IS packets that, due to their nature, do not carry DSCP bits.
- the DSCP value in the egress IP header will be as configured in this command. The egress QoS policy will not overwrite this value.

Only one DSCP name or DSCP value can be configured per application. If multiple entries are configured, then a subsequent entry overrides the previous entry.

The **no** form of this command reverts the DSCP value for the application back to its default value.

|                |                                                                                                                                                |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Default</b> | <b>none</b> (that is, sgt-qos does not enforce a DSCP value and the application uses its default value, as shown in <a href="#">Table 75</a> ) |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------|

**Table 75: Applications and Default Values for DSCP or dot1p Markings**

| Application                | Supported Marking | Default DSCP/dot1p | Application           | Supported Marking | Default DSCP/dot1p |
|----------------------------|-------------------|--------------------|-----------------------|-------------------|--------------------|
| IS-IS                      | dot1p             | 7                  | SSH (SCP)             | DSCP              | AF41               |
| ARP                        | dot1p             | 7                  | SNMP (get, set, etc.) | DSCP              | AF41               |
| BGP                        | DSCP              | NC1                | SNMP trap/log         | DSCP              | AF41               |
| DHCP                       | DSCP              | NC1                | syslog                | DSCP              | AF41               |
| 1588 PTP <sup>(1, 2)</sup> | DSCP              | NC1                | ICMP (ping)           | DSCP              | BE                 |
| LDP (T-LDP)                | DSCP              | NC1                | Traceroute            | DSCP              | BE                 |
| RSVP                       | DSCP              | NC1                | TACACS+               | DSCP              | AF41               |
| OSPF                       | DSCP              | NC1                | DNS                   | DSCP              | AF41               |
| Telnet                     | DSCP              | AF41               | NTP                   | DSCP              | NC1                |
| TFTP                       | DSCP              | AF41               | SNTP                  | DSCP              | AF41               |
| FTP                        | DSCP              | AF41               | RADIUS                | DSCP              | AF41               |

**Notes:**

1. PTP in the context of SGT QoS is defined as Precision Timing Protocol and is an application in the 7705 SAR. The PTP application name is also used in areas such as event-control and logging. Precision Timing Protocol is defined in IEEE 1588-2008.
2. PTP in the context of IP filters is defined as Performance Transparency Protocol. IP protocols can be used as IP filter match criteria; the match is made on the 8-bit protocol field in the IP header.

**Parameters** *dscp-app-name* — the DSCP application name

**Values** bgp, dhcp, dns, ftp, icmp, ldp, ntp, ospf, ptp, radius, rsvp, snmp, snmp-notification, ssh, syslog, tacplus, telnet, tftp, traceroute

*dscp-value* — the DSCP value when this packet egresses. The respective egress policy should provide the mapping for the DSCP value to either LSP-EXP bits or IEEE 802.1p (dot1p) bits as appropriate; otherwise, the default mapping applies.

**Values** 0 to 63

*dscp-name* — the DSCP name

**Values** none, be, ef, cp1, cp2, cp3, cp4, cp5, cp6, cp7, cp9, cs1, cs2, cs3, cs4, cs5, nc1, nc2, af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, cp11, cp13, cp15, cp17, cp19, cp21, cp23, cp25, cp27, cp29, cp31, cp33, cp35, cp37, cp39, cp41, cp42, cp43, cp44, cp45, cp47, cp49, cp50, cp51, cp52, cp53, cp54, cp55, cp57, cp58, cp59, cp60, cp61, cp62, cp63

*dot1p-app-name* — the dot1p application name

**Values** arp, isis

*dot1p-priority* — the dot1p priority

**Values** none, 0 to 7

## dscp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dscp</b> <i>dscp-name</i> <b>fc</b> <i>fc-name</i><br><b>no dscp</b> <i>dscp-name</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>vprn>sgt-qos                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | <p>This command creates a mapping between the DSCP of the self-generated traffic and the forwarding class.</p> <p>Self-generated traffic that matches the specified DSCP will be assigned to the corresponding forwarding class. Multiple commands can be entered to define the association of some or all of the 64 DSCP values to the forwarding class. For undefined code points, packets are assigned to the forwarding class specified under the <b>default-action</b> command.</p> <p>All DSCP names that define a DSCP value must be explicitly defined.</p> <p>The <b>no</b> form of this command removes the DSCP-to-forwarding class association. The default action then applies to that code point value.</p>                                                                                                                                                                                           |
| <b>Default</b>     | none                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <p><i>dscp-name</i> — the DSCP name to be associated with the forwarding class. DSCP can only be specified by its name and only an existing value can be specified. The software provides names for the well-known code points.</p> <p><b>Values</b> be, ef, cp1, cp2, cp3, cp4, cp5, cp6, cp7, cp9, cs1, cs2, cs3, cs4, cs5, nc1, nc2, af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, cp11, cp13, cp15, cp17, cp19, cp21, cp23, cp25, cp27, cp29, cp31, cp33, cp35, cp37, cp39, cp41, cp42, cp43, cp44, cp45, cp47, cp49, cp50, cp51, cp52, cp53, cp54, cp55, cp57, cp58, cp59, cp60, cp61, cp62, cp63</p> <p><i>fc-name</i> — the forwarding class name. All packets with a DSCP value or MPLS EXP bits that are not defined will be placed in this forwarding class.</p> <p><b>Default</b> none (the fc name must be specified)</p> <p><b>Values</b> be, l2, af, l1, h2, ef, h1, nc</p> |

## snmp-community

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                     |                 |                     |  |           |                     |  |            |                     |               |               |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-----------------|---------------------|--|-----------|---------------------|--|------------|---------------------|---------------|---------------|
| <b>Syntax</b>      | <b>snmp-community</b> <i>community-name</i> [ <b>hash</b>   <b>hash2</b> ] [ <b>version</b> <i>SNMP-version</i> ]<br><b>no snmp-community</b> <i>community-name</i> [ <b>hash</b>   <b>hash2</b> ]                                                                                                                                                                                                                                                                                           |                     |                 |                     |  |           |                     |  |            |                     |               |               |
| <b>Context</b>     | config>service>vprn                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |                 |                     |  |           |                     |  |            |                     |               |               |
| <b>Description</b> | <p>This command sets the SNMP community name to be used with the associated VPRN instance.</p> <p>If an SNMP community name is not specified, SNMP access is not allowed.</p> <p>The <b>no</b> form of the command removes the SNMP community name from the given VPRN context.</p>                                                                                                                                                                                                          |                     |                 |                     |  |           |                     |  |            |                     |               |               |
| <b>Default</b>     | <b>none</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                 |                     |  |           |                     |  |            |                     |               |               |
| <b>Parameters</b>  | <p><i>community-name</i> — one or more SNMP community names</p> <table><tr><td><b>Values</b></td><td>community-name:</td><td>32 characters (max)</td></tr><tr><td></td><td>hash-key:</td><td>33 characters (max)</td></tr><tr><td></td><td>hash2-key:</td><td>96 characters (max)</td></tr></table> <p><b>hash, hash2</b> — the hashing scheme for the community name</p> <p><i>SNMP-version</i> — the SNMP version</p> <table><tr><td><b>Values</b></td><td>v1, v2c, both</td></tr></table> | <b>Values</b>       | community-name: | 32 characters (max) |  | hash-key: | 33 characters (max) |  | hash2-key: | 96 characters (max) | <b>Values</b> | v1, v2c, both |
| <b>Values</b>      | community-name:                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 32 characters (max) |                 |                     |  |           |                     |  |            |                     |               |               |
|                    | hash-key:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 33 characters (max) |                 |                     |  |           |                     |  |            |                     |               |               |
|                    | hash2-key:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 96 characters (max) |                 |                     |  |           |                     |  |            |                     |               |               |
| <b>Values</b>      | v1, v2c, both                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                     |                 |                     |  |           |                     |  |            |                     |               |               |

## source-address

|                    |                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>source-address</b>                                                                                                         |
| <b>Context</b>     | config>service>vprn                                                                                                           |
| <b>Description</b> | This command enters the context to specify the source address and application that should be used in all unsolicited packets. |

## application

|                    |                                                                                                                              |               |                               |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|
| <b>Syntax</b>      | <b>application</b> <b>app</b> [ <i>ip-int-name</i>   <i>ip-address</i> ]<br><b>no application</b> <b>app</b>                 |               |                               |
| <b>Context</b>     | config>service>vprn>source-address                                                                                           |               |                               |
| <b>Description</b> | This command specifies the source address and application.                                                                   |               |                               |
| <b>Parameters</b>  | <b>app</b> — the application name<br><table> <tr> <td><b>Values</b></td><td>telnet, ssh, traceroute, ping</td></tr> </table> | <b>Values</b> | telnet, ssh, traceroute, ping |
| <b>Values</b>      | telnet, ssh, traceroute, ping                                                                                                |               |                               |

*ip-int-name* | *ip-address* — the name of the IP interface or IP address. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.

|               |                      |                                  |
|---------------|----------------------|----------------------------------|
| <b>Values</b> | <i>ip-int-name</i> : | up to 32 alphanumeric characters |
|               | <i>ip-address</i> :  | a.b.c.d                          |

spoke-sdp

**Syntax** [no] **spoke-sdp** *sdp-id*

**Context** config>service>vprn

**Description** This command binds a service to an existing Service Distribution Point (SDP).

The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service will be down.

The SDP must already be defined in the **config>service>sdp** context in order to associate an SDP with a VPRN service. If the **sdp** *sdp-id* is not already configured, an error message is generated. If the *sdp-id* exists, a binding between that *sdp-id* and the service is created.

SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end routers can participate in the service. Alternatively, **auto-bind** can be used. With **auto-bind**, no **vprn>spoke-sdp** configuration is required. When both **auto-bind** and **spoke-sdp** are configured, **spoke-sdp** takes precedence. **Spoke-sdp** must be deconfigured for **auto-bind** to take effect.

The **no** form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to a service is affected. Once the SDP is removed, no packets are forwarded to the far-end router.

**Default** none

Special Cases

**VPRN** — several SDPs can be bound to a VPRN service. Each SDP must be destined for a different 7705 SAR, 7750 SR, or 7710 SR router. If two *sdp-id* bindings terminate on the same 7705 SAR, an error occurs and the second SDP binding is rejected.

**Parameters** *sdp-id* — the SDP identifier

|               |            |
|---------------|------------|
| <b>Values</b> | 1 to 17407 |
|---------------|------------|

## static-route

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <p>[no] <b>static-route</b> {<i>ip-prefix/prefix-length</i>   <i>ip-prefix netmask</i>} [<b>preference</b> <i>preference</i>]<br/> [<b>metric</b> <i>metric</i>] [<b>tag</b> <i>tag</i>] [<b>enable</b>   <b>disable</b>] {<b>next-hop</b> <i>ip-int-name</i>   <i>ip-address</i>}<br/> [<b>bfd-enable</b>   {<b>cpe-check</b> <i>cpe-ip-address</i> [<i>interval seconds</i>] [<b>drop-count</b> <i>count</i>] [<b>log</b>]}]</p> <p>[no] <b>static-route</b> {<i>ip-prefix/prefix-length</i>   <i>ip-prefix netmask</i>} [<b>preference</b> <i>preference</i>]<br/> [<b>metric</b> <i>metric</i>] [<b>tag</b> <i>tag</i>] [<b>enable</b>   <b>disable</b>] [<b>cpe-check</b> <i>cpe-ip-address</i> [<i>interval seconds</i>]<br/> [<b>drop-count</b> <i>count</i>] [<b>log</b>]]</p> <p>[no] <b>static-route</b> {<i>ip-prefix/prefix-length</i>   <i>ip-prefix netmask</i>} [<b>preference</b> <i>preference</i>]<br/> [<b>metric</b> <i>metric</i>] [<b>tag</b> <i>tag</i>] [<b>enable</b>   <b>disable</b>] <b>black-hole</b></p> |
| <b>Context</b>     | config>service>vprn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | <p>This command creates static route entries within the associated router instance. When configuring a static route, either <b>next-hop</b> or <b>black-hole</b> must be configured.</p> <p>The <b>no</b> form of the command deletes the static route entry. If a static route needs to be removed when multiple static routes exist to the same destination, then enter as many parameters as necessary to uniquely identify that static route.</p> <p>If a CPE connectivity check target address is already being used as the target address in a different static route, then <b>cpe-check</b> parameters must match. If they do not match, the new configuration command will be rejected.</p> <p>If a <b>static-route</b> command is issued with no <b>cpe-check</b> target but the destination <i>prefix/netmask</i> and <b>next-hop</b> matches a static route that did have an associated <b>cpe-check</b>, then the <b>cpe-check</b> test will be removed from the associated static route.</p>                              |
| <b>Default</b>     | <b>no static-route</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <p><i>ip-prefix</i> — the destination address of the aggregate route in dotted-decimal notation</p> <p><b>Values</b>      a.b.c.d (host bits must be 0)</p> <p><i>prefix-length</i> — the prefix length expressed as a decimal number</p> <p><b>Values</b>      0 to 32</p> <p><i>netmask</i> — the subnet mask in dotted-decimal notation</p> <p><b>Values</b>      a.b.c.d (network bits all 1 and host bits all 0)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

*preference* — the preference of this static route (as opposed to the routes from different sources such as BGP or OSPF), expressed as a decimal integer. When modifying the **preference** value of an existing static route, the metric will not change unless specified.

If multiple routes are learned with an identical preference using the same protocol, the lowest-cost route is used. If multiple routes are learned with an identical preference using the same protocol and the costs (metrics) are equal, then the decision of which route to use is determined by the 7705 SAR OS.

**Default** 5

**Values** 1 to 255

*metric* — the cost metric for the static route, expressed as a decimal integer. This value is used when importing this static route into other protocols such as OSPF or IS-IS. This value is also used to determine the static route to install in the forwarding table: When modifying the *metric* values of an existing static route, the preference will not change unless specified.

If there are multiple static routes with the same preference but unequal *metric* values, the lower-cost (metric) route is installed. If there are multiple static routes with equal preference and metrics, then the 7705 SAR OS chooses the route with the lowest next-hop IP address as the best route. If there are multiple routes with unequal preferences, then the lower preference route is installed.

**Default** 1

**Values** 0 to 65535

*tag* — adds a 32-bit integer tag to the static route. The tag is used in route policies to control distribution of the route into other protocols.

**Values** 1 to 4294967295

**enable | disable** — static routes can be administratively enabled or disabled. Use the **enable** parameter to re-enable a disabled static route. Use the **disable** parameter to disable a static route while maintaining the static route in the configuration. In order to disable or enable a static route, it must be uniquely identified by the IP address, mask, and any other parameter that is required to identify the exact static route.

The administrative state is maintained in the configuration file.

**Default** enable

*ip-int-name | ip-address* — the directly connected next-hop IP address used to reach the destination. If the next hop is over an unnumbered interface, the *ip-int-name* of the unnumbered interface (on this node) can be configured.

The **next-hop** and **black-hole** keywords are mutually exclusive. If an identical command is entered (with the exception of the **black-hole** parameters), then this static route will be replaced with the newly entered command, and unless specified, the respective defaults for **preference** and **metric** will be applied.

The *ip-address* configured here can be either on the network side or the access side on this node. This address must be associated with a network directly connected to a network configured on this node.

**Values**     *ip-int-name*     32 chars max  
                  *ip-address*       a.b.c.d

**bfd-enable** — associates the state of the static route to a BFD session between the local system and the configured next hop. This keyword is only available when the **next-hop** keyword is used.

*cpe-ip-address* — the IP address of the target CPE device. ICMP pings will be sent to this target IP address. This parameter must be configured to enable the CPE connectivity feature for the associated static route. The *cpe-ip-address* cannot be in the same subnet as the static route subnet itself to avoid possible circular references. This option is mutually exclusive with BFD support on a given static route.

**Default**     no cpe-check enabled

**Values**     a.b.c.d

*seconds* — the interval between ICMP pings to the target IP address

**Values**     1 to 255 seconds

**Default**     1 second

*count* — the number of consecutive ping-replies that must be missed in order to declare the CPE down and to deactivate the associated static route

**Values**     1 to 255

**Default**     3

**log** — enables the logging of transitions between active and inactive routes based on the CPE connectivity check. Events should be sent to the system log, syslog and SNMP traps.

**black-hole** — specifies a black hole route, meaning that if the destination address on a packet matches this static route, it will be silently discarded.

The **black-hole** and **next-hop** keywords are mutually exclusive. If an identical command is entered, with the exception of the **next-hop** parameters, the static route is replaced with the new command, and unless specified, the respective defaults for **preference** and **metric** are applied.

## type

|                    |                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>type hub</b><br><b>no type</b>                                                                                                                                                       |
| <b>Context</b>     | config>service>vprn                                                                                                                                                                     |
| <b>Description</b> | This command designates the type of VPRN instance being configured for hub and spoke topologies.<br><br>The <b>no</b> form of the command resets to the default of a fully meshed VPRN. |
| <b>Default</b>     | <b>no type</b>                                                                                                                                                                          |



**Parameters**     **hub** — a hub VPRN, which allows all traffic from the hub SAP to be routed directly to the destination, while all traffic from spoke VPRNs or network interfaces can only be routed to a hub SAP

## vrf-export

**Syntax**     **vrf-export** *policy-name* [*policy-name...*(up to 5 max)]  
**no vrf-export**

**Context**     config>service>vprn

**Description**     This command specifies the export policies to control routes exported from the local VPN routing/forwarding table (VRF) to other VRFs on the same or remote PE routers (via MP-BGP). The policy (and *policy-name*) are defined under the **config>router>policy-options>policy-statement** command.

The **no** form of the command removes all route policy names from the export list.

**Default**     none

**Parameters**     *policy-name* — the route policy statement name (up to 32 characters)

## vrf-import

**Syntax**     **vrf-import** *policy-name* [*policy-name...*(up to 5 max)]  
**no vrf-import**

**Context**     config>service>vprn

**Description**     This command sets the import policies to control routes imported to the local VPN routing/forwarding table (VRF) from other VRFs on the same or remote PE routers (via MP-BGP). BGP-VPN routes imported with a **vrf-import** policy will use the BGP preference value of 170 when imported from remote PE routers, or retain the protocol preference value of the exported route when imported from other VRFs on the same router, unless the preference is changed by the policy.

The **no** form of the command removes all route policy names from the import list.

**Default**     none

**Parameters**     *policy-name* — the route policy statement name (up to 32 characters)

## vrf-target

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vrf-target</b> { <i>ext-community</i>   {[ <b>export</b> <i>ext-community</i> ] [ <b>import</b> <i>ext-community</i> ]}}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | <b>no vrf-target</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>vprn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command facilitates a simplified method to configure the route target to be added to advertised routes or compared against received routes from other VRFs on the same or remote PE routers (via MP-BGP).</p> <p>BGP-VPN routes imported with a <b>vrf-target</b> statement will use the BGP preference value of 170 when imported from remote PE routers, or retain the protocol preference value of the exported route when imported from other VRFs in the same router.</p> <p>Specified <b>vrf-import</b> or <b>vrf-export</b> policies override the <b>vrf-target</b> policy.</p> <p>The <b>no</b> form of the command removes the VRF target.</p> |
| <b>Default</b>     | <b>no vrf-target</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>  | <p><i>ext-community</i> — an extended BGP community in the <i>type:x:y</i> format.</p> <p><b>Values</b>      <i>ip-addr:comm-val</i>   <i>2byte-asnumber:ext-comm-val</i>   <i>4-byte-asnumber:comm-val</i><br/> where<br/> <i>ip-addr</i>              a.b.c.d<br/> <i>comm-val</i>            0 to 65535<br/> <i>2-byte-asnumber</i> 0 to 65535<br/> <i>ext-comm-val</i>      0 to 4294967295<br/> <i>4-byte-asnumber:</i> 0 to 4294967295</p> <p><b>export</b> <i>ext-community</i> — communities allowed to be sent to remote PE neighbors</p> <p><b>import</b> <i>ext-community</i> — communities allowed to be accepted from remote PE neighbors</p>      |

---

## Interface Commands

### interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> <i>ip-int-name</i><br><b>no interface</b> <i>ip-int-name</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>vprn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | <p>This command creates a logical IP routing interface for a Virtual Private Routed Network (VPRN). Once created, attributes such as an IP address and a service access point (SAP) can be associated with the IP interface.</p> <p>The <b>interface</b> command, under the context of services, is used to create and maintain IP routing interfaces within VPRN service IDs. The <b>interface</b> command can be executed in the context of a VPRN service ID. The IP interface created is associated with the VPRN service routing instance and VPRN service routing table.</p> <p>Interface names are case-sensitive and must be unique within the group of defined IP interfaces defined for <b>config router interface</b> and <b>config service vprn interface</b>. Interface names must not be in the dotted-decimal notation of an IP address. For example, the name “1.1.1.1” is not allowed, but “int-1.1.1.1” is allowed. <b>Show</b> commands for router interfaces use either interface names or the IP addresses. Use unique IP address values and IP address names to maintain clarity. It could be unclear to the user if the same IP address and IP address name values are used. Although not recommended, duplicate interface names can exist in different router instances.</p> <p>When a new name is entered, a new logical router interface is created. When an existing interface name is entered, the user enters the router interface context for editing and configuration.</p> <p>There are no default IP interface names defined within the system. All VPRN IP interfaces must be explicitly defined. Interfaces are created in an enabled state.</p> <p>The <b>no</b> form of this command removes the interface and all the associated configurations. The interface must be administratively shut down before issuing the <b>no interface</b> command.</p> |
| <b>Parameters</b>  | <p><i>ip-int-name</i> — the name of the IP interface. Interface names must be unique within the group of defined IP interfaces for <b>config service vprn interface</b> commands. An interface name cannot be in the form of an IP address. Interface names can be from 1 to 32 alphanumeric characters and must start with a letter. If the string contains special characters (#, \$, spaces, etc.), the entire string must be enclosed within double quotes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## address

|                    |                                                                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>address</b> { <i>ip-address/mask</i>   <i>ip-address netmask</i> } [ <b>broadcast</b> { <b>all-ones</b>   <b>host-ones</b> }]<br><b>no address</b>                  |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                          |
| <b>Description</b> | This command assigns an IP address, IP subnet, and broadcast address format to a VPRN IP router interface. Only one IP address can be associated with an IP interface. |

An IP address must be assigned to each VPRN IP interface. An IP address and a mask are used together to create a local IP prefix. The defined IP prefix must be unique within the context of the routing instance. It cannot overlap with other existing IP prefixes defined as local subnets on other IP interfaces in the same routing context within the 7705 SAR.

The IP address for the interface can be entered in either CIDR (Classless Inter-Domain Routing) or traditional dotted-decimal notation. The **show** commands display CIDR notation, which is stored in configuration files.

By default, no IP address or subnet association exists on an IP interface until it is explicitly created.

Use the **no** form of this command to remove the IP address assignment from the IP interface. When the **no address** command is entered, the interface becomes operationally down, as shown in [Table 76](#).

**Table 76: VPRN Interface State and IP Address**

| Address    | Administrative State | Operational State |
|------------|----------------------|-------------------|
| No address | Up                   | Down              |
| No address | Down                 | Down              |
| 1.1.1.1    | Up                   | Up                |
| 1.1.1.1    | Down                 | Down              |

The operational state is a read-only variable, and the only controlling variables are the address and administrative states. The address and administrative states are independent and can be set independently. If an interface is in an administratively up state and an address is assigned, it becomes operationally up and the protocol interfaces and the MPLS LSPs associated with that IP interface will be reinitialized.

|                   |                                                                                                                                                                                                                                                                                                    |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>ip-address</i> — the IP address of the IP interface. The <i>ip-address</i> portion of the <b>address</b> command specifies the IP host address that will be used by the IP interface within the subnet. This address must be unique within the subnet and specified in dotted-decimal notation. |
| <b>Values</b>     | a.b.c.d (no multicast address)<br>(1.0.0.0 to 223.255.255.255 (with support of /31 subnets))                                                                                                                                                                                                       |

The “/” (forward slash) is a parameter delimiter that separates the *ip-address* portion of the IP address from the *mask*, which defines the scope of the local subnet. No spaces are allowed between the *ip-address*, the “/”, and the *mask*. If a forward slash does not immediately follow the *ip-address*, a dotted-decimal *mask* must follow the prefix.

*mask* — the subnet mask length when the IP prefix is specified in CIDR notation. When the IP prefix is specified in CIDR notation, a forward slash separates the *ip-address* from the *mask*. The *mask* indicates the number of bits used for the network portion of the IP address; the remainder of the IP address is used to determine the host portion of the IP address.

**Values**      0 to 32

*netmask* — the subnet mask, in dotted-decimal notation. When the IP prefix is not specified in CIDR notation, a space separates the *ip-address* from a traditional dotted-decimal mask. The *netmask* parameter indicates the complete mask that will be used in a logical ‘AND’ function to derive the local subnet of the IP address.

**Values**      128.0.0.0 to 255.255.255.252  
                   (network bits all 1 and host bits all 0)  
                   (255.255.255.255 is reserved for system IP addresses)

**broadcast** — the optional **broadcast** parameter overrides the default broadcast address used by the IP interface when sourcing IP broadcasts on the IP interface. If no broadcast format is specified for the IP address, the default value is **host-ones**, which indicates a subnet broadcast address. Use this parameter to change the broadcast address to **all-ones** or revert back to a broadcast address of **host-ones**.

The broadcast format on an IP interface can be specified when the IP address is assigned or changed.

This parameter does not affect the type of broadcasts that can be received by the IP interface. A host sending either the local broadcast (**all-ones**) or the valid subnet broadcast address (**host-ones**) will be received by the IP interface.

**Default**      host-ones

**all-ones** — specifies that the broadcast address used by the IP interface for this IP address will be 255.255.255.255, also known as the local broadcast

**host-ones** — specifies that the broadcast address used by the IP interface for this IP address will be the subnet broadcast address. This is an IP address that corresponds to the local subnet described by the *ip-address* and the *mask*, or the *mask* with all the host bits set to binary one. This is the default broadcast address used by an IP interface.

The **broadcast** parameter within the **address** command does not have a negation feature, which is usually used to revert a parameter to the default value. To change the broadcast type to **host-ones** after being changed to **all-ones**, the address command must be executed with the **broadcast** parameter defined.

## allow-directed-broadcasts

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>allow-directed-broadcasts</b><br><b>no allow-directed-broadcasts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command controls the forwarding of directed broadcasts out of the IP interface.</p> <p>A directed broadcast is a packet received on a local router interface destined for the subnet broadcast address on another IP interface. The <b>allow-directed-broadcasts</b> command on an IP interface enables or disables the transmission of packets destined for the subnet broadcast address of the egress IP interface.</p> <p>When enabled, a frame destined for the local subnet on this IP interface will be sent as a subnet broadcast out this interface. Care should be exercised when allowing directed broadcasts as it is a well-known mechanism used for denial-of-service attacks.</p> <p>When disabled, directed broadcast packets discarded at this egress IP interface will be counted in the normal discard counters for the egress SAP.</p> <p>By default, directed broadcasts are not allowed and will be discarded at this egress IP interface.</p> <p>The <b>no</b> form of this command disables the forwarding of directed broadcasts out of the IP interface.</p> |
| <b>Default</b>     | <b>no allow-directed-broadcasts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## arp-timeout

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>arp-timeout</b> <i>seconds</i><br><b>no arp-timeout</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b> | <p>This command configures the minimum time, in seconds, that an ARP entry learned on the IP interface will be stored in the ARP table. ARP entries are automatically refreshed when an ARP request or gratuitous ARP is seen from an IP host; otherwise, the ARP entry is aged from the ARP table. If <b>arp-timeout</b> is set to a value of 0 s, ARP aging is disabled.</p> <p>The <b>no</b> form of this command restores <b>arp-timeout</b> to the default value.</p> |
| <b>Default</b>     | <b>14400 s</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>seconds</i> — the minimum number of seconds a learned ARP entry will be stored in the ARP table, expressed as a decimal integer. A value of 0 specifies that the timer is inoperative and learned ARP entries will not be aged.</p> <p><b>Values</b>      0 to 65535</p>                                                                                                                                                                                             |

## bfd

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|----------------|-----|---------------|----------------------------|----------------|-----|---------------|---------|----------------|---|---------------|----------------------------|----------------|-----|
| <b>Syntax</b>      | <b>bfd</b> <i>transmit-interval</i> [ <b>receive</b> <i>receive-interval</i> ] [ <b>multiplier</b> <i>multiplier</i> ] [ <b>echo-receive</b> <i>echo-interval</i> ]<br><b>no bfd</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Description</b> | <p>This command specifies the BFD parameters for the associated IP interface. If no parameters are defined, the default values are used.</p> <p>The multiplier specifies the number of consecutive BFD messages that must be missed from the peer before the BFD session state is changed to down. In addition, the Route Table Manager (RTM) is notified and the static routes with BFD enabled will go down, based on BFD status.</p> <p>The <b>no</b> form of the command removes BFD from the associated IGP protocol adjacency.</p>                                                                                                                                                                                                                                                                                                              |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Default</b>     | <b>no bfd</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Parameters</b>  | <p><i>transmit-interval</i> — sets the transmit interval for the BFD session</p> <table> <tr> <td><b>Values</b></td><td>100 to 100000 in milliseconds</td></tr> <tr> <td><b>Default</b></td><td>100</td></tr> </table> <p><i>receive-interval</i> — sets the receive interval for the BFD session</p> <table> <tr> <td><b>Values</b></td><td>100 to 100000 milliseconds</td></tr> <tr> <td><b>Default</b></td><td>100</td></tr> </table> <p><i>multiplier</i> — sets the multiplier for the BFD session</p> <table> <tr> <td><b>Values</b></td><td>3 to 20</td></tr> <tr> <td><b>Default</b></td><td>3</td></tr> </table> <p><i>echo-interval</i> — sets the minimum echo receive interval for the BFD session</p> <table> <tr> <td><b>Values</b></td><td>100 to 100000 milliseconds</td></tr> <tr> <td><b>Default</b></td><td>100</td></tr> </table> | <b>Values</b> | 100 to 100000 in milliseconds | <b>Default</b> | 100 | <b>Values</b> | 100 to 100000 milliseconds | <b>Default</b> | 100 | <b>Values</b> | 3 to 20 | <b>Default</b> | 3 | <b>Values</b> | 100 to 100000 milliseconds | <b>Default</b> | 100 |
| <b>Values</b>      | 100 to 100000 in milliseconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Default</b>     | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Values</b>      | 100 to 100000 milliseconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Default</b>     | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Values</b>      | 3 to 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Default</b>     | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Values</b>      | 100 to 100000 milliseconds                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |
| <b>Default</b>     | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |               |                               |                |     |               |                            |                |     |               |         |                |   |               |                            |                |     |

## ip-mtu

|                    |                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ip-mtu</b> <i>octets</i><br><b>no ip-mtu</b>                                                                                                                                                                     |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                       |
| <b>Description</b> | <p>This command configures the IP maximum transmit unit (packet) for this interface.</p> <p>The default value is derived from the port MTU.</p> <p>The <b>no</b> form of the command returns the default value.</p> |

|                   |                                                      |
|-------------------|------------------------------------------------------|
| <b>Default</b>    | <b>no ip-mtu</b>                                     |
| <b>Parameters</b> | <i>octets</i> — specifies the MTU for this interface |
| <b>Values</b>     | 512 to 2048                                          |

## ipcp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ipcp</b>                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command allows access to the Internet Protocol Control Protocol (IPCP) context within the interface configuration. Within this context, IPCP extensions can be configured to define such things as the remote IP address and DNS IP address to be signaled via IPCP on the associated PPP interface.</p> <p>This command is only applicable if the associated SAP/port is a PPP/MLPPP interface.</p> |
| <b>Default</b>     | <b>none</b>                                                                                                                                                                                                                                                                                                                                                                                                  |

## dns

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dns <i>ip-address</i> [secondary <i>ip-address</i>]</b><br><b>dns secondary <i>ip-address</i></b><br><b>no dns [<i>ip-address</i>] [secondary <i>ip-address</i>]</b>                                                                                                                                                                                                                                                                                   |
| <b>Context</b>     | config>service>vprn>if>ipcp                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command defines the DNS address(es) to be assigned to the far end of the associated PPP/MLPPP link via IPCP extensions.</p> <p>This command is only applicable if the associated SAP/port is a PPP/MLPPP interface with an IPCP encapsulation.</p> <p>The <b>no</b> form of the command deletes the specified primary DNS address, the secondary DNS address, or both addresses from the IPCP extension <b>peer-ip-address</b> configuration.</p> |
| <b>Default</b>     | <b>no dns</b>                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>ip-address</i> — a unicast IPv4 address for the primary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> <p><b>Values</b>      a.b.c.d (unicast only)</p> <p><b>secondary <i>ip-address</i></b> — a unicast IPv4 address for the secondary DNS server to be signaled to the far end of the associated PPP/MLPPP link via IPCP extensions</p> <p><b>Values</b>      a.b.c.d (unicast only)</p>      |



## peer-ip-address

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>peer-ip-address</b> <i>ip-address</i><br><b>no peer-ip-address</b>                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vprn>if>ipcp                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command defines the remote IP address to be assigned to the far end of the associated PPP/MLPPP link via IPCP extensions.</p> <p>This command is only applicable if the associated SAP/port is a PPP/MLPPP interface with an IPCP encapsulation.</p> <p>The interface must be shut down to modify the IPCP configuration.</p> <p>The <b>no</b> form of the command deletes the IPCP extension <b>peer-ip-address</b> configuration.</p> |
| <b>Default</b>     | <b>no peer-ip-address (0.0.0.0)</b>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>ip-address</i> — a unicast IPv4 address to be signaled to the far end of the associated PPP/ MLPPP link by IPCP extensions</p> <p><b>Values</b>      a.b.c.d (unicast only)</p>                                                                                                                                                                                                                                                           |

## mac

|                    |                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mac</b> <i>ieee-address</i><br><b>no mac</b> [ <i>ieee-address</i> ]                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b> | <p>This command assigns a specific MAC address to a VPRN IP interface.</p> <p>The <b>no</b> form of this command returns the MAC address of the IP interface to the default value.</p>                                                                                                                                                                                               |
| <b>Default</b>     | <b>The physical MAC address associated with the Ethernet interface that the SAP is configured on.</b>                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <p><i>ieee-address</i> — the 48-bit MAC address for the static ARP. Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses.</p> <p><b>Values</b>      <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i><br/>(where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i> and <i>ff</i> are hexadecimal numbers and cannot be all zeros)</p> |

## static-arp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>static-arp</b> <i>ip-address</i> <i>ieee-address</i><br>[no] <b>static-arp</b> <i>ip-address</i> [ <i>ieee-address</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command configures a static address resolution protocol (ARP) entry associating a subscriber IP address with a MAC address for the core router instance. This static ARP will appear in the core routing ARP table. A static ARP can only be configured if it exists on the network attached to the IP interface. If an entry for a particular IP address already exists and a new MAC address is configured for the IP address, the existing MAC address will be replaced with the new MAC address.</p> <p>The <b>no</b> form of this command removes a static ARP entry.</p> |
| <b>Default</b>     | none                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address for the static ARP in dotted-decimal notation</p> <p><b>Values</b>      a.b.c.d</p> <p><i>ieee-address</i> — the 48-bit MAC address for the static ARP. Allowed values are any non-broadcast, non-multicast MAC, and non-IEEE reserved MAC addresses.</p> <p><b>Values</b>      <i>aa:bb:cc:dd:ee:ff</i> or <i>aa-bb-cc-dd-ee-ff</i><br/>(where <i>aa</i>, <i>bb</i>, <i>cc</i>, <i>dd</i>, <i>ee</i> and <i>ff</i> are hexadecimal numbers and cannot be all zeros)</p>                                                                         |

---

## Interface DHCP Commands

### dhcp

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                    |
| <b>Context</b>     | config>service>vprn>interface                                  |
| <b>Description</b> | This command enables the context to configure DHCP parameters. |

### option

|                    |                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] option</b>                                                                                                                                                                                                                          |
| <b>Context</b>     | config>service>vprn>if>dhcp                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command enables DHCP Option 82 (Relay Agent Information Option) parameters processing and enters the context for configuring Option 82 suboptions.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>no option</b>                                                                                                                                                                                                                            |

### action

|                    |                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>action {replace   drop   keep}</b><br><b>no action</b>                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>vprn>if>dhcp>option                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | <p>This command configures the processing required when the 7705 SAR receives a DHCP request that already has a Relay Agent Information Option (Option 82) field in the packet.</p> <p>The <b>no</b> form of this command returns the system to the default value.</p>                                                                                                                     |
| <b>Default</b>     | <b>keep</b> (as per RFC 3046, <i>DHCP Relay Agent Information Option</i> , section 2.1.1, Reforwarded DHCP requests, the default is to keep the existing information intact. The exception to this occurs if the gi-addr (gateway interface address) of the received packet is the same as the ingress address on the router. In this case, the packet is dropped and an error is logged.) |
| <b>Parameters</b>  | <p><b>replace</b> — in the upstream direction (from the user), the existing Option 82 field is replaced with the Option 82 field from the router. In the downstream direction (towards the user) the Option 82 field is stripped (in accordance with RFC 3046).</p> <p><b>drop</b> — the packet is dropped, and an error is logged</p>                                                     |

**keep** — the existing information is kept in the packet and the router does not add any additional information. In the downstream direction, the Option 82 field is not stripped and is sent on towards the client.

The behavior is slightly different in the case of Vendor Specific Options (VSOs). When the **keep** parameter is specified, the router will insert its own VSO into the Option 82 field. This will only be done when the incoming message has an Option 82 field already.

If no Option 82 field is present, the router will not create the Option 82 field. In this case, no VSO will be added to the message.

### circuit-id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>circuit-id</b> [ <b>ascii-tuple</b>   <b>ifindex</b>   <b>sap-id</b>   <b>vlan-ascii-tuple</b> ]<br><b>no circuit-id</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>vprn>if>dhcp>option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command sends either an ASCII tuple or the interface index (If Index) on the specified SAP ID in the circuit-id suboption of the DHCP packet. The If Index of a router interface can be displayed using the command <b>show&gt;router&gt;interface&gt; detail</b>. This option specifies data that must be unique to the router that is relaying the circuit.</p> <p>If disabled, the <b>circuit-id</b> suboption of the DHCP packet is left empty.</p> <p>The <b>no</b> form of this command returns the system to the default.</p>                                                                                                       |
| <b>Default</b>     | <b>ascii-tuple</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <p><b>ascii-tuple</b> — the ASCII-encoded concatenated “tuple” will be used, where the “tuple” consists of the <i>access-node-identifier</i>, <i>service-id</i>, and <i>interface-name</i>, separated by the syntax symbol “[”</p> <p><b>ifindex</b> — the interface index will be used</p> <p><b>sap-id</b> — the SAP ID will be used</p> <p><b>vlan-ascii-tuple</b> — specifies that the format will include VLAN-id and dot1p bits, in addition to the <b>ascii-tuple</b>. The format is supported on dot1q ports only. Thus, when the Option 82 bits are stripped, dot1p bits will be copied to the Ethernet header of an outgoing packet.</p> |

### remote-id

|                    |                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>remote-id</b> [ <b>mac</b>   <b>string</b> <i>string</i> ]<br><b>no remote-id</b>                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>vprn>if>dhcp>option                                                                                                                                                                                                                                                                  |
| <b>Description</b> | <p>This command sends the MAC address of the remote end (typically, the DHCP client) in the <b>remote-id</b> suboption of the DHCP packet. This command identifies the host at the other end of the circuit. If disabled, the <b>remote-id</b> suboption of the DHCP packet will be left empty.</p> |

The **no** form of this command returns the system to the default.

|                   |                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Default</b>    | <b>remote-id</b>                                                                                            |
| <b>Parameters</b> | <b>mac</b> — the MAC address of the remote end is encoded in the suboption<br><i>string</i> — the remote ID |
| <b>Values</b>     | up to 32 alphanumeric characters                                                                            |

## vendor-specific-option

|                    |                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] vendor-specific-option</b>                                                                                                                                |
| <b>Context</b>     | config>service>vprn>if>dhcp>option                                                                                                                                |
| <b>Description</b> | This command enables the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet and enters the context for configuring the vendor-specific suboptions. |

## client-mac-address

|                    |                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] client-mac-address</b>                                                                                                                                                                                                                                                           |
| <b>Context</b>     | config>service>vprn>if>dhcp>option>vendor                                                                                                                                                                                                                                                |
| <b>Description</b> | This command enables the sending of the MAC address in the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet.<br><br>The <b>no</b> form of the command disables the sending of the MAC address in the Alcatel-Lucent vendor specific suboption of the DHCP relay packet. |
| <b>Default</b>     | <b>no client-mac-address</b>                                                                                                                                                                                                                                                             |

## sap-id

|                    |                                                                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap-id</b>                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>vprn>if>dhcp>option>vendor                                                                                                                                                                                                                                      |
| <b>Description</b> | This command enables the sending of the SAP ID in the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet.<br><br>The <b>no</b> form of the command disables the sending of the SAP ID in the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet. |
| <b>Default</b>     | <b>no sap-id</b>                                                                                                                                                                                                                                                               |

### service-id

|                    |                                                                                                                                                                                                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] service-id</b>                                                                                                                                                                                                                                                                        |
| <b>Context</b>     | config>service>vprn>if>dhcp>option>vendor                                                                                                                                                                                                                                                     |
| <b>Description</b> | <p>This command enables the sending of the service ID in the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet.</p> <p>The <b>no</b> form of the command disables the sending of the service ID in the Alcatel-Lucent vendor-specific suboption of the DHCP relay packet.</p> |
| <b>Default</b>     | <b>no service-id</b>                                                                                                                                                                                                                                                                          |

### string

|                    |                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>string <i>text</i></b><br><b>no string</b>                                                                                                                               |
| <b>Context</b>     | config>service>vprn>if>dhcp>option>vendor                                                                                                                                   |
| <b>Description</b> | <p>This command specifies the vendor-specific suboption string of the DHCP relay packet.</p> <p>The <b>no</b> form of the command returns the default value.</p>            |
| <b>Parameters</b>  | <i>text</i> — any combination of ASCII characters up to 32 characters in length. If spaces are used in the string, the entire string must be enclosed within double quotes. |
| <b>Default</b>     | <b>no string</b>                                                                                                                                                            |

### system-id

|                    |                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] system-id</b>                                                                                                 |
| <b>Context</b>     | config>service>vprn>if>dhcp>option>vendor                                                                             |
| <b>Description</b> | This command specifies whether the system ID is encoded in the Alcatel-Lucent vendor-specific suboption of Option 82. |
| <b>Default</b>     | <b>none</b>                                                                                                           |

## server

|                    |                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>server</b> <i>server1</i> [ <i>server2...</i> (up to 8 max)]<br><b>no server</b>                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vprn>if>dhcp                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b> | This command specifies a list of servers where requests will be forwarded. The list of servers can be entered as either IP addresses or fully qualified domain names. There must be at least one server specified for DHCP Relay to work. If there are multiple servers specified, the request is forwarded to all of the servers in the list. There can be a maximum of 8 DHCP servers configured. |
| <b>Default</b>     | <b>no server</b>                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parameters</b>  | <i>server</i> — the DHCP server IP address                                                                                                                                                                                                                                                                                                                                                          |

## trusted

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] trusted</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | config>service>vprn>if>dhcp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command enables or disables trusted mode on an IP interface.</p> <p>According to RFC 3046, <i>DHCP Relay Agent Information Option</i>, a DHCP request where the gi-addr (gateway interface address) is 0.0.0.0 and which contains an Option 82 field in the packet, should be discarded, unless it arrives on a “trusted” circuit.</p> <p>If trusted mode is enabled on an IP interface, the relay agent (the 7705 SAR) will modify the request's gi-addr to be equal to the ingress interface and forward the request.</p> <p>This behavior only applies when the <b>action</b> in the Relay Agent Information Option is “keep”.</p> <p>In the case where the Option 82 field is being replaced by the relay agent (<b>action</b> = “replace”), the original Option 82 information is lost. Thus, in this case, there is no reason for enabling the <b>trusted</b> option.</p> <p>The <b>no</b> form of this command returns the system to the default.</p> |
| <b>Default</b>     | <b>no trusted</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

---

## Interface ICMP Commands

### icmp

|                    |                                                                                                                                            |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>icmp</b>                                                                                                                                |
| <b>Context</b>     | config>service>vprn>interface                                                                                                              |
| <b>Description</b> | This command configures Internet Control Message Protocol (ICMP) parameters on a VPRN service and enters the context for configuring ICMP. |

### mask-reply

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] mask-reply</b>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | config>service>vprn>if>icmp                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command enables responses to ICMP mask requests on the router interface.</p> <p>If a local node sends an ICMP mask request to the router interface, the <b>mask-reply</b> command configures the router interface to reply to the request.</p> <p>By default, the router instance will reply to mask requests.</p> <p>The <b>no</b> form of this command disables replies to ICMP mask requests on the router interface.</p> |
| <b>Default</b>     | <b>mask-reply</b>                                                                                                                                                                                                                                                                                                                                                                                                                    |

### ttl-expired

|                    |                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ttl-expired</b> <i>number seconds</i><br><b>no ttl-expired</b> [ <i>number seconds</i> ]                                                                                                                                                                                                                                                             |
| <b>Context</b>     | config>service>vprn>if>icmp                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command configures the rate at which ICMP TTL-expired messages are issued by the IP interface.</p> <p>By default, generation of ICMP TTL-expired messages is enabled at a maximum rate of 100 per 10-s time interval.</p> <p>The <b>no</b> form of this command disables limiting the rate of TTL-expired messages on the router interface.</p> |
| <b>Default</b>     | <b>ttl-expired 100 10</b>                                                                                                                                                                                                                                                                                                                               |



|                   |                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Parameters</b> | <i>number</i> — the maximum number of ICMP TTL-expired messages to send, expressed as a decimal integer. This parameter must be specified along with the <i>seconds</i> parameter. |
| <b>Values</b>     | 10 to 100                                                                                                                                                                          |
|                   | <i>seconds</i> — the time, in seconds, used to limit the number of ICMP TTL-expired messages that can be issued, expressed as a decimal integer                                    |
| <b>Values</b>     | 1 to 60                                                                                                                                                                            |

## unreachables

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>unreachables</b> <i>number seconds</i><br><b>no unreachables</b> [ <i>number seconds</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>vprn>if>icmp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b> | <p>This command enables and configures the rate of ICMP host and network destination unreachable messages issued on the router interface.</p> <p>The <b>unreachables</b> command enables the generation of ICMP destination unreachables on the router interface. The rate at which ICMP unreachables is issued can be controlled with the <i>number</i> and <i>seconds</i> parameters by indicating the maximum number of destination unreachable messages that can be issued on the interface for a given time interval.</p> <p>By default, generation of ICMP destination unreachable messages is enabled at a maximum rate of 100 per 10-s time interval.</p> <p>The <b>no</b> form of this command disables the generation of ICMP destination unreachable messages on the router interface.</p> |
| <b>Default</b>     | <b>unreachables 100 10</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Parameters</b>  | <p><i>number</i> — the maximum number of ICMP unreachable messages to send. This parameter must be specified along with the <i>seconds</i> parameter.</p> <p><b>Values</b> 10 to 100</p> <p><i>seconds</i> — the time frame, in seconds, used to limit the number of ICMP unreachable messages that can be issued</p> <p><b>Values</b> 1 to 60</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

---

## Interface SAP Commands

### sap

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                            |                                                         |  |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------|--|
| Syntax      | <b>sap</b> <i>sap-id</i> [ <b>create</b> ]<br><b>no sap</b> <i>sap-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                            |                                                         |  |
| Context     | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                            |                                                         |  |
| Description | <p>This command creates a Service Access Point (SAP) within a service when used with the <b>create</b> keyword. The <b>create</b> keyword is not needed when entering an existing SAP to edit SAP parameters.</p> <p>A SAP is a combination of port and encapsulation parameters that identify the service access point on the interface and within the 7705 SAR. Each SAP must be unique.</p> <p>All SAPs must be explicitly created. If no SAPs are created within a service or on an IP interface, a SAP will not exist on that object.</p> <p>The SAP is owned by the service in which it was created.</p> <p>A SAP can only be associated with a single service. A SAP can only be defined on a port that has been configured as an access port using the <b>config interface</b> <i>port-type</i> <i>port-id</i> <b>mode access</b> command. Channelized TDM ports are always access ports.</p> <p>If a port is shut down with the <b>shutdown</b> command, all SAPs on that port become operationally down. When a service is shut down, SAPs for the service are not displayed as operationally down although all traffic traversing the service will be discarded. The operational state of a SAP is relative to the operational state of the port on which the SAP is defined.</p> <p>The <b>no</b> form of this command deletes the SAP with the specified port. When a SAP is deleted, all configuration parameters for the SAP will also be deleted.</p> |                                                                            |                                                         |  |
|             | Default                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>no SAPs are defined</b>                                                 |                                                         |  |
|             | Parameters                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <i>sap-id</i> — the physical port identifier portion of the SAP definition |                                                         |  |
|             | Values                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | null:                                                                      | <i>port-id</i>   <i>bundle-id</i>   <i>aps-id</i>       |  |
|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | dot1q:                                                                     | <i>port-id</i>   <i>bundle-id</i>   <i>aps-id:qtag1</i> |  |
|             | ipcp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <i>slot/mda/port.channel</i>                                               |                                                         |  |
|             | <i>port-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <i>slot/mda/port</i> [ <i>.channel</i> ]                                   |                                                         |  |
|             | <i>bundle-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>bundle-type-slot/mda.bundle-num</b>                                     |                                                         |  |
|             | <i>bundle-num</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1 to 32                                                                    |                                                         |  |
|             | <i>group-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1 to 64                                                                    |                                                         |  |
|             | <i>qtag1</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0 to 4094                                                                  |                                                         |  |
|             | <b>create</b> — keyword used to create a SAP instance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                            |                                                         |  |

## accounting-policy

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>accounting-policy</b> <i>acct-policy-id</i><br><b>no accounting-policy</b> [ <i>acct-policy-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | config>service>vprn>if>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> | <p>This command creates the accounting policy context that can be applied to an interface SAP.</p> <p>An accounting policy must be defined before it can be associated with a SAP. Accounting policies are configured in the <b>config log</b> context. A maximum of one accounting policy can be associated with a SAP at one time.</p> <p>If the <i>acct-policy-id</i> does not exist, an error message is generated.</p> <p>The <b>no</b> form of this command removes the accounting policy association from the SAP, and the accounting policy reverts to the default.</p> |
| <b>Default</b>     | <b>no accounting policy</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Parameters</b>  | <i>acct-policy-id</i> — the accounting policy ID as configured in the <b>config log accounting-policy</b> context                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Values</b>      | 1 to 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## collect-stats

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | config>service>vprn>if>sap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables accounting and statistical data collection for either an interface SAP or network port. When applying accounting policies, the data, by default, is collected in the appropriate records and written to the designated billing file.</p> <p>When the <b>no collect-stats</b> command is issued, the statistics are still accumulated. However, the CPU will not obtain the results and write them to the billing file. If a subsequent <b>collect-stats</b> command is issued, then the counters written to the billing file include all the traffic while the <b>no collect-stats</b> command was in effect.</p> |
| <b>Default</b>     | <b>collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

---

## Interface SAP Filter and QoS Policy Commands

### egress

|                    |                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                                                                                                                                                                                                                                                            |
| <b>Context</b>     | config>service>vprn>if>sap                                                                                                                                                                                                                                                                               |
| <b>Description</b> | <p>This command enables the context to configure egress SAP Quality of Service (QoS) policies and filter policies.</p> <p>If no sap-egress QoS policy is defined, the system default sap-egress QoS policy is used for egress processing. If no egress filter is defined, no filtering is performed.</p> |

### ingress

|                    |                                                                                                                                                                                                                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | config>service>vprn>if>sap                                                                                                                                                                                                                                                                                    |
| <b>Description</b> | <p>This command enables the context to configure ingress SAP Quality of Service (QoS) policies and filter policies.</p> <p>If no sap-ingress QoS policy is defined, the system default sap-ingress QoS policy is used for ingress processing. If no ingress filter is defined, no filtering is performed.</p> |

### filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>no filter</b> [ <i>ip ip-filter-id</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Context</b>     | config>service>vprn>if>sap>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | <p>This command associates an IP filter policy with an ingress Service Access Point (SAP) or IP interface. Filter policies control the forwarding and dropping of packets based on IP matching criteria.</p> <p>The <b>filter</b> command is used to associate a filter policy with a specified <i>ip-filter-id</i> with an ingress SAP. The <i>ip-filter-id</i> must already be defined before the filter command is executed. If the filter policy does not exist, the operation will fail and an error message will be returned.</p> <p>In general, filters applied to SAPs (ingress) apply to all packets on the SAP. One exception is that non-IP packets are not applied to IP match criteria, in which case the default action in the filter policy applies to these packets.</p> |

The **no** form of this command removes any configured filter ID association with the SAP or IP interface. The filter ID itself is not removed from the system unless the scope of the created filter is set to **local**. To avoid deletion of the filter ID and only break the association with the service object, use the **scope** command within the filter definition to change the scope to **local** or **global**. The default scope of a filter is **local**.

**Parameters** *ip-filter-id* — the IP filter policy. The filter ID must already exist within the created IP filters.

**Values** 1 to 65535

## qos

**Syntax** **qos** *policy-id*  
**no qos** [*policy-id*]

**Context** config>service>vprn>if>sap>egress  
 config>service>vprn>if>sap>ingress

**Description** This command associates a QoS policy with an ingress or egress SAP. QoS ingress and egress policies are important for the enforcement of SLA agreements. The policy ID must be defined prior to associating the policy with a SAP. If the *policy-id* does not exist, an error will be returned.

The **qos** command is used to associate both ingress and egress QoS policies. The **qos** command only allows ingress policies to be associated on SAP ingress and egress policies on SAP egress. Attempts to associate a QoS policy of the wrong type returns an error; for example, trying to associate an egress policy on SAP ingress.

Only one ingress and one egress QoS policy can be associated with a SAP at one time. Attempts to associate a second QoS policy of a given type will return an error.

By default, no specific QoS policy is associated with the SAP for ingress or egress, so the default QoS policy is used.

The **no** form of this command removes the QoS policy association from the SAP, and the QoS policy reverts to the default.

**Parameters** *policy-id* — the ingress or egress policy ID to associate with the SAP on ingress or egress. The policy ID must already exist.

**Values** 1 to 65535

---

## Interface Spoke SDP Commands

### spoke-sdp

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>        | <b>spoke-sdp</b> <i>sdp-id:vc-id</i> [ <b>create</b> ]<br><b>no spoke-sdp</b> <i>sdp-id:vc-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Context</b>       | config>service>vprn>interface                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>   | <p>This command binds a service to an existing Service Distribution Point (SDP).</p> <p>A spoke SDP is treated like the equivalent of a traditional bridge “port”, where flooded traffic received on the spoke SDP is replicated on all other “ports” (other spoke SDPs or SAPs) and not transmitted on the port it was received on.</p> <p>The SDP has an operational state that determines the operational state of the SDP within the service. For example, if the SDP is administratively or operationally down, the SDP for the service is down.</p> <p>The SDP must already be defined in the <b>config&gt;service&gt;sdp</b> context in order to associate it with a service. If the <b>sdp</b> <i>sdp-id</i> is not already configured, an error message is generated. If the <i>sdp-id</i> does exist, a binding between that <i>sdp-id</i> and the service is created.</p> <p>SDPs must be explicitly associated and bound to a service. If an SDP is not bound to a service, no far-end devices can participate in the service.</p> <p>Class-based forwarding is not supported on a spoke SDP used for termination on an IES or VPRN service. All packets are forwarded over the default LSP.</p> <p>The <b>no</b> form of this command removes the SDP binding from the service. The SDP configuration is not affected; only the binding of the SDP to the service. Once the binding is removed, no packets are forwarded to the far-end router. The spoke SDP must be shut down first before it can be deleted from the configuration.</p> |
| <b>Default</b>       | n/a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Special Cases</b> | <b>VPRN</b> — several SDPs can be bound to a VPRN service. Each SDP must be destined for a different 7705 SAR router. If two <i>sdp-id</i> bindings terminate on the same 7705 SAR, an error occurs and the second SDP binding is rejected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>    | <p><i>sdp-id</i> — the SDP identifier</p> <p><b>Values</b> 1 to 17407</p> <p><i>vc-id</i> — the virtual circuit identifier</p> <p><b>Values</b> 1 to 4294967295</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## collect-stats

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | <p>This command enables accounting and statistical data collection for an interface spoke SDP. When applying accounting policies, the data, by default, is collected in the appropriate records and written to the designated billing file.</p> <p>When the <b>no collect-stats</b> command is issued, the statistics are still accumulated by the CSM cards. However, the CPU will not obtain the results and write them to the billing file. If a subsequent <b>collect-stats</b> command is issued, then the counters written to the billing file include all the statistics collected while the <b>no collect-stats</b> command was in effect.</p> |
| <b>Default</b>     | <b>collect-stats</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## egress

|                    |                                                                      |
|--------------------|----------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress</b>                                                        |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp                              |
| <b>Description</b> | This command enables the context to configure egress SDP parameters. |

## vc-label

|                    |                                                                                                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label egress-vc-label</b><br><b>no vc-label [egress-vc-label]</b>                                                                                   |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp>egress                                                                                                            |
| <b>Description</b> | This command configures the static MPLS VC label used by the 7705 SAR to send packets to the far-end device in this service via this SDP.                 |
| <b>Parameters</b>  | <i>egress-vc-label</i> — a VC egress value that indicates a specific connection<br><div style="margin-left: 40px;"><b>Values</b>      16 to 1048575</div> |

## ingress

|                    |                                                                       |
|--------------------|-----------------------------------------------------------------------|
| <b>Syntax</b>      | <b>ingress</b>                                                        |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp                               |
| <b>Description</b> | This command enables the context to configure ingress SDP parameters. |

## filter

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>filter ip</b> <i>ip-filter-id</i><br><b>no filter</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp>ingress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b> | <p>This command associates an IP filter policy with a spoke SDP. Filter policies control the forwarding and dropping of packets based on IP or MAC matching criteria.</p> <p>The <i>ip-filter-id</i> must already be defined before the filter command is executed. If the filter policy does not exist, the operation will fail and an error message will be returned.</p> <p>In general, filters applied to ingress spoke SDPs will apply to all packets on the spoke SDP. One exception is that non-IP packets are not applied to IP match criteria, so the default action in the filter policy applies to these packets.</p> <p>The <b>no</b> form of this command removes any configured filter ID association with the spoke SDP.</p> |
| <b>Parameters</b>  | <p><i>ip-filter-id</i> — specifies the IP filter policy. The filter ID must already exist within the created IP filters.</p> <p><b>Values</b>      1 to 65535</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## vc-label

|                    |                                                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>vc-label</b> <i>ingress-vc-label</i><br><b>no vc-label</b> [ <i>ingress-vc-label</i> ]                                                 |
| <b>Context</b>     | config>service>vprn>interface>spoke-sdp>ingress                                                                                           |
| <b>Description</b> | This command configures the static MPLS VC label used by the far-end device to send packets to the 7705 SAR in this service via this SDP. |
| <b>Parameters</b>  | <p><i>ingress-vc-label</i> — a VC ingress value that indicates a specific connection</p> <p><b>Values</b>      2048 to 18431</p>          |



## Show Service Commands

### egress-label

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>egress-label</b> <i>start-label</i> [ <i>end-label</i> ]                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | <p>This command displays service information using the range of egress labels.</p> <p>If only the mandatory <i>start-label</i> parameter is specified, only services using the specified label are displayed.</p> <p>If both <i>start-label</i> and <i>end-label</i> parameters are specified, the services using the labels in the specified range are displayed.</p> <p>Use the <b>show router ldp bindings</b> command to display dynamic labels.</p>     |
| <b>Parameters</b>  | <p><i>end-label</i> — the ending egress label value for which to display services using the label range</p> <p><b>Values</b> 2049 to 131071</p> <p><b>Default</b> the <i>start-label</i> value</p> <p><i>start-label</i> — the starting egress label value for which to display services using the label range. If only <i>start-label</i> is specified, services only using <i>start-label</i> are displayed.</p> <p><b>Values</b> 0, or 2048 to 131071</p> |
| <b>Output</b>      | The following output is an example of service egress label information, and <a href="#">Table 77</a> describes the fields.                                                                                                                                                                                                                                                                                                                                   |

### Sample Output

In the example below, services 3, 5 and 6 are IES, and services 5000 and 5001 are VPLS services.

```
*A:ALU-12>show>service# egress-label 0 131071
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

3 15:15 Spok 0 0
5 5:5 Spok 0 0
6 5:6 Spok 0 0
5000 15:5000 Mesh 0 0
5000 15:5001 Spok 0 0
5001 5001:100 Spok 0 0

Number of Bindings Found : 6
=====
```

**Table 77: Show Service Egress Output Fields**

| <b>Label</b>             | <b>Description</b>                                                                                |
|--------------------------|---------------------------------------------------------------------------------------------------|
| Svc Id                   | The ID that identifies a service                                                                  |
| Sdp Binding              | The ID that identifies an SDP                                                                     |
| Type                     | Indicates whether the SDP binding is a spoke or a mesh                                            |
| I. Lbl                   | The VC label used by the far-end device to send packets to this device in this service by the SDP |
| E. Lbl                   | The VC label used by this device to send packets to the far-end device in this service by the SDP |
| Number of Bindings Found | The total number of SDP bindings that exist within the specified label range                      |

id

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Context</b>     | show>service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b> | This command accesses the context to display information for a particular service ID. Once the particular service context has been accessed, the filtering commands listed below are available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <i>service-id</i> — the unique service identification number that identifies the service in the service domain<br><b>all</b> — detailed information about the service<br><b>arp</b> — ARP entries for the service<br><b>base</b> — basic service information<br><b>dhcp</b> — DHCP entries for the service<br><b>endpoint</b> — service endpoint information<br><b>fdb</b> — FDB entries for the service<br><b>interface</b> — service interfaces<br><b>labels</b> — labels being used by this service<br><b>mac-move</b> — MAC move related information about this service<br><b>sap</b> — SAPs associated to the service<br><b>sdp</b> — SDPs associated with the service |

**split-horizon** — service split horizon groups

**static-host** — static hosts configured on this service

all

|                    |                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | all                                                                                                                  |
| <b>Context</b>     | show>service>id                                                                                                      |
| <b>Description</b> | This command displays detailed information for all aspects of the service.                                           |
| <b>Output</b>      | The following output is an example of service ID all information, and <a href="#">Table 78</a> describes the fields. |

### Sample Output

```
*A:ALU-2#>show>service>id# all
=====
Service Detailed Information
=====
Service Id : 6
Service Type : VPRN
Customer Id : 1
Last Status Change: 02/03/2010 21:59:01
Last Mgmt Change : 03/01/2010 18:55:58
Admin State : Down
Oper State : Down

Route Dist. : 12.34.56.78:655
AS Number : None
ECMP : Enabled
Max IPv4 Routes : No Limit
Max IPv6 Routes : No Limit
Vrf Target : None
Vrf Import : None
Vrf Export : None

SAP Count : 1
SDP Bind Count : 1

Service Destination Points (SDPs)

Sdp Id 1:6 -(10.10.10.10)

SDP Id : 1:6
VC Type : n/a
Admin Path MTU : 0
Far End : 10.10.10.10
Type : Spoke
VC Tag : n/a
Oper Path MTU : 0
Delivery : MPLS

Admin State : Up
Acct. Pol : None
Ingress Label : n/a
Ing mac Fltr : n/a
Ing ip Fltr : n/a
Ing ipv6 Fltr : n/a
Admin ControlWord : Not Preferred
Oper State : Down
Collect Stats : Disabled
Egress Label : n/a
Egr mac Fltr : n/a
Egr ip Fltr : n/a
Egr ipv6 Fltr : n/a
Oper ControlWord : False
```

## VP RN Services Command Reference

```
Last Status Change : 02/03/2010 21:59:01 Signaling : n/a
Last Mgmt Change : 03/01/2010 18:55:58
Class Fwding State : Down
Flags : SdpOperDown

KeepAlive Information :
Admin State : Disabled Oper State : Disabled
Hello Time : 10 Hello Msg Len : 0
Max Drop Count : 3 Hold Down Time : 10

Statistics :
I. Fwd. Pkts. : n/a I. Dro. Pkts. : n/a
I. Fwd. Octs. : n/a I. Dro. Octs. : n/a
E. Fwd. Pkts. : n/a E. Fwd. Octets : n/a

Associated LSP LIST :
No LSPs Associated
```

```

Number of SDPs : 1

```

```

Service Access Points

```

```

SAP 1/5/2

```

```
Service Id : 6
SAP : 1/5/2 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02
Sub Type : regular
Dot1Q Ethertype : 0x8100 QinQ Ethertype : 0x8100

Admin MTU : 1514 Oper MTU : 1514
Ingr IP Fltr-Id : 2 Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
Ingr IPv6 Fltr-Id : n/a Egr IPv6 Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max
Q Frame-Based Acct : Disabled

Acct. Pol : None Collect Stats : Disabled

Anti Spoofing : None Nbr Static Hosts : 0

```

```

QOS

```

```
Ingress qos-policy : 2 Egress qos-policy : 2
Shared Q plcy : n/a Multipoint shared : Disabled

Sap Statistics

```

Last Cleared Time : N/A

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | 0      |
| Off. HiPrio             | : 0     | 0      |
| Off. LowPrio            | : 0     | 0      |

Queueing Stats(Ingress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. HiPrio  | : 0 | 0 |
| Dro. LowPrio | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

Queueing Stats(Egress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. InProf  | : 0 | 0 |
| Dro. OutProf | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

-----  
Sap per Queue stats  
-----

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 0     | 0      |
| Off. LoPrio                          | : 0     | 0      |
| Dro. HiPrio                          | : 0     | 0      |
| Dro. LoPrio                          | : 0     | 0      |
| For. InProf                          | : 0     | 0      |
| For. OutProf                         | : 0     | 0      |

Egress Queue 1

|              |     |   |
|--------------|-----|---|
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |
| Dro. InProf  | : 0 | 0 |
| Dro. OutProf | : 0 | 0 |

-----  
Service Interfaces  
-----

-----  
Interface  
-----

|             |                  |              |             |
|-------------|------------------|--------------|-------------|
| If Name     | : vprn_interface |              |             |
| Admin State | : Up             | Oper (v4/v6) | : Down/Down |
| Protocols   | : None           |              |             |

IP Addr/mask : Not Assigned  
-----

Details  
-----

|               |                       |                 |         |
|---------------|-----------------------|-----------------|---------|
| If Index      | : 2                   | Virt. If Index  | : 2     |
| Last Oper Chg | : 02/03/2010 21:59:02 | Global If Index | : 125   |
| SAP Id        | : 1/5/2               |                 |         |
| TOS Marking   | : Trusted             | If Type         | : VPRN  |
| SNTP B.Cast   | : False               |                 |         |
| MAC Address   | :                     | Arp Timeout     | : 14400 |

```

IP MTU : 1500
Arp Populate : Disabled
LdpSyncTimer : None

ICMP Mask Reply : True
Host Conn Verify : Disabled

Proxy ARP Details
Rem Proxy ARP : Disabled
Policies : none

Local Proxy ARP : Disabled

Proxy Neighbor Discovery Details
Local Pxy ND : Disabled
Policies : none

DHCP Details
Admin State : Down
Action : Keep

Lease Populate : 0
Trusted : Disabled

DHCP6 Relay Details
Admin State : Down
Oper State : Down
If-Id Option : None
Src Addr : Not configured

Lease Populate : 0
Nbr Resolution : Disabled
Remote Id : Disabled

DHCP6 Server Details
Admin State : Down

Max. Lease States : 8000

ICMP Details
Redirects : Number - 100
Unreachables : Number - 100
TTL Expired : Number - 100

Time (seconds) - 10
Time (seconds) - 10
Time (seconds) - 10

IPCP Address Extension Details
Peer IP Addr : Not configured
Peer Pri DNS Addr : Not configured
Peer Sec DNS Addr : Not configured
=====
*A:ALU-2#>show>service>id#

```

**Table 78: Show Service ID All Output Fields**

| Label                               | Description                                                                                          |
|-------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Service Detailed Information</b> |                                                                                                      |
| Service Id                          | The service identifier                                                                               |
| VPN Id                              | The number that identifies the VPN                                                                   |
| Service Type                        | The type of service (VPRN)                                                                           |
| Customer Id                         | The customer identifier                                                                              |
| Last Status Change                  | The date and time of the most recent change in the administrative or operating status of the service |
| Last Mgmt Change                    | The date and time of the most recent management-initiated change to this service                     |

**Table 78: Show Service ID All Output Fields (Continued)**

| Label                                    | Description                                                                                                                                                      |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Admin State                              | The desired state of the service                                                                                                                                 |
| Oper State                               | The current operational state of the service                                                                                                                     |
| Route Dist.                              | The route distribution number                                                                                                                                    |
| VPRN Type                                | Only valid in services that accept mesh SDP bindings. It is used to validate the VC ID portion of each mesh SDP binding defined in the service.                  |
| AS Number                                | The autonomous system number                                                                                                                                     |
| Router Id                                | The router ID for this service                                                                                                                                   |
| ECMP                                     | Displays equal cost multipath information                                                                                                                        |
| ECMP Max Routes                          | The maximum number of routes that can be received from the neighbors in the group or for the specific neighbor                                                   |
| Max IPv4 Routes                          | The maximum number of routes that can be used for path sharing                                                                                                   |
| Max IPv6 Routes                          | Not applicable                                                                                                                                                   |
| Auto Bind                                | The automatic binding type for the SDP assigned to this service                                                                                                  |
| Vrf Target                               | The VRF target applied to this service                                                                                                                           |
| Vrf Import                               | The VRF import policy applied to this service                                                                                                                    |
| Vrf Export                               | The VRF export policy applied to this service                                                                                                                    |
| SAP Count                                | The number of SAPs specified for this service                                                                                                                    |
| SDP Bind Count                           | The number of SDPs bound to this service                                                                                                                         |
| <b>Service Destination Points (SDPs)</b> |                                                                                                                                                                  |
| SDP Id                                   | The SDP identifier                                                                                                                                               |
| Type                                     | Indicates whether this service SDP binding is a spoke or a mesh                                                                                                  |
| VC Type                                  | The VC type: ether or vlan                                                                                                                                       |
| VC Tag                                   | The explicit dot1Q value used when encapsulating to the SDP far end                                                                                              |
| Admin Path MTU                           | The desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |

**Table 78: Show Service ID All Output Fields (Continued)**

| Label              | Description                                                                                                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper Path MTU      | The actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |
| Far End            | Specifies the IP address of the remote end of the GRE, MPLS, or IP tunnel defined by this SDP                                                                   |
| Delivery           | Specifies the type of delivery used by the SDP: GRE, MPLS, or IP                                                                                                |
| Admin State        | The administrative state of this SDP                                                                                                                            |
| Oper State         | The operational state of this SDP                                                                                                                               |
| Acct. Pol          | The accounting policy applied to the SDP                                                                                                                        |
| Collect Stats      | Specifies whether accounting statistics are collected on the SDP                                                                                                |
| Ingress Label      | The label used by the far-end device to send packets to this device in this service by this SDP                                                                 |
| Egress Label       | The label used by this device to send packets to the far-end device in this service by this SDP                                                                 |
| Ing mac Fltr       | Not applicable                                                                                                                                                  |
| Egr mac Fltr       | Not applicable                                                                                                                                                  |
| Ing ip Fltr        | The SDP ingress filter policy ID                                                                                                                                |
| Egr ip Fltr        | The SDP egress filter policy ID                                                                                                                                 |
| Ing ipv6 Fltr      | Not applicable                                                                                                                                                  |
| Egr ipv6 Fltr      | Not applicable                                                                                                                                                  |
| Admin ControlWord  | The administrative state of the control word: Preferred (control word enabled) or Not Preferred (control word disabled)                                         |
| Oper ControlWord   | The operational state of the control word: True (control word enabled) or False (control word disabled)                                                         |
| Last Status Change | The date and time of the most recent status change to this SDP                                                                                                  |
| Signaling          | The signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on this SDP                                         |
| Last Mgmt Change   | The date and time of the most recent management-initiated change to this SDP                                                                                    |



**Table 78: Show Service ID All Output Fields (Continued)**

| <b>Label</b>                 | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Class Fwding State           | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flags                        | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SapAdminDown, InterfaceAdminDown, PortOperDown, PortMTUTooSmall, L2OperDown, SapIngressQoSMismatch, SapEgressQoSMismatch, RelearnLimitExceeded, RxProtSrcMac, ParentIfAdminDown, NoSapIpipeCelpAddr, TodResourceUnavail, TodMssResourceUnavail, SapParamMismatch, CemSapNoEcidOrMacAddr, StandByForMcRing, ServiceMTUTooSmall, SapIngressNamedPoolMismatch, SapEgressNamedPoolMismatch, NoSapEpipeRingNode |
| <b>KeepAlive Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Admin State                  | The operating status of the keepalive protocol                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Oper State                   | The current status of the keepalive protocol                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Hello Time                   | Specifies how often the SDP echo request messages are transmitted on this SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Hello Msg Len                | The length of the SDP echo request messages transmitted on this SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Max Drop Count               | The maximum number of consecutive SDP Echo Request messages that can be unacknowledged before the keepalive protocol reports a fault                                                                                                                                                                                                                                                                                                                                                                                         |
| Hold Down Time               | The time to wait before the keepalive operating status is eligible to enter the alive state                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Statistics</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| I. Fwd. Pkts.                | The number of forwarded ingress packets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| I. Dro. Pkts.                | The number of dropped ingress packets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| I. Fwd. Octs.                | The number of forwarded ingress octets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| I. Dro. Octs.                | The number of dropped ingress octets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| E. Fwd. Pkts.                | The number of forwarded egress packets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| E. Fwd. Octets               | The number of forwarded egress octets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

**Table 78: Show Service ID All Output Fields (Continued)**

| Label                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Associated LSP LIST          | If the SDP type is MPLS, a list of LSPs used to reach the far-end router displays. All the LSPs in the list must terminate at the IP address specified in the far-end field. If the SDP type is GRE, the following message displays: SDP delivery mechanism is not MPLS                                                                                                                                                                                                                                                      |
| Number of SDPs               | The total number of SDPs applied to this service ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Service Access Points</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Service Id                   | The service identifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| SAP                          | The SAP identifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Encap                        | The encapsulation type of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Admin State                  | The administrative state of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Oper State                   | The operating state of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flags                        | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SapAdminDown, InterfaceAdminDown, PortOperDown, PortMTUTooSmall, L2OperDown, SapIngressQoSMismatch, SapEgressQoSMismatch, RelearnLimitExceeded, RxProtSrcMac, ParentIfAdminDown, NoSapIpipeCeIpAddr, TodResourceUnavail, TodMssResourceUnavail, SapParamMismatch, CemSapNoEcIdOrMacAddr, StandByForMcRing, ServiceMTUTooSmall, SapIngressNamedPoolMismatch, SapEgressNamedPoolMismatch, NoSapEpipeRingNode |
| Multi Svc Site               | Indicates the multi-service site that the SAP is a member of                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Last Status Change           | The time of the most recent operating status change to this SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Last Mgmt Change             | The time of the most recent management-initiated change to this SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sub Type                     | The supported sub type: regular                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Dot1Q Ethertype              | The value of the dot1q Ethertype                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| QinQ Ethertype               | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Admin MTU                    | The desired largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented                                                                                                                                                                                                                                                                                                                                                              |

**Table 78: Show Service ID All Output Fields (Continued)**

| <b>Label</b>                   | <b>Description</b>                                                                                                                                             |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper MTU                       | The actual largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented |
| Ingr IP Fltr-Id                | The ingress filter policy ID assigned to the SAP                                                                                                               |
| Egr IP Fltr-Id                 | The egress filter policy ID assigned to the SAP                                                                                                                |
| Ingr Mac Fltr-Id               | Not applicable                                                                                                                                                 |
| Ingr IPv6 Fltr-ID              | Not applicable                                                                                                                                                 |
| Egr IPv6 Fltr-ID               | Not applicable                                                                                                                                                 |
| tod-suite                      | Indicates whether a time-based policy is applied to a multiservice site                                                                                        |
| qinq-pbit-marking              | Not applicable                                                                                                                                                 |
| Egr Agg Rate Limit             | Not applicable                                                                                                                                                 |
| Q Frame-Based Acct             | Not applicable                                                                                                                                                 |
| Acct. Pol                      | The accounting policy applied to the SAP                                                                                                                       |
| Collect Stats                  | Specifies whether accounting statistics are collected on the SAP                                                                                               |
| Anti Spoofing                  | Not applicable                                                                                                                                                 |
| Nbr Static Hosts               | Not applicable                                                                                                                                                 |
| <b>QoS</b>                     |                                                                                                                                                                |
| Ingress qos-policy             | The SAP ingress QoS policy ID                                                                                                                                  |
| Egress qos-policy              | The SAP egress QoS policy ID                                                                                                                                   |
| Shared Q plcy                  | Not applicable                                                                                                                                                 |
| Multipoint shared              | Not applicable                                                                                                                                                 |
| <b>SAP Statistics</b>          |                                                                                                                                                                |
| Last Cleared time              | The date and time that a clear command was issued on the statistics                                                                                            |
| <b>Forwarding Engine Stats</b> |                                                                                                                                                                |
| Dropped                        | The number of packets or octets dropped by the forwarding engine                                                                                               |

**Table 78: Show Service ID All Output Fields (Continued)**

| <b>Label</b>                               | <b>Description</b>                                                                                                     |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Off. HiPrio                                | The number of high-priority packets or octets offered to the forwarding engine                                         |
| Off. LowPrio                               | The number of low-priority packets offered to the forwarding engine                                                    |
| <b>Queueing Stats (Ingress QoS Policy)</b> |                                                                                                                        |
| Dro. HiPrio                                | The number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy                   |
| Dro. LowPrio                               | The number of low-priority packets discarded, as determined by the SAP ingress QoS policy                              |
| For. InProf                                | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy     |
| For. OutProf                               | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy |
| <b>Queueing Stats (Egress QoS Policy)</b>  |                                                                                                                        |
| Dro. InProf                                | The number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy                       |
| Dro. OutProf                               | The number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy                   |
| For. InProf                                | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy      |
| For. OutProf                               | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy  |
| <b>Sap per Queue stats</b>                 |                                                                                                                        |
| Ingress Queue <i>n</i>                     | The index of the ingress QoS queue of this SAP, where <i>n</i> is the index number                                     |
| Off. HiPrio                                | The number of packets or octets of high-priority traffic for the SAP (offered)                                         |
| Off. LoPrio                                | The number of packets or octets count of low-priority traffic for the SAP (offered)                                    |
| Dro. HiPrio                                | The number of high-priority traffic packets or octets dropped                                                          |
| Dro. LoPrio                                | The number of low-priority traffic packets or octets dropped                                                           |

**Table 78: Show Service ID All Output Fields (Continued)**

| Label                     | Description                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| For. InProf               | The number of in-profile packets or octets (rate below CIR) forwarded                                                                          |
| For. OutProf              | The number of out-of-profile packets or octets (rate above CIR) forwarded                                                                      |
| Egress Queue <i>n</i>     | The index of the egress QoS queue of the SAP, where <i>n</i> is the index number                                                               |
| For. InProf               | The number of in-profile packets or octets (rate below CIR) forwarded                                                                          |
| For. OutProf              | Number of out-of-profile packets or octets (rate above CIR) forwarded                                                                          |
| Dro. InProf               | The number of in-profile packets or octets dropped for the SAP                                                                                 |
| Dro. OutProf              | The number of out-of-profile packets or octets discarded                                                                                       |
| <b>Service Interfaces</b> |                                                                                                                                                |
| <b>Interface</b>          |                                                                                                                                                |
| If Name                   | The name used to refer to the interface                                                                                                        |
| Admin State               | The desired state of the interface                                                                                                             |
| Oper (v4/v6)              | The operating state of the interface                                                                                                           |
| Protocols                 | The protocols supported on the interface                                                                                                       |
| IP Addr/mask              | The IP address/IP subnet/broadcast address of the interface                                                                                    |
| <b>Details</b>            |                                                                                                                                                |
| If Index                  | The index corresponding to this interface. The primary index is 1. For example, all interfaces are defined in the Base virtual router context. |
| Virt. If Index            | The virtual interface index of the VPRN interface                                                                                              |
| Last Oper Chg             | The date and time of the last operating state change on the interface                                                                          |
| Global If Index           | The global interface index of the VPRN interface                                                                                               |
| TOS Marking               | Specifies whether the ToS marking is trusted or untrusted for the interface                                                                    |
| If Type                   | The interface type                                                                                                                             |

**Table 78: Show Service ID All Output Fields (Continued)**

| <b>Label</b>                          | <b>Description</b>                                                                                                                              |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| SNTP B.Cast                           | Specifies whether SNTP broadcast client mode is enabled or disabled                                                                             |
| MAC Address                           | The 48-bit IEEE 802.3 MAC address                                                                                                               |
| Arp Timeout                           | The timeout for an ARP entry learned on the interface                                                                                           |
| IP MTU                                | The IP maximum transmit unit for the interface                                                                                                  |
| ICMP Mask Reply                       | Specifies whether ICMP mask reply is enabled or disabled                                                                                        |
| ARP Populate                          | Specifies if ARP is enabled or disabled                                                                                                         |
| Host Conn Verify                      | Not applicable                                                                                                                                  |
| LdpSyncTimer                          | Not applicable                                                                                                                                  |
| <b>DHCP Details</b>                   |                                                                                                                                                 |
| Admin State                           | The desired state of DHCP                                                                                                                       |
| Lease Populate                        | Not applicable                                                                                                                                  |
| Action                                | The processing required that occurs when the 7705 SAR receives a DHCP request that already has a Relay Agent Information Option (Option 82):    |
| Trusted                               | Indicates whether trusted mode is enabled or disabled on the IP interface                                                                       |
| <b>ICMP Details</b>                   |                                                                                                                                                 |
| Redirects                             | The rate for ICMP redirect messages                                                                                                             |
| Unreachables                          | The rate for ICMP unreachable messages                                                                                                          |
| TTL Expired                           | The rate for ICMP TTL messages                                                                                                                  |
| <b>IPCP Address Extension Details</b> |                                                                                                                                                 |
| Peer IP Addr                          | Specifies the remote IP address to be assigned to the far-end of the associated PPP/MLPPP link via IPCP extensions                              |
| Peer Pri DNS Addr                     | Specifies a unicast IPv4 address for the primary DNS server to be signaled to the far-end of the associate PPP/MLPPP link via IPCP extensions   |
| Peer Sec DNS Addr                     | Specifies a unicast IPv4 address for the secondary DNS server to be signaled to the far-end of the associate PPP/MLPPP link via IPCP extensions |

arp

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax      | arp [ <i>ip-address</i> ]   [ <b>mac</b> <i>ieee-address</i> ]   [ <b>sap</b> <i>sap-id</i> ]   [ <b>interface</b> <i>ip-int-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Context     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Description | This command displays the ARP table for the VPRN instance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Parameters  | <p><i>ip-address</i> — the IP address for which ARP entries will be displayed</p> <p><b>Values</b>        a.b.c.d (1.0.0.0 to 223.255.255.255)</p> <p><b>Default</b>       all IP addresses</p> <p><i>ieee-address</i> — the 48-bit MAC address for which ARP entries will be displayed. The MAC address can be expressed in the form aa:bb:cc:dd:ee:ff or aa-bb-cc-dd-ee-ff, where aa, bb, cc, dd, ee and ff are hexadecimal numbers.</p> <p><b>Values</b>        xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx</p> <p><b>Default</b>       all MAC addresses</p> <p><i>sap-id</i> — the SAP ID for which ARP entries will be displayed</p> <p><b>Values</b>        See <a href="#">sap</a> for <i>sap-id</i> values</p> <p><i>ip-int-name</i> — the IP interface name for which to display matching ARPs</p> |
| Output      | The following output is an example of service ID ARP information, and <a href="#">Table 79</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

Sample Output

```

*A:ALU-12>show>service>id# arp

=====
ARP Table
=====
IP Address MAC Address Type Expiry Interface SAP

190.11.1.1 00:03:fa:00:08:22 Other 00:00:00 ies-100-190.11.1 1/1/11:0
=====
*A:ALU-12>show>service>id#

```

Table 79: Show Service ID ARP Output Fields

| Label       | Description                      |
|-------------|----------------------------------|
| IP Address  | The IP address of the ARP entry  |
| MAC Address | The MAC address of the ARP entry |

**Table 79: Show Service ID ARP Output Fields**

| Label     | Description                                                    |
|-----------|----------------------------------------------------------------|
| Type      | Dyn — The ARP entry is a dynamic ARP entry                     |
|           | Inv — The ARP entry is an inactive static ARP entry (invalid). |
|           | Oth — The ARP entry is a local or system ARP entry             |
|           | Sta — The ARP entry is an active static ARP entry              |
| Expiry    | The age of the ARP entry                                       |
| Interface | The IP interface name associated with the ARP entry            |
| SAP       | The port identifier of the SAP                                 |

## base

- Syntax**     **base**
- Context**    show>service>id
- Description**   This command displays basic information about the service ID, including service type, description, SAPs and SDPs.
- Output**        The following output is an example of service ID base information, and [Table 80](#) describes the fields.

### Sample Output

```
*A:ALU-12>show>service>id# base
```

```
=====
Service Basic Information
=====
Service Id : 6 Vpn ID : 4
Service Type : VPRN
Customer Id : 1
Last Status Change: 02/03/2010 21:59:01
Last Mgmt Change : 03/01/2010 18:55:58
Admin State : Down Oper State : Down

Route Dist. : 12.34.56.78:655 VPRN Type : regular
AS Number : None Router Id : 255.0.0.0
ECMP : Enabled ECMP Max Routes : 1
Max IPv4 Routes : No Limit Auto Bind : None
Max IPv6 Routes : No Limit
Vrf Target : None
Vrf Import : None
Vrf Export : None

SAP Count : 1 SDP Bind Count : 1
```



-----  
Service Access & Destination Points  
-----

| Identifier             | Type | AdmMTU | OprMTU | Adm | Opr  |
|------------------------|------|--------|--------|-----|------|
| sap:1/5/2              | null | 1514   | 1514   | Up  | Down |
| sdp:1:6 S(10.10.10.10) | n/a  | 0      | 0      | Up  | Down |

=====

\*A:ALU-12&gt;show&gt;service&gt;id#

**Table 80: Show Service ID Base Output Fields**

| Label              | Description                                                                                                                                     |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id         | The service identifier                                                                                                                          |
| Vpn Id             | The VPN ID assigned to the service                                                                                                              |
| Service Type       | The type of service: VPRN                                                                                                                       |
| Description        | Generic information about the service                                                                                                           |
| Customer Id        | The customer identifier                                                                                                                         |
| Last Status Change | The date and time of the most recent status change to this service                                                                              |
| Last Mgmt Change   | The date and time of the most recent management-initiated change to this service                                                                |
| Admin State        | The desired state of the service                                                                                                                |
| Oper State         | The operating state of the service                                                                                                              |
| Route Dist.        | The largest frame size (in octets) that the service can handle                                                                                  |
| VPRN Type          | Only valid in services that accept mesh SDP bindings. It is used to validate the VC ID portion of each mesh SDP binding defined in the service. |
| AS Number          | The autonomous system number                                                                                                                    |
| Router ID          | The router ID for this service                                                                                                                  |
| ECMP               | Displays equal cost multipath information                                                                                                       |
| ECMP Max Routes    | The maximum number of routes that can be received from the neighbors in the group or for the specific neighbor                                  |
| Max IPv4 Routes    | The maximum number of routes that can be used for path sharing                                                                                  |
| Auto Bind          | The automatic binding type for the SDP assigned to this service                                                                                 |
| Max IPv6 Routes    | Not applicable                                                                                                                                  |
| Vrf Target         | The VRF target applied to this service                                                                                                          |
| Vrf Import         | The VRF import policy applied to this service                                                                                                   |

**Table 80: Show Service ID Base Output Fields (Continued)**

| Label                                        | Description                                                                                                                                                      |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vrf Export                                   | The VRF export policy applied to this service                                                                                                                    |
| SAP Count                                    | The number of SAPs defined on the service                                                                                                                        |
| SDP Bind Count                               | The number of SDPs bound to the service                                                                                                                          |
| <b>Service Access and Destination Points</b> |                                                                                                                                                                  |
| Identifier                                   | The service access (SAP) and destination (SDP) points                                                                                                            |
| Type                                         | The signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on the SDP                                           |
| AdmMTU                                       | The desired largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented |
| OprMTU                                       | The actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented  |
| Adm                                          | The administrative state of the SAP or SDP                                                                                                                       |
| Opr                                          | The operating state of the SAP or SDP                                                                                                                            |

## dhcp

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                                             |
| <b>Context</b>     | show>service>id                                                                         |
| <b>Description</b> | This command enables the context to display DHCP information for the specified service. |

## statistics

|                    |                                                                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [ <b>interface</b> <i>ip-int-name</i>   <i>ip-address</i> ]                                                                                                                                              |
| <b>Context</b>     | show>service>id>dhcp                                                                                                                                                                                                       |
| <b>Description</b> | This command displays DHCP statistics information.                                                                                                                                                                         |
| <b>Parameters</b>  | <i>ip-int-name</i> — the interface name for which DHCP statistics will be displayed<br><i>ip-address</i> — the IP address of the interface for which to display information<br><b>Values</b> a.b.c.d (host bits must be 0) |

**Output** The following output is an example of server ID DHCP statistics information, and [Table 81](#) describes the fields.

### Sample Output

```
*A:ALU-12>show>service>id>dhcp# statistics

=====
DHCP Global Statistics, service 6
=====
Rx Packets : 0
Tx Packets : 0
Rx Malformed Packets : 0
Rx Untrusted Packets : 0
Client Packets Discarded : 0
Client Packets Relayed : 0
Server Packets Discarded : 0
Server Packets Relayed : 0
=====
*A:ALU-12>show>service>id>dhcp#
```

**Table 81: Show Service ID DHCP Statistics Output Fields**

| Label                                    | Description                                                                                                                                                                                                               |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DHCP Global Statistics, service x</b> |                                                                                                                                                                                                                           |
| Rx Packets                               | The number of packets received from the DHCP clients                                                                                                                                                                      |
| Tx Packets                               | The number of packets transmitted to the DHCP clients                                                                                                                                                                     |
| Rx Malformed Packets                     | The number of corrupted/invalid packets received from the DHCP clients                                                                                                                                                    |
| Rx Untrusted Packets                     | The number of untrusted packets received from the DHCP clients. In this case, a frame is dropped due to the client sending a DHCP packet with Option 82 filled in before “trust” is set under the DHCP interface command. |
| Client Packets Discarded                 | The number of packets received from the DHCP clients that were discarded                                                                                                                                                  |
| Client Packets Relayed                   | The number of packets received from the DHCP clients that were forwarded                                                                                                                                                  |
| Server Packets Discarded                 | The number of packets received from the DHCP server that were discarded                                                                                                                                                   |
| Server Packets Relayed                   | The number of packets received from the DHCP server that were forwarded                                                                                                                                                   |

## summary

- Syntax** **summary** [**interface** *interface-name* | **saps**]
- Context** show>service>id>dhcp
- Description** This command displays DHCP configuration summary information.
- Parameters** *interface-name* — the interface name for which DHCP summary statistics will be displayed  
**saps** — displays SAPs per interface

The following output is an example of service ID DHCP summary information, and [Table 82](#) describes the fields.

**Sample Output**

```
*A:ALU-12>show>service>id>dhcp# summary

=====
DHCP Summary, service 6
=====
Interface Name Arp Used/ Info Admin
 SapId/Sdp Populate Provided Option State

vprn_interface No 0/0 Keep Down

Interfaces: 1
=====
*A:ALU-12>show>service>id>dhcp#
```

**Table 82: Show Service ID DHCP Summary Output Fields**

| Label                          | Description                                                                                                                                                                                                                              |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DHCP Summary, service x</b> |                                                                                                                                                                                                                                          |
| Interface Name<br>Sap/Sdp      | The name of the interface                                                                                                                                                                                                                |
| Arp Populate                   | Specifies whether ARP populate is enabled or disabled                                                                                                                                                                                    |
| Used/Provided                  | Used — the number of lease-states that are currently in use on the specified interface, that is, the number of clients on the interface that got an IP address by DHCP. This value is always less than or equal to the “Provided” field. |
|                                | Provided — the lease-populate value that is configured for a specific interface                                                                                                                                                          |

**Table 82: Show Service ID DHCP Summary Output Fields (Continued)**

| Label       | Description                                                                                                   |
|-------------|---------------------------------------------------------------------------------------------------------------|
| Info Option | Keep — the existing information is kept on the packet and the router does not add any additional information  |
|             | Replace — on ingress, the existing information-option is replaced with the information-option from the router |
|             | Drop — The packet is dropped and an error is logged                                                           |
| Admin State | The administrative state                                                                                      |

## interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> [ <i>ip-address</i>   <i>ip-int-name</i> ] [ <i>interface-type</i> ] [ <b>detail</b> ] [ <b>summary</b> ]                                                                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b> | <p>This command displays information for the IP interfaces associated with the service.</p> <p>If no optional parameters are specified, a summary of all IP interfaces associated to the service are displayed.</p>                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address of the interface for which to display information</p> <p><b>Values</b>      a.b.c.d (host bits must be 0)</p> <p><i>ip-int-name</i> — the IP interface name for which to display information</p> <p><i>interface type</i> — displays either group or subscriber interfaces</p> <p><b>detail</b> — displays detailed IP interface information</p> <p><b>summary</b> — displays summary IP interface information</p> |
| <b>Output</b>      | The following output is an example of service ID interface information, and <a href="#">Table 83</a> describes the fields.                                                                                                                                                                                                                                                                                                                               |

### Sample Output

```
*A:ALU-12>show>service>id# interface
```

```
=====
Interface Table
=====
Interface-Name Adm Opr (v4/v6) Type Port/SapId
IP-Address PfxState

vprn_interface Up Down/Down VPRN 1/5/2
- -

```

```
Interfaces : 1
```

```
*A:ALU-12>show>service>id# interface summary
```

## Service Interface Summary

| Service Id | Interfaces | Admin-Up | Oper-Up (v4/v6) |
|------------|------------|----------|-----------------|
| 6          | 1          | 1        | 0/0             |

```
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# interface detail
```

## Interface Table

### Interface

|             |                  |              |             |
|-------------|------------------|--------------|-------------|
| If Name     | : vprn_interface | Oper (v4/v6) | : Down/Down |
| Admin State | : Up             |              |             |
| Protocols   | : None           |              |             |

```
IP Addr/mask : Not Assigned
```

### Details

|                |                     |                  |            |
|----------------|---------------------|------------------|------------|
| If Index       | : 2                 | Virt. If Index   | : 2        |
| Last Oper Chg: | 02/03/2010 21:59:02 | Global If Index  | : 125      |
| SAP Id         | : 1/5/2             | If Type          | : VPRN     |
| TOS Marking    | : Trusted           | Arp Timeout      | : 14400    |
| SNTP B.Cast    | : False             | ICMP Mask Reply  | : True     |
| MAC Address    | :                   | Host Conn Verify | : Disabled |
| IP MTU         | : 1500              |                  |            |
| Arp Populate   | : Disabled          |                  |            |
| LdpSyncTimer   | : None              |                  |            |

### Proxy ARP Details

|                |          |                 |            |
|----------------|----------|-----------------|------------|
| Rem Proxy ARP: | Disabled | Local Proxy ARP | : Disabled |
| Policies       | : none   |                 |            |

### Proxy Neighbor Discovery Details

|              |            |
|--------------|------------|
| Local Pxy ND | : Disabled |
| Policies     | : none     |

### DHCP Details

|             |        |                |            |
|-------------|--------|----------------|------------|
| Admin State | : Down | Lease Populate | : 0        |
| Action      | : Keep | Trusted        | : Disabled |

### DHCP6 Relay Details

|              |        |                |            |
|--------------|--------|----------------|------------|
| Admin State  | : Down | Lease Populate | : 0        |
| Oper State   | : Down | Nbr Resolution | : Disabled |
| If-Id Option | : None | Remote Id      | : Disabled |

```

Src Addr : Not configured

DHCP6 Server Details
Admin State : Down Max. Lease States: 8000

ICMP Details
Redirects : Number - 100 Time (seconds) - 10
Unreachables : Number - 100 Time (seconds) - 10
TTL Expired : Number - 100 Time (seconds) - 10

IPCP Address Extension Details
Peer IP Addr*: Not configured
Peer Pri DNS*: Not configured
Peer Sec DNS*: Not configured

Interfaces : 1
=====
* indicates that the corresponding row element may have been truncated.
*A:ALU-12>show>service>id#

```

**Table 83: Show Service ID Interface Detailed Output Fields**

| Label            | Description                                                                                                                                    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b> |                                                                                                                                                |
| If Name          | The name used to refer to the interface                                                                                                        |
| Admin State      | The desired state of the interface                                                                                                             |
| Oper (v4/v6)     | The operating state of the interface                                                                                                           |
| Protocols        | The protocols supported on this interface                                                                                                      |
| IP Addr/mask     | The IP address/IP subnet/broadcast address of the interface                                                                                    |
| <b>Details</b>   |                                                                                                                                                |
| If Index         | The index corresponding to this interface. The primary index is 1. For example, all interfaces are defined in the Base virtual router context. |
| Virt. If Index   | The virtual interface index of the VPRN interface                                                                                              |
| Last Oper Chg    | The date and time of the last operating state change on the interface                                                                          |
| Global If Index  | The global interface index of the VPRN interface                                                                                               |
| TOS Marking      | Specifies whether the ToS marking is trusted or untrusted for the interface                                                                    |
| If Type          | The interface type                                                                                                                             |
| SNTP B.Cast      | Specifies whether SNTP broadcast client mode is enabled or disabled                                                                            |
| MAC Address      | The 48-bit IEEE 802.3 MAC address                                                                                                              |

**Table 83: Show Service ID Interface Detailed Output Fields (Continued)**

| Label                                 | Description                                                                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Arp Timeout                           | The timeout for an ARP entry learned on the interface                                                                                        |
| IP MTU                                | The IP maximum transmit unit for the interface                                                                                               |
| ICMP Mask Reply                       | Specifies whether ICMP mask reply is enabled or disabled                                                                                     |
| ARP Populate                          | Specifies if ARP is enabled or disabled                                                                                                      |
| Host Conn Verify                      | Not applicable                                                                                                                               |
| LdpSyncTimer                          | Not applicable                                                                                                                               |
| <b>DHCP Details</b>                   |                                                                                                                                              |
| Admin State                           | The administrative state of DHCP                                                                                                             |
| Lease Populate                        | Not applicable                                                                                                                               |
| Action                                | The processing required that occurs when the 7705 SAR receives a DHCP request that already has a Relay Agent Information Option (Option 82): |
| Trusted                               | Indicates whether trusted mode is enabled or disabled on the IP interface                                                                    |
| <b>ICMP Details</b>                   |                                                                                                                                              |
| Redirects                             | The rate for ICMP redirect messages                                                                                                          |
| Unreachables                          | The rate for ICMP unreachable messages                                                                                                       |
| TTL Expired                           | The rate for ICMP TTL messages                                                                                                               |
| <b>IPCP Address Extension Details</b> |                                                                                                                                              |
| Peer IP Addr                          | The remote IP address to be assigned to the far-end of the associated PPP/MLPPP link via IPCP extensions                                     |
| Peer Pri DNS                          | The unicast IPv4 address for the primary DNS server to be signaled to the far-end of the associate PPP/MLPPP link via IPCP extensions        |
| Peer Sec DNS                          | The unicast IPv4 address for the secondary DNS server to be signaled to the far-end of the associate PPP/MLPPP link via IPCP extensions      |



## sap

- Syntax** `sap [sap-id [detail]]`
- Context** `show>service>id`
- Description** This command displays information for the SAPs associated with the service.  
If no optional parameters are specified, a summary of all associated SAPs is displayed.
- Parameters** *sap-id* — the SAP ID for which SAP information will be displayed
- Values** See [sap](#) for *sap-id* values
- detail** — displays detailed information for the SAP
- Output** The following output is an example of service SAP information, and [Table 84](#) describes the fields.

**Sample Output**

```
*A:ALU-12>show>service>id# sap

=====
SAP(Summary), Service 6
=====
PortId SvcId Ing. Ing. Egr. Egr. Adm Opr
 QoS Fltr QoS Fltr

1/5/2 6 2 ip4 2 none Up Down

Number of SAPs : 1
=====
*A:ALU-12>show>service>id#

*A:ALU-12>show>service>id# sap 1/5/2

=====
Service Access Points(SAP)
=====
Service Id : 6
SAP : 1/5/2 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02
=====
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# sap 1/5/2 detail
```

## Service Access Points (SAP)

```
=====
Service Id : 6
SAP : 1/5/2 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02
Sub Type : regular
Dot1Q Ethertype : 0x8100 QinQ Ethertype : 0x8100

Admin MTU : 1514 Oper MTU : 1514
Ingr IP Fltr-Id : 2 Egr IP Fltr-Id : n/a
Ingr Mac Fltr-Id : n/a Egr Mac Fltr-Id : n/a
Ingr IPv6 Fltr-Id : n/a Egr IPv6 Fltr-Id : n/a
tod-suite : None qinq-pbit-marking : both
Egr Agg Rate Limit : max
Q Frame-Based Acct : Disabled

Acct. Pol : None Collect Stats : Disabled
Anti Spoofing : None Nbr Static Hosts : 0
=====
```

## QoS

```

Ingress qos-policy : 2 Egress qos-policy : 2
Shared Q plcy : n/a Multipoint shared : Disabled

```

## Sap Statistics

```

Last Cleared Time : N/A

```

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | 0      |
| Off. HiPrio             | : 0     | 0      |
| Off. LowPrio            | : 0     | 0      |

## Queueing Stats(Ingress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. HiPrio  | : 0 | 0 |
| Dro. LowPrio | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

## Queueing Stats(Egress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. InProf  | : 0 | 0 |
| Dro. OutProf | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

```

```

## Sap per Queue stats

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 0     | 0      |
| Off. LoPrio                          | : 0     | 0      |
| Dro. HiPrio                          | : 0     | 0      |
| Dro. LoPrio                          | : 0     | 0      |
| For. InProf                          | : 0     | 0      |
| For. OutProf                         | : 0     | 0      |
| Egress Queue 1                       |         |        |
| For. InProf                          | : 0     | 0      |
| For. OutProf                         | : 0     | 0      |
| Dro. InProf                          | : 0     | 0      |
| Dro. OutProf                         | : 0     | 0      |

```
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>>show>service>id# sap 1/5/2 atm
```

## Service Access Points (SAP)

```

Service Id : 6
SAP : 1/5/2 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02

```

```
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# sap 1/5/2 qos
```

## Service Access Points (SAP)

```

Service Id : 6
SAP : 1/5/2 Encap : null
Admin State : Up Oper State : Down
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02

```

## QOS

```

Ingress qos-policy : 2 Egress qos-policy : 2
Shared Q plcy : n/a Multipoint shared : Disabled

```

```
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# sap 1/5/2 sap-stats
```

## Service Access Points (SAP)

```
Service Id : 6
SAP : 1/5/2
Admin State : Up
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02
```

## Sap Statistics

```
Last Cleared Time : N/A
```

|                         | Packets | Octets |
|-------------------------|---------|--------|
| Forwarding Engine Stats |         |        |
| Dropped                 | : 0     | 0      |
| Off. HiPrio             | : 0     | 0      |
| Off. LowPrio            | : 0     | 0      |

## Queueing Stats(Ingress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. HiPrio  | : 0 | 0 |
| Dro. LowPrio | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

## Queueing Stats(Egress QoS Policy 2)

|              |     |   |
|--------------|-----|---|
| Dro. InProf  | : 0 | 0 |
| Dro. OutProf | : 0 | 0 |
| For. InProf  | : 0 | 0 |
| For. OutProf | : 0 | 0 |

```
*A:ALU-12>show>service>id# sap 1/5/2 stats
```

## Service Access Points (SAP)

```
Service Id : 6
SAP : 1/5/2
Admin State : Up
Flags : ServiceAdminDown
 PortOperDown
Multi Svc Site : None
Last Status Change : 02/03/2010 21:59:01
Last Mgmt Change : 02/03/2010 21:59:02
```

## Sap per Queue stats

|                                      | Packets | Octets |
|--------------------------------------|---------|--------|
| Ingress Queue 1 (Unicast) (Priority) |         |        |
| Off. HiPrio                          | : 0     | 0      |
| Off. LoPrio                          | : 0     | 0      |
| Dro. HiPrio                          | : 0     | 0      |
| Dro. LoPrio                          | : 0     | 0      |

```

For. InProf : 0 0
For. OutProf : 0 0

Egress Queue 1
For. InProf : 0 0
For. OutProf : 0 0
Dro. InProf : 0 0
Dro. OutProf : 0 0
=====
*A:ALU-12>show>service>id#

```

**Table 84: Show Service ID SAP Detailed Output Fields**

| Label              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Id         | The service identifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| SAP                | The SAP identifier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Encap              | The encapsulation type of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Admin State        | The administrative state of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Oper State         | The operating state of the SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flags              | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SapAdminDown, InterfaceAdminDown, PortOperDown, PortMTUTooSmall, L2OperDown, SapIngressQoSMismatch, SapEgressQoSMismatch, RelearnLimitExceeded, RxProtSrcMac, ParentIfAdminDown, NoSapIpipeCeIpAddr, TodResourceUnavail, TodMssResourceUnavail, SapParamMismatch, CemSapNoEcidOrMacAddr, StandByForMcRing, ServiceMTUTooSmall, SapIngressNamedPoolMismatch, SapEgressNamedPoolMismatch, NoSapEpipeRingNode |
| Last Status Change | The time of the most recent operating status change to this SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Last Mgmt Change   | The time of the most recent management-initiated change to this SAP                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Sub Type           | The supported sub type: regular                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Dot1Q Ethertype    | The value of the dot1q Ethertype                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| QinQ Ethertype     | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Admin MTU          | The desired largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented                                                                                                                                                                                                                                                                                                                                                              |

**Table 84: Show Service ID SAP Detailed Output Fields (Continued)**

| Label                          | Description                                                                                                                                                    |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Oper MTU                       | The actual largest service frame size (in octets) that can be transmitted through the SAP to the far-end router, without requiring the packet to be fragmented |
| Ingr IP Fltr-Id                | The ingress filter policy ID assigned to the SAP                                                                                                               |
| Egr IP Fltr-Id                 | The egress filter policy ID assigned to the SAP                                                                                                                |
| Ingr Mac Fltr-Id               | Not applicable                                                                                                                                                 |
| Egr Mac Fltr-Id                | Not applicable                                                                                                                                                 |
| tod-suite                      | Indicates whether a time-based policy is applied to a multiservice site                                                                                        |
| qinq-pbit-marking              | Not applicable                                                                                                                                                 |
| Egr Agg Rate Limit             | Not applicable                                                                                                                                                 |
| Q Frame-Based Acct             | Not applicable                                                                                                                                                 |
| Acct. Pol                      | The accounting policy ID assigned to the SAP                                                                                                                   |
| Collect Stats                  | Specifies whether accounting statistics are collected on the SAP                                                                                               |
| Anti Spoofing                  | Not applicable                                                                                                                                                 |
| Nbr Static Hosts               | Not applicable                                                                                                                                                 |
| <b>QOS</b>                     |                                                                                                                                                                |
| Ingress qos-policy             | The ingress QoS policy ID assigned to the SAP                                                                                                                  |
| Egress qos-policy              | The egress QoS policy ID assigned to the SAP                                                                                                                   |
| Shared Q plcy                  | Not applicable                                                                                                                                                 |
| Multipoint shared              | Not applicable                                                                                                                                                 |
| <b>Sap Statistics</b>          |                                                                                                                                                                |
| Last Cleared Time              | The date and time that a clear command was issued on statistics                                                                                                |
| <b>Forwarding Engine Stats</b> |                                                                                                                                                                |
| Dropped                        | The number of packets or octets dropped by the forwarding engine                                                                                               |

**Table 84: Show Service ID SAP Detailed Output Fields (Continued)**

| Label                                      | Description                                                                                                            |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Off. HiPrio                                | The number of high-priority packets or octets offered to the forwarding engine                                         |
| Off. LowPrio                               | The number of low-priority packets offered to the forwarding engine                                                    |
| <b>Queueing Stats (Ingress QoS Policy)</b> |                                                                                                                        |
| Dro. HiPrio                                | The number of high-priority packets or octets discarded, as determined by the SAP ingress QoS policy                   |
| Dro. LowPrio                               | The number of low-priority packets discarded, as determined by the SAP ingress QoS policy                              |
| For. InProf                                | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP ingress QoS policy     |
| For. OutProf                               | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP ingress QoS policy |
| <b>Queueing Stats (Egress QoS Policy)</b>  |                                                                                                                        |
| Dro. InProf                                | The number of in-profile packets or octets discarded, as determined by the SAP egress QoS policy                       |
| Dro. OutProf                               | The number of out-of-profile packets or octets discarded, as determined by the SAP egress QoS policy                   |
| For. InProf                                | The number of in-profile packets or octets (rate below CIR) forwarded, as determined by the SAP egress QoS policy      |
| For. OutProf                               | The number of out-of-profile packets or octets (rate above CIR) forwarded, as determined by the SAP egress QoS policy  |
| <b>Sap per Queue stats</b>                 |                                                                                                                        |
| Ingress Queue <i>n</i>                     | The index of the ingress QoS queue of this SAP, where <i>n</i> is the index number                                     |
| Off. HiPrio                                | The number of packets or octets of high-priority traffic for the SAP (offered)                                         |
| Off. LoPrio                                | The number of packets or octets count of low-priority traffic for the SAP (offered)                                    |
| Dro. HiPrio                                | The number of high-priority traffic packets or octets dropped                                                          |
| Dro. LoPrio                                | The number of low-priority traffic packets or octets dropped                                                           |
| For. InProf                                | The number of in-profile packets or octets (rate below CIR) forwarded                                                  |
| For. OutProf                               | The number of out-of-profile packets or octets (rate above CIR) forwarded                                              |

**Table 84: Show Service ID SAP Detailed Output Fields (Continued)**

| Label                 | Description                                                                      |
|-----------------------|----------------------------------------------------------------------------------|
| Egress Queue <i>n</i> | The index of the egress QoS queue of the SAP, where <i>n</i> is the index number |
| For. InProf           | The number of in-profile packets or octets (rate below CIR) forwarded            |
| For. OutProf          | The number of out-of-profile packets or octets (rate above CIR) forwarded        |
| Dro. InProf           | The number of in-profile packets or octets dropped for the SAP                   |
| Dro. OutProf          | The number of out-of-profile packets or octets discarded                         |

## ingress-label

**Syntax** **ingress-label** *start-label* [*end-label*]

**Context** show>service

**Description** This command displays service information using the range of ingress labels.

If only the mandatory *start-label* parameter is specified, only services using the specified label are displayed.

If both *start-label* and *end-label* parameters are specified, the services using the labels in the specified range are displayed.

Use the **show router ldp bindings** command to display dynamic labels.

**Parameters** *end-label* — the ending ingress label value for which to display services using the label range

**Values** 2049 to 131071

**Default** the *start-label* value

*start-label* — the starting ingress label value for which to display services using the label range. If only *start-label* is specified, services only using *start-label* are displayed.

**Values** 0, or 2048 to 131071

**Output** The following output is an example of service ingress label information, and [Table 85](#) describes the fields.

### Sample Output

In the example below, services 3, 5 and 6 are IES, and services 5000 and 5001 are VPLS services.



```

*A:ALU-12>show>service# ingress-label 0 131071
=====
Martini Service Labels
=====
Svc Id Sdp Binding Type I.Lbl E.Lbl

3 15:15 Spok 0 0
5 5:5 Spok 0 0
6 5:6 Spok 0 0
5000 15:5000 Mesh 0 0
5000 15:5001 Spok 0 0
5001 5001:100 Spok 0 0

Number of Bindings Found : 6

=====
*A:ALU-12#

```

**Table 85: Show Service ingress Output Field**

| Label                    | Description                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------|
| Svc Id                   | The ID that identifies a service                                                                  |
| Sdp Binding              | The ID that identifies an SDP                                                                     |
| Type                     | Indicates whether the SDP binding is a spoke or a mesh                                            |
| I. Lbl                   | The VC label used by the far-end device to send packets to this device in this service by the SDP |
| E. Lbl                   | The VC label used by this device to send packets to the far-end device in this service by the SDP |
| Number of Bindings Found | The total number of SDP bindings that exist within the specified label range                      |

## sdp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sdp</b> {[ <i>sdp-id</i> [: <i>vc-id</i> ]   <b>far-end</b> <i>ip-addr</i> ]} [ <b>detail</b> ]<br><b>sdp</b> [ <i>sdp-id</i> [: <i>vc-id</i> ]]                                                                                                                                                                                                                                             |
| <b>Context</b>     | show>service>id                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b> | This command displays information for the SDPs associated with the service. If no optional parameters are specified, a summary of all associated SDPs is displayed.                                                                                                                                                                                                                             |
| <b>Parameters</b>  | <p><i>sdp-id</i> — the SDP ID for which SDP information will be displayed</p> <p><b>Values</b> 1 to 17407</p> <p><b>Default</b> all SDPs</p> <p><i>vc-id</i> — the virtual circuit ID on the SDP ID</p> <p><b>Values</b> 1 to 4294967295</p> <p><i>ip-addr</i> — displays only SDPs matching with the specified far-end IP address</p> <p><b>detail</b> — displays detailed SDP information</p> |
| <b>Output</b>      | The following output is an example of service ID SDP information, and <a href="#">Table 86</a> describes the fields.                                                                                                                                                                                                                                                                            |

### Sample Output

```
*A:ALU-12>show>service>id# sdp

=====
Services: Service Destination Points
=====
SdpId Type IP address Adm Opr I.Lbl E.Lbl

1:6 Spok 10.10.10.10 Up Down n/a n/a

Number of SDPs : 1

*A:ALU-12>show>service>id#

*A:ALU-12>show>service>id# sdp 1

=====
Service Destination Point (Sdp Id : 1)
=====
SdpId Type IP address Adm Opr I.Lbl E.Lbl

1:6 Spok 10.10.10.10 Up Down n/a n/a

*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# sdp far-end 10.10.10.10
```

```
=====
Service Destination Point(Far-End : 10.10.10.10)
=====
```

| SdpId | Type | IP address  | Adm | Opr  | I.Lbl | E.Lbl |
|-------|------|-------------|-----|------|-------|-------|
| 1:6   | Spok | 10.10.10.10 | Up  | Down | n/a   | n/a   |

```

Number of SDPs : 1

```

```
=====
*A:ALU-12>show>service>id#
```

```
*A:ALU-12>show>service>id# sdp detail
```

```
=====
Services: Service Destination Points Details
=====
```

```

Sdp Id 1:6 -(10.10.10.10)

```

|                    |                       |                  |            |
|--------------------|-----------------------|------------------|------------|
| SDP Id             | : 1:6                 | Type             | : Spoke    |
| VC Type            | : n/a                 | VC Tag           | : n/a      |
| Admin Path MTU     | : 0                   | Oper Path MTU    | : 0        |
| Far End            | : 10.10.10.10         | Delivery         | : MPLS     |
| Admin State        | : Up                  | Oper State       | : Down     |
| Acct. Pol          | : None                | Collect Stats    | : Disabled |
| Ingress Label      | : n/a                 | Egress Label     | : n/a      |
| Ing mac Fltr       | : n/a                 | Egr mac Fltr     | : n/a      |
| Ing ip Fltr        | : n/a                 | Egr ip Fltr      | : n/a      |
| Ing ipv6 Fltr      | : n/a                 | Egr ipv6 Fltr    | : n/a      |
| Admin ControlWord  | : Not Preferred       | Oper ControlWord | : False    |
| Last Status Change | : 02/03/2010 21:59:01 | Signaling        | : n/a      |
| Last Mgmt Change   | : 03/01/2010 18:55:58 |                  |            |
| Class Fwding State | : Down                |                  |            |
| Flags              | : SdpOperDown         |                  |            |

```
KeepAlive Information :
```

|                |            |                |            |
|----------------|------------|----------------|------------|
| Admin State    | : Disabled | Oper State     | : Disabled |
| Hello Time     | : 10       | Hello Msg Len  | : 0        |
| Max Drop Count | : 3        | Hold Down Time | : 10       |

```
Statistics :
```

|               |       |                |       |
|---------------|-------|----------------|-------|
| I. Fwd. Pkts. | : n/a | I. Dro. Pkts.  | : n/a |
| I. Fwd. Octs. | : n/a | I. Dro. Octs.  | : n/a |
| E. Fwd. Pkts. | : n/a | E. Fwd. Octets | : n/a |

```
Associated LSP LIST :
```

```
No LSPs Associated
```

```

Number of SDPs : 1

=====
```

**Table 86: Show Service ID SDP Detailed Output Fields**

| Label             | Description                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sdp Id            | The SDP identifier                                                                                                                                                          |
| Type              | Indicates whether the SDP is a spoke or a mesh                                                                                                                              |
| VC Type           | The VC type: ether or vlan                                                                                                                                                  |
| VC Tag            | The explicit dot1Q value used when encapsulating to the SDP far end                                                                                                         |
| Admin Path MTU    | The operating path MTU of the SDP is equal to the admin path MTU (when one is set) or the dynamically computed tunnel MTU, when no admin path MTU is set (the default case) |
| Oper Path MTU     | The actual largest service frame size (in octets) that can be transmitted through this SDP to the far-end router, without requiring the packet to be fragmented             |
| Far End           | The IP address of the remote end of the GRE, MPLS, or IP tunnel defined by this SDP.                                                                                        |
| Delivery          | Specifies the type of delivery used by the SDP: GRE, MPLS, or IP                                                                                                            |
| Admin State       | The administrative state of this SDP                                                                                                                                        |
| Oper State        | The operational state of this SDP                                                                                                                                           |
| Acct. Pol         | The accounting policy applied to the SDP                                                                                                                                    |
| Collect Stats     | Specifies whether accounting statistics are collected on the SDP                                                                                                            |
| Ingress Label     | The label used by the far-end device to send packets to this device in this service by this SDP                                                                             |
| Egress Label      | The label used by this device to send packets to the far-end device in this service by the SDP                                                                              |
| Ing mac Fltr      | Not applicable                                                                                                                                                              |
| Egr mac Fltr      | Not applicable                                                                                                                                                              |
| Ing ip Fltr       | The ingress filter policy ID assigned to the SDP                                                                                                                            |
| Egr ip Fltr       | The egress filter policy ID assigned to the SDP                                                                                                                             |
| Admin ControlWord | The administrative state of the control word: Preferred (control word enabled) or Not Preferred (control word disabled)                                                     |
| Oper ControlWord  | The operational state of the control word: True (control word enabled) or False (control word disabled)                                                                     |

**Table 86: Show Service ID SDP Detailed Output Fields (Continued)**

| <b>Label</b>                 | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Last Status Change           | The date and time of the most recent change to the SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Signaling                    | The signaling protocol used to obtain the ingress and egress labels used in frames transmitted and received on this SDP                                                                                                                                                                                                                                                                                                                                                                                                      |
| Last Mgmt Change             | The date and time of the most recent management-initiated change to this SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Class Fwding State           | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Flags                        | Specifies the conditions that affect the operating status of this SAP. Display output includes: ServiceAdminDown, SapAdminDown, InterfaceAdminDown, PortOperDown, PortMTUTooSmall, L2OperDown, SapIngressQoSMismatch, SapEgressQoSMismatch, RelearnLimitExceeded, RxProtSrcMac, ParentIfAdminDown, NoSapIpipeCeIpAddr, TodResourceUnavail, TodMssResourceUnavail, SapParamMismatch, CemSapNoEcIdOrMacAddr, StandByForMcRing, ServiceMTUTooSmall, SapIngressNamedPoolMismatch, SapEgressNamedPoolMismatch, NoSapEpipeRingNode |
| <b>KeepAlive Information</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Admin State                  | The administrative state of the keepalive process                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Oper State                   | The operational state of the keepalive process                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Hello Time                   | Specifies how often the SDP echo request messages are transmitted on this SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Hell Msg Length              | The length of the SDP echo request messages transmitted on this SDP                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Max Drop Count               | The maximum number of consecutive SDP echo request messages that can be unacknowledged before the keepalive protocol reports a fault                                                                                                                                                                                                                                                                                                                                                                                         |
| Hold Down Time               | The time to wait before the keepalive operating status is eligible to enter the alive state                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table 86: Show Service ID SDP Detailed Output Fields (Continued)**

| Label               | Description                                                                                                                                                                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Statistics</b>   |                                                                                                                                                                                                                                                                            |
| I. Fwd. Pkts.       | The number of forwarded ingress packets                                                                                                                                                                                                                                    |
| I. Dro. Pkts.       | The number of dropped ingress packets                                                                                                                                                                                                                                      |
| I. Fwd. Octs.       | The number of forwarded ingress octets                                                                                                                                                                                                                                     |
| I. Dro. Octs.       | The number of dropped ingress octets                                                                                                                                                                                                                                       |
| E. Fwd. Pkts.       | The number of forwarded egress packets                                                                                                                                                                                                                                     |
| E. Fwd. Octets      | The number of forwarded egress octets                                                                                                                                                                                                                                      |
| Associated LSP LIST | If the SDP type is MPLS, a list of LSPs used to reach the far-end router displays. All the LSPs in the list must terminate at the IP address specified in the far-end field.<br>If the SDP type is GRE, the following message displays: SDP delivery mechanism is not MPLS |
| Number of SDPs      | The total number of SDPs applied to this service ID                                                                                                                                                                                                                        |

## service-using

**Syntax** **service-using vprn** [**sdp sdp-id**] [**customer customer-id**]

**Context** show>service

**Description** This command displays the services matching certain usage properties.  
If no optional parameters are specified, all services defined on the system are displayed.

**Parameters** **vprn** — displays matching VPRN services

*sdp-id* — displays only services bound to the specified SDP ID

**Values** 1 to 17407

*customer-id* — displays only those services associated with the specified customer ID

**Values** 1 to 2147483647

**Output** The following output is an example of service-using information, and [Table 87](#) describes the fields.

**Sample Output**

```
*A:ALU-12>show>service# service-using vprn
```

```
=====
Services [vprn]
=====
ServiceId Type Adm Opr CustomerId Last Mgmt Change

6 VPRN Down Down 1 03/01/2010 18:55:58

Matching Services : 1

=====
*A:ALU-12>show>service#
```

```
*A:ALU-12>show>service# service-using customer 1
```

```
=====
Services Customer 1
=====
ServiceId Type Adm Opr CustomerId Last Mgmt Change

1 Cpipe Down Down 1 02/03/2010 21:59:01
2 Epipe Down Down 1 02/03/2010 21:59:02
5 Apipe Down Down 1 02/03/2010 21:59:02
6 VPRN Down Down 1 03/01/2010 18:55:58
23 IES Down Down 1 02/03/2010 21:59:01
100 Ipipe Down Down 1 02/03/2010 21:59:02

Matching Services : 6

=====
*A:ALU-12>show>service#
```

```
:
```

**Table 87: Show Service Service-Using Output Fields**

| Label             | Description                                                                      |
|-------------------|----------------------------------------------------------------------------------|
| Service Id        | The service identifier                                                           |
| Type              | The service type configured for the service ID                                   |
| Adm               | The desired state of the service                                                 |
| Opr               | The operating state of the service                                               |
| CustomerID        | The ID of the customer who owns this service                                     |
| Last Mgmt Change  | The date and time of the most recent management-initiated change to this service |
| Matching Services | The number of services of the same type                                          |

---

## Show Router Commands

### router

|                    |                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>router</b> [ <i>service-id</i> ]                                                                                                                                               |
| <b>Context</b>     | show                                                                                                                                                                              |
| <b>Description</b> | This command provides access to the show commands for the service specified by the <i>service-id</i> .<br>Using <i>service-id</i> with this command applies only to VPRN service. |
| <b>Parameters</b>  | <i>service-id</i> — specifies the <i>service-id</i><br><b>Values</b> 1 to 2147483647                                                                                              |

### arp

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>arp</b> [ <i>ip-address</i>   <i>ip-int-name</i>   <b>mac</b> <i>ieee-mac-addr</i> ] [ <b>sdp</b> <i>sdp-id:vc-id</i> ] [ <b>summary</b> ]                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Context</b>     | show>router                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b> | This command displays the router ARP table sorted by IP address.<br>If no command line options are specified, all ARP entries are displayed.                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Parameters</b>  | <i>ip-addr</i> — the IP address for which ARP entries will be displayed<br><i>ip-int-name</i> — the interface name for which ARP entries will be displayed<br><i>ieee-mac-addr</i> — the MAC address for which ARP entries will be displayed<br><i>sdp-id</i> — the SDP ID for which ARP entries will be displayed<br><b>Values</b> 1 to 17407<br><b>Default</b> all SDPs<br><i>vc-id</i> — the virtual circuit ID on the SDP ID<br><b>Values</b> 1 to 4294967295<br><b>summary</b> — displays summary APR table information |



**Output** The following output is an example of ARP table information, and [Table 88](#) describes the fields.

### Sample Output

```
*A:ALU-12# show router 6 arp

=====
ARP Table (Service: 6)
=====
IP Address MAC Address Expiry Type Interface

10.10.10.103 04:67:ff:00:00:01 00h00m00s Oth system
10.10.4.3 00:00:00:00:00:00 00h00m00s Oth ALU-1-2

No. of ARP Entries: 2
=====
*A:ALU-12#
```

**Table 88: Show ARP Table Output Fields**

| Label              | Description                                                   |
|--------------------|---------------------------------------------------------------|
| IP Address         | The IP address of the ARP entry                               |
| MAC Address        | The MAC address of the ARP entry                              |
| Expiry             | The age of the ARP entry                                      |
| Type               | Dyn — The ARP entry is a dynamic ARP entry                    |
|                    | Inv — The ARP entry is an inactive static ARP entry (invalid) |
|                    | Oth — The ARP entry is a local or system ARP entry            |
|                    | Sta — The ARP entry is an active static ARP entry             |
| Interface          | The IP interface name associated with the ARP entry           |
| No. of ARP Entries | The number of ARP entries displayed in the list               |

## statistics

- Syntax** **statistics** [*ip-int-name* | *ip-address*]
- Context** show>router>dhcp
- Description** This command displays statistics for DHCP Relay.
- If no IP address or interface name is specified, then all configured interfaces are displayed.
- If an IP address or interface name is specified, then only data regarding the specified interface is displayed.
- Parameters** *ip-int-name* | *ip-address* — displays statistics for the specified IP interface
- Output** The following output is an example of DHCP statistics information, and [Table 89](#) describes the fields.

**Sample Output**

```
*A:ALU-1# show router dhcp statistics
=====
DHCP Global Statistics (Service: x)
=====
Rx Packets : 0
Tx Packets : 0
Rx Malformed Packets : 0
Rx Untrusted Packets : 0
Client Packets Discarded : 0
Client Packets Relayed : 0
Server Packets Discarded : 0
Server Packets Relayed : 0
=====
*A:ALU-1#
```

**Table 89: Show DHCP Statistics Output Fields**

| Label                                      | Description                                                    |
|--------------------------------------------|----------------------------------------------------------------|
| <b>DHCP Global Statistics (Service: x)</b> |                                                                |
| Rx Packets                                 | The number of packets received                                 |
| Tx Packets                                 | The number of packets transmitted                              |
| Rx Malformed Packets                       | The number of malformed packets received                       |
| Rx Untrusted Packets                       | The number of untrusted packets received                       |
| Client Packets Discarded                   | The number of packets from the DHCP client that were discarded |

**Table 89: Show DHCP Statistics Output Fields (Continued)**

| Label                    | Description                                                    |
|--------------------------|----------------------------------------------------------------|
| Client Packets Relayed   | The number of packets from the DHCP client that were forwarded |
| Server Packets Discarded | The number of packets from the DHCP server that were discarded |
| Server Packets Relayed   | The number of packets from the DHCP server that were forwarded |

## summary

|                    |                                                                                                                    |
|--------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>summary</b>                                                                                                     |
| <b>Context</b>     | show>router>dhcp                                                                                                   |
| <b>Description</b> | This command displays a summary of DHCP configuration.                                                             |
| <b>Output</b>      | The following output is an example of DHCP summary information, and <a href="#">Table 90</a> describes the fields. |

### Sample Output

```
A:ALU-48# show router 6 dhcp summary
=====
DHCP Summary (Service: 6)
=====
Interface Name Arp Used/ Info Admin
 SapId/Sdp Populate Provided Option State

vprn_interface No 0/0 Keep Down
 sap:1/5/2 0/0

Interfaces: 1
=====
A:ALU-48#
```

Table 90: Show DHCP Summary Output Fields

| Label                            | Description                                                                                                                                                                                                                           |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DHCP Summary (Service: x)</b> |                                                                                                                                                                                                                                       |
| Interface Name<br>SapID/Sdp      | The name of the interface                                                                                                                                                                                                             |
| Arp Populate                     | Specifies whether ARP populate is enabled or disabled                                                                                                                                                                                 |
| Used/Provided                    | Used — number of lease-states that are currently in use on the specified interface; that is, the number of clients on the interface that got an IP address by DHCP. This number is always less than or equal to the “Provided” field. |
|                                  | Provided — lease-populate value configured for the specified interface                                                                                                                                                                |
| Info Option                      | Keep — the existing information is kept on the packet and the router does not add any additional information                                                                                                                          |
|                                  | Replace — on ingress, the existing information-option is replaced with the information-option from the router                                                                                                                         |
|                                  | Drop — The packet is dropped and an error is logged                                                                                                                                                                                   |
| Admin State                      | The administrative state                                                                                                                                                                                                              |

## interface

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> <i>[[ip-address   ip-int-name] [detail]]</i>   <b>[summary]</b>   <b>[exclude-services]</b>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Context</b>     | show>router                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b> | This command displays the router IP interface table sorted by interface index.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Parameters</b>  | <p><i>ip-address</i> — the IP address of the interface for which to display information</p> <p><i>ip-int-name</i> — the IP interface name for which to display information</p> <p><b>detail</b> — displays detailed IP interface information for the router</p> <p><b>summary</b> — displays summary IP interface information for the router</p> <p><b>exclude-services</b> — displays IP interface information, excluding IP interfaces configured for customer services. Only core network IP interfaces are displayed.</p> |
| <b>Output</b>      | The following output is an example of standard IP interface information, and <a href="#">Table 91</a> describes the fields.                                                                                                                                                                                                                                                                                                                                                                                                   |

**Sample Output**

```

*A:ALU-12# show router 6 interface
=====
Interface Table (Service: 6)
=====
Interface-Name Adm Opr (v4/v6) Mode Port/SapId
IP-Address PfxState

vprn_interface Up Down/Down VPRN 1/5/2
-

Interfaces : 1
=====
*A:ALU-12#

```

**Table 91: Show IP Interface Output Fields**

| Label                               | Description                                                        |
|-------------------------------------|--------------------------------------------------------------------|
| <b>Interface Table (Service: x)</b> |                                                                    |
| Interface-Name                      | The name of the interface                                          |
| IP-Address                          | The IP address of the interface                                    |
| Adm                                 | The administrative state of the interface                          |
| Opr (v4/v6)                         | The operational state of the interface (only ipv4 addresses apply) |
| Type                                | The service type                                                   |
| Port/SapId<br>PfxState              | The port or SAP associated with the interface                      |

## route-table

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>route-table</b> [ <i>ip-prefix</i> <i>/[mask]</i> ] [ <b>longer</b> ]   [ <b>protocol</b> <i>protocol</i> ]   [ <b>summary</b> ]                                                                                                                                                                                                                                                                               |
| <b>Context</b>     | show>router                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | This command displays the active routes in the routing table.<br><br>If no command line arguments are specified, all routes are displayed, sorted by prefix.                                                                                                                                                                                                                                                      |
| <b>Parameters</b>  | <i>ip-prefix</i> <i>/[mask]</i> — the IP prefix and optional mask for which to display routes<br><br><b>longer</b> — displays routes matching the ip-prefix/mask and routes with longer masks<br><br><i>protocol</i> — displays routes learned from the specified protocol<br><br><b>Values</b> bgp, isis, local, ospf, rip, static, aggregate<br><br><b>summary</b> — displays a route table summary information |
| <b>Output</b>      | The following output is an example of route table information, and <a href="#">Table 92</a> describes the fields.                                                                                                                                                                                                                                                                                                 |

**Sample Output**

```
*A:ALU-12# show router 6 route-table
=====
Route Table (Service: 6)
=====
Dest Prefix Type Proto Age Pref
 Next Hop[Interface Name] Metric

10.10.0.1/32 Remote OSPF 65844 10
 10.10.13.1 1001
10.10.0.2/32 Remote OSPF 65844 10
 10.10.13.1 2001

No. of Routes: 2
=====
*A:ALU-12#
```

**Table 92: Show Route Table Output Fields**

| Label       | Description                                                                |
|-------------|----------------------------------------------------------------------------|
| Dest Prefix | The route destination address and mask                                     |
| Next Hop    | The next hop IP address for the route destination                          |
| Type        | Local — The route is a local route<br>Remote — The route is a remote route |

**Table 92: Show Route Table Output Fields (Continued)**

| Label          | Description                                      |
|----------------|--------------------------------------------------|
| Proto          | The protocol through which the route was learned |
| Age            | The route age in seconds for the route           |
| Metric         | The route metric value for the route             |
| Pref           | The route preference value for the route         |
| No. of Routes: | The number of routes displayed in the list       |

## sgt-qos

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| <b>Syntax</b>      | <b>sgt-qos</b>                                                      |
| <b>Context</b>     | show>router <i>service-id</i>                                       |
| <b>Description</b> | This command displays QoS information about self-generated traffic. |
| <b>Parameters</b>  | <i>service-id</i> — specifies the service id of the service         |
| <b>Values</b>      | 1 to 2147483647                                                     |

## application

|                    |                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>application</b> [ <i>app-name</i> ] [ <b>dscp</b>   <b>dot1p</b> ]                                                                            |
| <b>Context</b>     | show>router <i>service-id</i> > sgt-qos                                                                                                          |
| <b>Description</b> | This command displays application QoS settings.                                                                                                  |
| <b>Parameters</b>  | <i>app-name</i> — the specified application                                                                                                      |
| <b>Values</b>      | arp, bgp, dhcp, dns, ftp, icmp, isis, ldp, ntp, ospf, ptp, radius, rsvp, snmp, snmp-notification, ssh, syslog, tacplus, telnet, tftp, traceroute |



### Notes:

- PTP in the context of SGT QoS is defined as Precision Timing Protocol and is an application in the 7705 SAR. The PTP application name is also used in areas such as event-control and logging. Precision Timing Protocol is defined in IEEE 1588-2008.
- PTP in the context of IP filters is defined as Performance Transparency Protocol. IP protocols can be used as IP filter match criteria; the match is made on the 8-bit protocol field in the IP header.

**dscp** — specifies to show all DSCP applications

**dot1p** — specifies to show all dot1p applications

**Output** The following output is an example of application QoS information, and [Table 93](#) describes the fields.

### Sample Output

```
*A:ALU-1>show# router 6 sgt-qos application
```

```
=====
DSCP Application Values
=====
Application DSCP Value Default DSCP Value

bgp none none
dhcp none none
dns none none
ftp none none
icmp none none
ldp none none
ntp none none
ospf none none
radius none none
rsvp none none
snmp none none
snmp-notification none none
ssh none none
syslog none none
tacplus none none
telnet none none
tftp none none
traceroute none none
ptp none none
=====

=====
Dot1p Application Values
=====
Application Dot1p Value Default Dot1p Value

arp none none
isis none none
=====
*A:ALU-1>show#
```



**Table 93: Application QoS Output Fields**

| Label               | Description                                                                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application         | The DSCP or dot1p application                                                                                                                             |
| DSCP Value          | The DSCP name or value assigned to the application; if you assign a value to the application (0 to 63), the DSCP name that maps to the value is displayed |
| Default DSCP Value  | The default DSCP value                                                                                                                                    |
| Dot1p Value         | The dot1p priority assigned to the application (applies only to ARP and IS-IS)                                                                            |
| Default Dot1p Value | The default dot1p value                                                                                                                                   |

## dscp-map

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dscp-map</b> [ <i>dscp-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Context</b>     | show>router <i>service-id</i> >sgt-qos                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b> | This command displays the DSCP-to-FC mappings.                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Parameters</b>  | <i>dscp-name</i> — the specified DSCP name.                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Values</b>      | be   ef     cp1   cp2   cp3   cp4   cp5   cp6   cp7   cp9   cs1   cs2   cs3   cs4   cs5   nc1   nc2   af11   af12   af13   af21   af22   af23   af31   af32   af33   af41   af42   af43   cp11   cp13   cp15   cp17   cp19   cp21   cp23   cp25   cp27   cp29   cp31   cp33   cp35   cp37   cp39   cp41   cp42   cp43   cp44   cp45   cp47   cp49   cp50   cp51   cp52   cp53   cp54   cp55   cp57   cp58   cp59   cp60   cp61   cp62   cp63 |
| <b>Output</b>      | The following output is an example of DSCP-to-FC mapping information, and <a href="#">Table 94</a> describes the fields.                                                                                                                                                                                                                                                                                                                     |

### Sample Output

```
A:ALU-1# show router 6 sgt-qos dscp-map
=====
DSCP to FC Mappings
=====
DSCP Value FC Value Default FC Value

be nc nc
cp1 be be
cp2 be be
cp3 be be
cp4 be be
cp5 be be
cp6 be be
cp7 be be
cs1 be be
```

## VP RN Services Command Reference

|      |    |    |
|------|----|----|
| cp9  | be | be |
| af11 | af | af |
| cp11 | be | be |
| af12 | af | af |
| cp13 | be | be |
| af13 | af | af |
| cp15 | be | be |
| cs2  | be | be |
| cp17 | be | be |
| af21 | 11 | 11 |
| cp19 | be | be |
| af22 | 11 | 11 |
| cp21 | be | be |
| af23 | 11 | 11 |
| cp23 | be | be |
| cs3  | be | be |
| cp25 | be | be |
| af31 | 11 | 11 |
| cp27 | be | be |
| af32 | 11 | 11 |
| cp29 | be | be |
| af33 | 11 | 11 |
| cp31 | be | be |
| cs4  | be | be |
| cp33 | be | be |
| af41 | nc | nc |
| cp35 | be | be |
| af42 | af | h2 |
| cp37 | be | be |
| af43 | h2 | h2 |
| cp39 | be | be |
| cs5  | be | be |
| cp41 | be | be |
| cp42 | be | be |
| cp43 | be | be |
| cp44 | be | be |
| cp45 | be | be |
| ef   | ef | ef |
| cp47 | be | be |
| nc1  | nc | nc |
| cp49 | be | be |
| cp50 | h2 | h2 |
| cp51 | be | be |
| cp52 | be | be |
| cp53 | be | be |
| cp54 | be | be |
| cp55 | be | be |
| nc2  | nc | nc |
| cp57 | be | be |
| cp58 | be | be |
| cp59 | be | be |
| cp60 | be | be |
| cp61 | be | be |
| cp62 | be | be |
| cp63 | be | be |

=====

A:ALU-1#

**Table 94: DSCP-to-FC Mapping Output Fields**

| Label            | Description                                                        |
|------------------|--------------------------------------------------------------------|
| DSCP Value       | The DSCP values (displayed as names) of the self-generated traffic |
| FC Value         | The FC value mapped to each DSCP value                             |
| Default FC Value | The default FC value                                               |

## static-arp

|                    |                                                                                                                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>static-arp</b> [ <i>ip-address</i>   <i>ip-int-name</i>   <b>mac</b> <i>ieee-mac-addr</i> ]                                                                                                                                                                   |
| <b>Context</b>     | show>router                                                                                                                                                                                                                                                      |
| <b>Description</b> | This command displays the router static ARP table sorted by IP address.<br><br>If no options are present, all ARP entries are displayed.                                                                                                                         |
| <b>Parameters</b>  | <i>ip-address</i> — the IP address for which static ARP entries are displayed<br><br><i>ip-int-name</i> — the interface name for which static ARP entries are displayed<br><br><i>ieee-mac-addr</i> — the MAC address for which static ARP entries are displayed |
| <b>Output</b>      | The following output is an example of static ARP table information, and <a href="#">Table 95</a> describes the fields.                                                                                                                                           |

### Sample Output

```
*A:ALU-12# show router 6 static-arp
=====
ARP Table (Service: 6)
=====
IP Address MAC Address Expiry Type Interface

10.200.0.253 00:00:5a:40:00:01 00:00:00 Sta to-ser1
12.200.1.1 00:00:5a:01:00:33 00:00:00 Inv to-ser1a

No. of ARP Entries: 2
=====
*A:ALU-12#
```

**Table 95: Show Static ARP Table Output Fields**

| Label              | Description                                                             |
|--------------------|-------------------------------------------------------------------------|
| IP Address         | The IP address of the static ARP entry                                  |
| MAC Address        | The MAC address of the static ARP entry                                 |
| Expiry             | The age of the ARP entry. Static ARPs always have 00:00:00 for the age. |
| Type               | Inv — The ARP entry is an inactive static ARP entry (invalid)           |
|                    | Sta — The ARP entry is an active static ARP entry                       |
| Interface          | The IP interface name associated with the ARP entry.                    |
| No. of ARP Entries | The number of ARP entries displayed in the list.                        |

## static-route

**Syntax** **static-route** [*ip-prefix /mask*] | [**preference** *preference*] | [**next-hop** *ip-address*] [**detail**]

**Context** show>router

**Description** This command displays the static entries in the routing table.

If no options are present, all static routes are displayed sorted by prefix.

**Parameters** *ip-prefix /mask* — displays only the static routes matching the specified IP prefix and mask

*preference* — displays static routes with the specified route preference

**Values** 0 to 65535

*ip-address* — displays only the static routes with the specified next-hop IP address

**detail** — displays detailed information about the static route

**Output** The following output is an example of static route information, and [Table 96](#) describes the fields.

**Sample Output**

```

*A:ALU-12# show router 6 static-route
=====
Static Route Table (Service: 6) Family: IPv4
=====
Prefix Tag Met Pref Type Act
Next Hop Interface

192.168.250.0/24 1 5 NH Y
 10.200.10.1 to-ser1
192.168.252.0/24 1 5 NH N
 10.10.0.254 n/a
=====
*A:ALU-12#

```

**Table 96: Show Static Route Output Fields**

| Label          | Description                                                                                                                  |
|----------------|------------------------------------------------------------------------------------------------------------------------------|
| Prefix         | The static route destination address and mask                                                                                |
| Tag            | The 32-bit integer tag added to the static route                                                                             |
| Met            | The route metric value for the static route                                                                                  |
| Pref           | The route preference value for the static route                                                                              |
| Type           | BH — The static route is a black hole route, where the next hop for this type of route is black-hole                         |
|                | ID — The static route is an indirect route, where the next hop for this type of route is the non-directly connected next hop |
|                | NH — The route is a static route with a directly connected next hop                                                          |
| Act            | N — The static route is inactive; for example, the static route is disabled or the next hop IP interface is down             |
|                | Y — The static route is active                                                                                               |
| Next Hop       | The next hop for the static route destination                                                                                |
| No. of Routes: | The number of routes displayed in the list                                                                                   |

## tunnel-table

**Syntax** **tunnel-table** [*ip-address[/mask]*] [**protocol** *protocol* | **sdp** *sdp-id*]  
**tunnel-table** [**summary**]

**Context** show>router

**Description** This command displays tunnel table information.

Note that **auto-bind** GRE tunnels are not displayed in the **show** command output. GRE tunnels are not the same as SDP tunnels that use the GRE encapsulation type. When the **auto-bind** command is used when configuring a VPRN service, it means the MP-BGP NH resolution is referring to the core routing instance for IP reachability. For a VPRN service, this object specifies the lookup to be used by the routing instance if no SDP to the destination exists.

**Parameters** *ip-address[/mask]* — the IP address and mask for the tunnel table destination

*protocol* — displays LDP protocol information

*sdp-id* — displays information about the specified SDP

**summary** — displays summary tunnel table information

**Output** The following output is an example of tunnel table information, and [Table 97](#) describes the fields.

**Sample Output**

```
*A:ALU-12>config>service# show router 6 tunnel-table
=====
Tunnel Table (Service: 6)
=====
Destination Owner Encap TunnelId Pref Nexthop Metric

10.0.0.1/32 sdp GRE 10 5 10.0.0.1 0
10.0.0.1/32 sdp GRE 21 5 10.0.0.1 0
10.0.0.1/32 sdp GRE 31 5 10.0.0.1 0
10.0.0.1/32 sdp GRE 41 5 10.0.0.1 0
=====
*A:ALU-12>
```

**Table 97: Show Tunnel Table Output Fields**

| <b>Label</b> | <b>Description</b>                                                  |
|--------------|---------------------------------------------------------------------|
| Destination  | The route's destination address and mask                            |
| Owner        | The tunnel owner                                                    |
| Encap        | The tunnel encapsulation type                                       |
| TunnelID     | The tunnel (SDP) identifier                                         |
| Pref         | The route preference for routes learned from the configured peer(s) |
| Nexthop      | The next hop for the route's destination                            |
| Metric       | The route metric value for the route                                |

---

## Clear Service Commands

### id

|                    |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>Syntax</b>      | <b>id</b> <i>service-id</i>                                   |
| <b>Context</b>     | clear>service<br>clear>service>statistics                     |
| <b>Description</b> | This command clears commands for a specific service.          |
| <b>Parameters</b>  | <i>service-id</i> — the ID that uniquely identifies a service |
| <b>Values</b>      | 1 to 2147483647                                               |

### spoke-sdp

|                    |                                                                        |
|--------------------|------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>spoke-sdp</b> <i>sdp-id:vc-id ingress-vc-label</i>                  |
| <b>Context</b>     | clear>service>id                                                       |
| <b>Description</b> | This command clears and resets the spoke SDP bindings for the service. |
| <b>Parameters</b>  | <i>sdp-id</i> — the spoke SDP ID to be reset                           |
| <b>Values</b>      | 1 to 17407                                                             |
|                    | <i>vc-id</i> — the virtual circuit ID on the SDP ID to be reset        |
| <b>Values</b>      | 1 to 4294967295                                                        |
|                    | <b>ingress-vc-label</b> — the locally assigned ingress service label   |



---

## Clear Router Commands

### arp

|                    |                                    |
|--------------------|------------------------------------|
| <b>Syntax</b>      | <b>arp</b>                         |
| <b>Context</b>     | clear>router>id                    |
| <b>Description</b> | This command clears the ARP table. |

### dhcp

|                    |                                                                    |
|--------------------|--------------------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                                        |
| <b>Context</b>     | clear>router                                                       |
| <b>Description</b> | This command enables the context to clear and reset DHCP entities. |

### statistics

|                    |                                                                       |
|--------------------|-----------------------------------------------------------------------|
| <b>Syntax</b>      | <b>statistics</b> [interface <i>ip-int-name</i>   <i>ip-address</i> ] |
| <b>Context</b>     | clear>router>dhcp                                                     |
| <b>Description</b> | This command clears DHCP statistics.                                  |

### forwarding-table

|                    |                                                                                                                                                                                   |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>forwarding-table</b> [ <i>slot-number</i> ]                                                                                                                                    |
| <b>Context</b>     | clear>router                                                                                                                                                                      |
| <b>Description</b> | This command clears the route table on the specified IOM with the route table.<br><br>If the slot number is not specified, the command forces the route table to be recalculated. |
| <b>Parameters</b>  | <i>slot-number</i> — the specified IOM slot to be cleared                                                                                                                         |
| <b>Default</b>     | all IOMs                                                                                                                                                                          |
| <b>Values</b>      | 1 to 10                                                                                                                                                                           |

### interface

|                    |                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>interface</b> [ <i>ip-int-name</i>   <i>ip-addr</i> ] [ <b>icmp</b> ]                                                                                                                                 |
| <b>Context</b>     | clear>router                                                                                                                                                                                             |
| <b>Description</b> | <p>This command clears IP interface statistics.</p> <p>If no IP interface is specified either by IP interface name or IP address, the command will perform the clear operation on all IP interfaces.</p> |
| <b>Parameters</b>  | <p><i>ip-int-name</i>   <i>ip-addr</i> — the IP interface name or IP interface address</p> <p><b>icmp</b> — specifies to reset the ICMP statistics for the IP interface(s) used for ICMP rate limit</p>  |

---

## Debug Service Commands

### id

|                    |                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] id</b> <i>service-id</i>                                                                                  |
| <b>Context</b>     | debug>service                                                                                                     |
| <b>Description</b> | This command debugs commands for a specific service.<br><br>The <b>no</b> form of the command disables debugging. |
| <b>Parameters</b>  | <i>service-id</i> — the ID that uniquely identifies a service                                                     |

### sap

|                    |                                                                                                                               |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] sap</b> <i>sap-id</i>                                                                                                 |
| <b>Context</b>     | debug>service>id                                                                                                              |
| <b>Description</b> | This command enables debugging for a specific SAP.<br><br>The <b>no</b> form of the command disables debugging.               |
| <b>Parameters</b>  | <i>sap-id</i> — the physical port identifier portion of the SAP definition. See <a href="#">sap</a> for <i>sap-id</i> values. |

### sdp

|                    |                                                                                                                                                                                                                                      |               |            |  |                 |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|--|-----------------|
| <b>Syntax</b>      | <b>[no] sdp</b> <i>sdp-id:vc-id</i>                                                                                                                                                                                                  |               |            |  |                 |
| <b>Context</b>     | debug>service>id<br>debug>service>stp                                                                                                                                                                                                |               |            |  |                 |
| <b>Description</b> | This command enables debugging for a specific SDP.<br><br>The <b>no</b> form of the command disables debugging.                                                                                                                      |               |            |  |                 |
| <b>Parameters</b>  | <i>sdp-id</i> — the spoke SDP ID<br><br><table> <tr> <td><b>Values</b></td><td>1 to 17407</td></tr> </table> <i>vc-id</i> — the virtual circuit ID on the SDP ID<br><br><table> <tr> <td></td><td>1 to 4294967295</td></tr> </table> | <b>Values</b> | 1 to 17407 |  | 1 to 4294967295 |
| <b>Values</b>      | 1 to 17407                                                                                                                                                                                                                           |               |            |  |                 |
|                    | 1 to 4294967295                                                                                                                                                                                                                      |               |            |  |                 |

### event-type

|                    |                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] event-type {config-change   svc-oper-status-change   sap-oper-status-change   sdpbind-oper-status-change}</b>    |
| <b>Context</b>     | debug>service>id                                                                                                         |
| <b>Description</b> | This command enables debugging for a particular event type.<br><br>The <b>no</b> form of the command disables debugging. |

### event-type

|                    |                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>[no] event-type {config-change   oper-status-change}</b>                                                              |
| <b>Context</b>     | debug>service>id>sap<br>debug>service>id>sdp                                                                             |
| <b>Description</b> | This command enables debugging for a particular event type.<br><br>The <b>no</b> form of the command disables debugging. |

---

## Debug Router Commands

### dhcp

|                    |                                                      |
|--------------------|------------------------------------------------------|
| <b>Syntax</b>      | <b>dhcp</b>                                          |
| <b>Context</b>     | debug>router>id>                                     |
| <b>Description</b> | This command enables the context for DHCP debugging. |

### detail-level

|                    |                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>detail-level {low   medium   high}</b><br><b>no detail-level</b>                                                            |
| <b>Context</b>     | debug>router>id>dhcp                                                                                                           |
| <b>Description</b> | This command enables debugging for the DHCP tracing detail level.<br><br>The <b>no</b> form of the command disables debugging. |

### mode

|                    |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | <b>mode {dropped-only   ingr-and-dropped   egr-ingr-and-dropped}</b><br><b>no mode</b>                                 |
| <b>Context</b>     | debug>router>id>dhcp                                                                                                   |
| <b>Description</b> | This command enables debugging for the DHCP tracing mode.<br><br>The <b>no</b> form of the command disables debugging. |



# Standards and Protocol Support

---

## Standards Compliance

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| IEEE 802.1ag    | Service Layer OAM                                           |
| IEEE 802.1p/q   | VLAN Tagging                                                |
| IEEE 802.3      | 10BaseT                                                     |
| IEEE 802.3ah    | Ethernet OAM                                                |
| IEEE 802.3u     | 100BaseTX                                                   |
| IEEE 802.3x     | Flow Control                                                |
| IEEE 802.3z     | 1000BaseSX/LX                                               |
| IEEE 802.3-2008 | Revised base standard                                       |
| ITU-T Y.1731    | OAM functions and mechanisms<br>for Ethernet-based networks |

## Telecom Compliance

|                                      |                                                                                                                                                 |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| IC CS-03 Issue 9                     | Spectrum Management and<br>Telecommunications                                                                                                   |
| ACTA TIA-968-A                       |                                                                                                                                                 |
| AS/ACIF S016 (Australia/New Zealand) | Requirements for Customer<br>Equipment for connection to<br>hierarchical digital interfaces                                                     |
| ITU-T G.703                          | Physical/electrical characteristics<br>of hierarchical digital interfaces                                                                       |
| ITU-T G.707                          | Network node interface for the<br>Synchronous Digital Hierarchy (SDH)                                                                           |
| ITU-T G.712-2001                     | Transmission performance<br>characteristics of pulse code<br>modulation channels                                                                |
| ITU-T G.957                          | Optical interfaces for equipments<br>and systems relating to the<br>synchronous digital hierarchy                                               |
| ITU-T V.24                           | List of definitions for interchange<br>circuits between data terminal<br>equipment (DTE) and data circuit-<br>terminating equipment (DCE)       |
| ITU-T V.36                           | Modems for synchronous data<br>transmission using 60-108 kHz group<br>band circuits                                                             |
| ITU-T X.21                           | Interface between Data Terminal<br>Equipment and Data Circuit-<br>Terminating Equipment for<br>Synchronous Operation on Public<br>Data Networks |

## Protocol Support

### ATM

|                              |                                                                                                                                    |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| RFC 2514                     | Definitions of Textual Conventions and<br>OBJECT_IDENTITIES for ATM<br>Management, February 1999                                   |
| RFC 2515                     | Definition of Managed Objects for ATM<br>Management, February 1999                                                                 |
| RFC 2684                     | Multiprotocol Encapsulation over ATM<br>Adaptation Layer 5                                                                         |
| af-tm-0121.000               | Traffic Management Specification<br>Version 4.1, March 1999                                                                        |
| ITU-T Recommendation I.610   | B-ISDN Operation<br>and Maintenance Principles and Functions version<br>11/95                                                      |
| ITU-T Recommendation I.432.1 | B-ISDN user-<br>network interface - Physical layer specification:<br>General characteristics                                       |
| GR-1248-CORE                 | Generic Requirements for<br>Operations of ATM Network Elements (NEs). Issue<br>3 June 1996                                         |
| GR-1113-CORE                 | Bellcore, Asynchronous Transfer<br>Mode (ATM) and ATM Adaptation Layer (AAL)<br>Protocols Generic Requirements, Issue 1, July 1994 |
| AF-PHY-0086.001              | Inverse Multiplexing for ATM<br>(IMA)                                                                                              |

### BFD

|                                 |                                                                   |
|---------------------------------|-------------------------------------------------------------------|
| draft-ietf-bfd-mib-00.txt       | Bidirectional Forwarding<br>Detection Management Information Base |
| draft-ietf-bfd-base-o5.txt      | Bidirectional Forwarding<br>Detection                             |
| draft-ietf-bfd-v4v6-1hop-06.txt | BFD IPv4 and IPv6<br>(Single Hop)                                 |
| draft-ietf-bfd-multihop-06.txt  | BFD for Multi-hop<br>Paths                                        |

### **BGP**

- RFC 1397 BGP Default Route Advertisement
- RFC 1997 BGP Communities Attribute
- RFC 2385 Protection of BGP Sessions via MDS
- RFC 2439 BGP Route Flap Dampening
- RFC 2547bis BGP/MPLS VPNs
- RFC 2918 Route Refresh Capability for BGP-4
- RFC 3107 Carrying Label Information in BGP-4
- RFC 3392 Capabilities Advertisement with BGP-4
- RFC 4271 BGP-4 (previously RFC 1771)
- RFC 4360 BGP Extended Communities Attribute
- RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs) (previously RFC 2574bis BGP/MPLS VPNs)
- RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP (previously RFC 1966 and RFC 2796)
- RFC 4724 Graceful Restart Mechanism for BGP - GR Helper
- RFC 4760 Multi-protocol Extensions for BGP (previously RFC 2858)
- RFC 4893 BGP Support for Four-octet AS Number Space

### **DHCP/DHCPv6**

- RFC 1534 Interoperation between DHCP and BOOTP
- RFC 2131 Dynamic Host Configuration Protocol (REV)
- RFC 3046 DHCP Relay Agent Information Option (Option 82)
- RFC 3315 Dynamic Host Configuration Protocol for IPv6

### **DIFFERENTIATED SERVICES**

- RFC 2474 Definition of the DS Field in the IPv4 and IPv6 Headers
- RFC 2597 Assured Forwarding PHB Group
- RFC 2598 An Expedited Forwarding PHB
- RFC 3140 Per-Hop Behavior Identification Codes

### **DIGITAL DATA NETWORK MANAGEMENT V.35**

- RS-232 (also known as EIA/TIA-232)

### **GRE**

- RFC 2784 Generic Routing Encapsulation (GRE)

### **IPv6**

- RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
- RFC 2462 IPv6 Stateless Address Autoconfiguration
- RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
- RFC 3587 IPv6 Global Unicast Address Format
- RFC 3595 Textual Conventions for IPv6 Flow Label
- RFC 4007 IPv6 Scoped Address Architecture
- RFC 4193 Unique Local IPv6 Unicast Addresses
- RFC 4291 IPv6 Addressing Architecture
- RFC 4443 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 Specification
- RFC 4649 DHCPv6 Relay Agent Remote-ID Option
- RFC 4861 Neighbor Discovery for IP version 6 (IPv6)

### **LDP**

- RFC 5036 LDP Specification

### **IS-IS**

- RFC 1142 OSI IS-IS Intra-domain Routing Protocol (ISO 10589)
- RFC 1195 Use of OSI IS-IS for routing in TCP/IP & dual environments
- RFC 2763 Dynamic Hostname Exchange for IS-IS
- RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
- RFC 2973 IS-IS Mesh Groups
- RFC 3373 Three-Way Handshake for Intermediate System to Intermediate System (IS-IS) Point-to-Point Adjacencies
- RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
- RFC 3719 Recommendations for Interoperable Networks using IS-IS
- RFC 3784 Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)
- RFC 3787 Recommendations for Interoperable IP Networks
- RFC 4205 for Shared Risk Link Group (SRLG) TLV draft-ietf-isis-igp-p2p-over-lan-05.txt
- RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols



**MPLS**

- RFC 3031 MPLS Architecture
- RFC 3032 MPLS Label Stack Encoding
- RFC 3815 Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP)
- RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

**NETWORK MANAGEMENT**

- ITU-T X.721: Information technology- OSI-Structure of Management Information
- ITU-T X.734: Information technology- OSI-Systems Management: Event Report Management Function
- M.3100/3120 Equipment and Connection Models
- TMF 509/613 Network Connectivity Model
- RFC 1157 SNMPv1
- RFC 1305 Network Time Protocol (Version 3) Specification, Implementation and Analysis
- RFC 1850 OSPF-MIB
- RFC 1907 SNMPv2-MIB
- RFC 2011 IP-MIB
- RFC 2012 TCP-MIB
- RFC 2013 UDP-MIB
- RFC 2030 Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
- RFC 2096 IP-FORWARD-MIB
- RFC 2138 RADIUS
- RFC 2206 RSVP-MIB
- RFC 2571 SNMP-FRAMEWORKMIB
- RFC 2572 SNMP-MPD-MIB
- RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB
- RFC 2574 SNMP-USER-BASED-SMMIB
- RFC 2575 SNMP-VIEW-BASED ACM-MIB
- RFC 2576 SNMP-COMMUNITY-MIB
- RFC 2588 SONET-MIB
- RFC 2665 EtherLike-MIB
- RFC 2819 RMON-MIB
- RFC 2863 IF-MIB
- RFC 2864 INVERTED-STACK-MIB
- RFC 3014 NOTIFICATION-LOG MIB
- RFC 3164 The BSD Syslog Protocol
- RFC 3273 HCRMON-MIB
- RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks

- RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
- RFC 3413 Simple Network Management Protocol (SNMP) Applications
- RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
- RFC 3418 SNMP MIB
- draft-ietf-disman-alarm-mib-04.txt
- draft-ietf-mpls-ldp-mib-07.txt
- draft-ietf-ospf-mib-update-04.txt
- draft-ietf-mpls-lsr-mib-06.txt
- draft-ietf-mpls-te-mib-04.txt
- IANA-IFType-MIB

**OSPF**

- RFC 1765 OSPF Database Overflow
- RFC 2328 OSPF Version 2
- RFC 2370 Opaque LSA Support
- RFC 3101 OSPF NSSA Option
- RFC 3137 OSPF Stub Router Advertisement
- RFC 3630 Traffic Engineering (TE) Extensions to OSPF
- RFC 4203 Shared Risk Link Group (SRLG) sub-TLV

**PPP**

- RFC 1332 PPP Internet Protocol Control Protocol (IPCP)
- RFC 1570 PPP LCP Extensions
- RFC 1619 PPP over SONET/SDH
- RFC 1661 The Point-to-Point Protocol (PPP)
- RFC 1662 PPP in HDLC-like Framing
- RFC 1989 PPP Link Quality Monitoring
- RFC 1990 The PPP Multilink Protocol (MP)
- RFC 2686 The Multi-Class Extension to Multi-Link PPP

**PSEUDOWIRES**

- RFC 3550 RTP: A Transport Protocol for Real-Time Applications
- RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
- RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
- RFC 4446 IANA Allocation for PWE3
- RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)

RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks  
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)  
RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks  
RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires  
RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)  
draft-ietf-pwe3-redundancy-02 Pseudowire (PW) Redundancy

### **RADIUS**

RFC 2865 Remote Authentication Dial In User Service  
RFC 2866 RADIUS Accounting

### **RSVP-TE and FRR**

RFC 2430 A Provider Architecture for DiffServ & TE  
RFC 2961 RSVP Refresh Overhead Reduction Extensions  
RFC 2702 Requirements for Traffic Engineering over MPLS  
RFC 2747 RSVP Cryptographic Authentication  
RFC 3097 RSVP Cryptographic Authentication - Updated Message Type Value  
RFC 3209 Extensions to RSVP for LSP Tunnels  
RFC 3210 Applicability Statement for Extensions to RSVP for LSP Tunnels  
RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels

### **SONET/SDH**

GR-253-CORE SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000  
ITU-T Recommendation G.841 Telecommunication Standardization Section of ITU, Types and Characteristics of SDH Networks Protection Architecture, issued in October 1998 and as augmented by Corrigendum1 issued in July 2002

### **SSH**

draft-ietf-secsh-architecture.txt SSH Protocol Architecture  
draft-ietf-secsh-userauth.txt SSH Authentication Protocol  
draft-ietf-secsh-transport.txt SSH Transport Layer Protocol  
draft-ietf-secsh-connection.txt SSH Connection Protocol  
draft-ietf-secsh-newmodes.txt SSH Transport Layer Encryption Modes

### **SYNCHRONIZATION**

G.813 Timing characteristics of SDH equipment slave clocks (SEC)  
G.8261 Timing and synchronization aspects in packet networks  
G.8262 Timing characteristics of synchronous Ethernet equipment slave clock  
GR 1244 CORE Clocks for the Synchronized Network: Common Generic Criteria  
IEEE 1588v2 1588 PTP 2008

### **TACACS+**

IETF draft-grant-tacacs-02.txt The TACACS+ Protocol

### **TCP/IP**

RFC 768 User Datagram Protocol  
RFC 791 Internet Protocol  
RFC 792 Internet Control Message Protocol  
RFC 793 Transmission Control Protocol  
RFC 826 Ethernet Address Resolution Protocol  
RFC 854 Telnet Protocol Specification  
RFC 1350 The TFTP Protocol (Rev. 2)  
RFC 1812 Requirements for IPv4 Routers

### **VPLS**

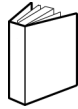
RFC 4762 Virtual Private LAN Services Using LDP

**Proprietary MIBs**

TIMETRA-ATM-MIB.mib  
TIMETRA-CAPABILITY-7705-V1.mib  
TIMETRA-CFLOWD-MIB.mib  
TIMETRA-CHASSIS-MIB.mib  
TIMETRA-CLEAR-MIB.mib  
TIMETRA-FILTER-MIB.mib  
TIMETRA-GLOBAL-MIB.mib  
TIMETRA-LDP-MIB.mib  
TIMETRA-LOG-MIB.mib  
TIMETRA-MPLS-MIB.mib  
TIMETRA-OAM-TEST-MIB.mib  
TIMETRA-PORT-MIB.mib  
TIMETRA-PPP-MIB.mib  
TIMETRA-QOS-MIB.mib  
TIMETRA-ROUTE-POLICY-MIB.mib  
TIMETRA-RSVP-MIB.mib  
TIMETRA-SAP-MIB.mib  
TIMETRA-SDP-MIB.mib  
TIMETRA-SECURITY-MIB.mib  
TIMETRA-SERV-MIB.mib  
TIMETRA-SYSTEM-MIB.mib  
TIMETRA-TC-MIB.mib



# Customer documentation and product support



## Customer documentation

<http://www.alcatel-lucent.com/myaccess>

Product manuals and documentation updates are available at [alcatel-lucent.com](http://www.alcatel-lucent.com). If you are a new user and require access to this service, please contact your Alcatel-Lucent sales representative.



## Technical Support

<http://support.alcatel-lucent.com>



## Documentation feedback

[documentation.feedback@alcatel-lucent.com](mailto:documentation.feedback@alcatel-lucent.com)

