Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER | RELEASE 3.0

SERIAL DATA INTERFACE CARD UPDATE - X.21 SUPPORT

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

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.

Preface

About This Guide

This guide provides site preparation recommendations and step-by-step procedures to install, remove, and replace a 12-port Serial Data Interface card. After the hardware installation process is completed, refer to the List of Technical Publications for details on the boot process, software configuration, and Command Line Interface (CLI) information to configure system and network parameters.

The 12-port Serial Data Interface card has four 68-pin connectors on its faceplate. Each connector supports three data ports. The connectors are labeled Ports 1-3, 4-6, 7-9, and 10-12. The Serial Data Interface card data ports operate in access mode only and can be configured for a V.35 interface, RS-232 (also known as EIA/TIA-232) interface, or X.21 interface.

The Serial Data Interface card is connected to a V.35, RS-232, or X.21 distribution panel using a 2 m (6.5 ft) cable, or to a customer-supplied distribution panel using a 10 m (32.8 ft) open-ended cable.

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.

Warnings and Notes

Observe the warnings and notes to avoid injury or router damage during installation and maintenance. Follow the safety procedures and guidelines when working with and near electrical equipment. Warning statements and notes are provided in each chapter.

Audience

This guide is intended for network installers and system administrators who are responsible for installing, configuring, or maintaining networks. This guide assumes you are familiar with electronic and networking technologies.

Information Symbols

Table 1 describes symbols contained in this guide.

Table 1: Information Symbols

Symbol	Meaning	Description
	Danger	This symbol warns that improper handling and installation could result in bodily injury. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be aware of your networking environments, and instigate accident prevention procedures.
	Warning	This symbol warns that improper handling and installation could result in equipment damage or loss of data.
	Caution	This symbol warns that improper handling may reduce your component or system performance.
	Note	This symbol provides additional operational information.

Technical Support

If you purchased a service agreement for your 7705 SAR-8 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, contact your welcome center at:

Web: http://www.alcatel-lucent.com/support

Installing an Adapter Card

In This Chapter

This chapter provides information about installing and removing a 12-port Serial Data Interface card in the 7705 SAR-8.

This chapter provides information on the following topics:

Power Consumption

Table 2 lists the power consumption for the 12-port Serial Data Interface card.

Table 2: Power Consumption

Description	Typical Power (W)	Maximum Power (W)
12-port Serial Data Interface card	21.5 W	25 W

Refer to “Power Consumption” in the 7705 SAR-8 Installation Guide for more information on the power consumption of other hardware.

Provisioning Requirements

To configure cards and ports, you must be able to access the 7705 SAR-8 by console or Telnet connection. Refer to the 7705 SAR-8 Installation Guide for information and instructions on console and Telnet connections.

The CSM does not require provisioning. However, the IOM, which is an integral part of the CSM software module, must be activated before any adapter cards and port parameters can be provisioned and configured. The IOM is activated using the `card` and `card-type` CLI commands to specify its slot number and card type. Adapter cards must be provisioned before their ports can be configured.

Notes:

- IOMs are specified using the card and card-type commands (items 1 and 2 in the list below).
- Adapter cards are provisioned and configured using the mda and mda-type commands (items 3 and 4 in the list below).

Provision components in the following order:

1. Card slot number (use the `card` command)
2. Card type
3. Adapter card slot number (use the `mda` command)
4. Adapter card type
5. Ports

Provisioning an Adapter Card

After the IOM has been activated on the CSM (Steps 1 and 2 below), continue in the `config` context with the following CLI commands to provision the adapter card. The steps below provision two 12-port Serial Data Interface cards, one in slot 1 and another in slot 2. The 7705 SAR-8 chassis supports a maximum of six adapter cards.

Note: The 7705 SAR-8 supports up to six adapter cards, in any combination that does not exceed the maximum; however, for a network application, at least one of the installed cards must be a network-capable adapter card.

	Command Syntax	Example
Step 1.	`card` *`slot-number`*	`card 1`
Step 2.	`card-type` *`card-type`*	`card-type iom-1g`
	Note: The *slot-number* is always 1 and the *card-type* is always iom-1g.	
Step 3.	`mda` *`mda-number`*	`mda 1`
Step 4.	`mda-type` *`mda-type`*	`mda-type a12-sdi`
Step 5.	`exit`	`exit`

To provision an additional adapter card, continue the configuration process with Step 6:

Step 6.	`mda` *`mda-number`*	`mda 2`
Step 7.	`mda-type` *`mda-type`*	`mda-type a12-sdi`
Step 8.	`exit`	`exit`

Configuration Example

The following example shows the `card`, `card-type`, `mda` and `mda-type` commands to specify the IOM as an `iom-1g` type and provision 12-port Serial Data Interface cards in slots 1 and 2.

```
ALU-1>config# card 1
ALU-1>config>card# card-type iom-1g
ALU-1>config>card# mda 1
ALU-1>config>card>mda# mda-type a12-sdi
ALU-1>config>card>mda# exit
ALU-1>config>card# mda 2
ALU-1>config>card>mda# mda-type a12-sdi
ALU-1>config>card>mda# exit
```

Sample Output

Use the `config>info` command to display card configuration information:

```
ALU-1>config# info
...
#--------------------------------------------------
echo "Card Configuration"
#--------------------------------------------------
    card 1
        card-type iom-1g
        mda 1
            mda-type a12-sdi
        exit
        mda 2
            mda-type a12-sdi
        exit
        mda 3
            mda-type a4-oc3
        exit
        mda 4
            mda-type a16-chds1
        exit
        mda 5
            mda-type a8-eth
        exit
        mda 6
            mda-type a2-choc3
        exit
    exit
#--------------------------------------------------
...
```

Use the `show card state` command to display administrative and operational states for all cards:

```
ALU-1# show card state

===============================================================================
Card State
===============================================================================
Slot/  Provisioned      Equipped         Admin Operational   Num   Num Comments
Id     Type             Type             State State         Ports MDA
-------------------------------------------------------------------------------
1      iom-1g           iom-1g           up    up                  6
1/1    a12-sdi                           up    provisioned   12
1/2    a12-sdi                           up    provisioned   12
1/3    a4-oc3                            up    provisioned   4
1/4    a16-chds1                         up    provisioned   16
1/5    a8-eth                            up    provisioned   8
1/6    a2-choc3                          up    provisioned   2
A      csm-1g           csm-1g           up    up                        Active
B      csm-1g                            up    down                      Standby
===============================================================================
ALU-1#
```

Use the `show mda` command to display provisioned adapter card information:

```
ALU-1# show mda

===============================================================================
MDA Summary
===============================================================================
Slot  Mda   Provisioned           Equipped              Admin     Operational
            Mda-type              Mda-type              State     State
-------------------------------------------------------------------------------
1     1     a12-sdi                                     up        provisioned
      2     a12-sdi                                     up        provisioned
      3     a4-oc3                                      up        provisioned
      4     a16-chds1                                   up        provisioned
      5     a8-eth                                      up        provisioned
      6     a2-choc3                                    up        provisioned
===============================================================================
ALU-1#
```

Removing an Adapter Card Configuration

If you remove an adapter card and will not be replacing it, or will be replacing it with a card of a different type, you must first remove the associated configuration, such as SAPs, SDPs, and port connections, prior to removing the installed card. If you will be replacing it with a card of the same type, you do not need to remove the associated configuration.

Refer to the 7705 SAR OS Interface Configuration Guide for details on configuring cards and ports.

In the example below, a 12-port Serial Data Interface card in slot 1 is being removed. In this example, only the port configuration must be removed.

Command Syntax	Example
Step 1. `port` *`port-id`*	`port 1/1/5`
Step 2. `shutdown`	`shutdown`

Note: The `port>shutdown` command must be repeated for all enabled ports on the adapter card.

Step 3. `exit`	`exit`
Step 4. `card` *`slot-number`*	`card 1`
Step 5. `mda` *`mda-slot`*	`mda 1`
Step 6. `shutdown`	`shutdown`
Step 7. `exit`	`exit`
Step 8. `no mda` *`mda-slot`*	`no mda 1`

You can now remove the installed card and replace it if required; see Removing and Replacing an Adapter Card. If you are simply removing the card, insert a filler plate in the empty slot. If you are replacing the card with a different type, provision the new card before installing it. If you are replacing the card with the same type, you do not need to provision it.

Installation Procedures

Warnings and Notes

Danger: Always assume that fiber-optic cables are connected to a light source.

Warnings:

- Electrostatic discharge (ESD) damage can occur if adapter cards are mishandled. Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to a nearby ground point that is connected to the site grounding point when working with an adapter card. Typical ground points include the ground stud on the 7705 SAR-8 mounting bracket, or a properly grounded rack or work bench.
- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-8 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly.
- Filler plates are required in all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.
- To comply with the GR-1089-CORE requirement R4-9 [31] standard for electromagnetic compatibility and safety, all intra-building ports are specified for use with shielded and grounded cables at both ends.
- The intra-building port(s) of the equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or sub-assembly must not be metallically connected to interfaces that connect to the Outside Plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

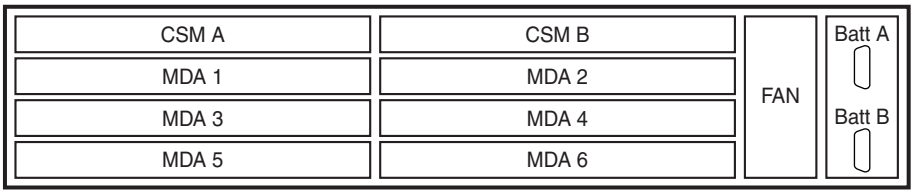
Notes:

- Ports cannot be configured until the adapter card is provisioned.
- Services cannot be provisioned until the ports are configured.
- Adapter card slot numbers are MDA 1 through MDA 6.

Installing an Adapter Card

Figure 1 identifies the location of the MDA slots. Figure 2 illustrates the installation of an adapter card. Table 3 identifies the installation features. Ejector levers help install and remove the adapter card; captive screws secure the card in place.

Figure 1: 7705 SAR-8 Slot Identification



The 12-port Serial Data Interface card has four 68-pin mini-Champ connectors on its faceplate. These connectors are cabled to a V.35, RS-232, or X.21 distribution panel using a 2 m (6.5 ft) cable, or to a customer-supplied distribution panel using a 10 m (32.8 ft) open-ended cable. See Serial Data Interface Card Connectors.

The 12-port Serial Data Interface card has four LEDs on its faceplate to display card and port status. See LED Descriptions.

Figure 2: Installing an Adapter Card

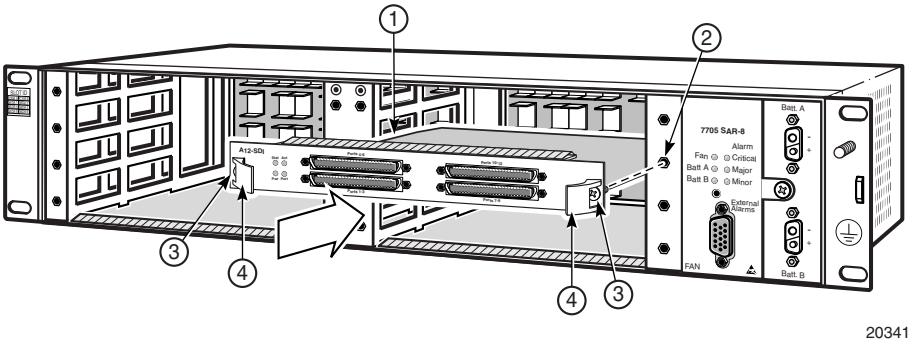


Table 3: Adapter Card Installation and Removal Features

Key	Description
1	Slot guide
2	Threaded receptacle
3	Captive screw
4	Ejector lever

Tools required:

- torque driver for Phillips screws

To install an adapter card:

Step 1. Remove the adapter card from the packaging and place on an anti-static work surface. Avoid touching the card components and connector pins.

Step 2. Insert the adapter card into an empty MDA slot.
With the ejector levers pressed inward, hold the adapter card by the levers and align the adapter card with the slot guides and the captive screws with the threaded receptacles (see Figure 2).

Step 3. Press the adapter card firmly into the slot. Make sure that the card connectors are seated and that the captive screws are engaged in the threaded receptacle.

Step 4. Tighten the captive screws to secure the card. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N•m).

Step 5. Check the Power LED on the adapter card faceplate. If the adapter card is properly inserted and the 7705 SAR-8 has valid power, the Power LED is lit blue. See LED Descriptions for a description of LED activity.

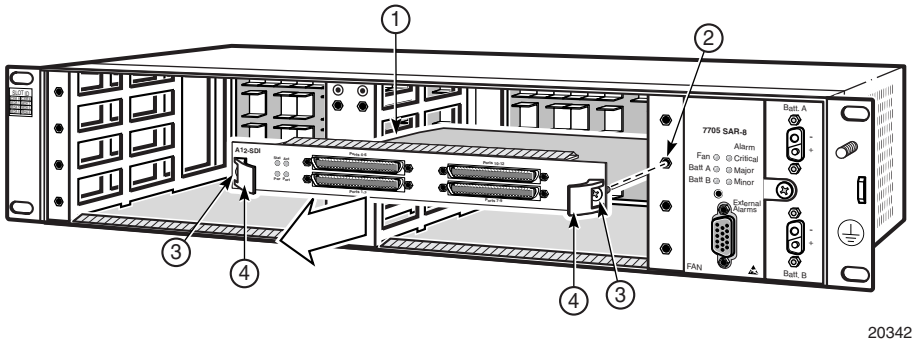
Step 6. Connect the distribution panel cables. See Serial Data Interface Card Connectors for cable descriptions and pinout assignments.

Removing and Replacing an Adapter Card

Before you remove and replace an adapter card, see Removing an Adapter Card Configuration.

Figure 3 illustrates removing an adapter card. Table 3 identifies the removal features.

Figure 3: Removing an Adapter Card



Tools required:

- Phillips screwdriver
- torque driver for Phillips screws

To remove and replace an adapter card:

Step 1. Disconnect all cable connections to the adapter card.

Step 2. Use a Phillips screwdriver to loosen the captive screws.

Caution: Do not try to remove the adapter card from the slot before the captive screws are loosened.

Step 3. Simultaneously rotate both ejector levers outward to release the adapter card connectors from the backplane.

Step 4. Hold the adapter card by the ejector levers and pull the card out of the slot.

Step 5. Place the adapter card on an anti-static surface.

Step 6. Install a replacement adapter card in the slot or cover the slot with a filler plate.

Step 7. Tighten the captive screws to secure the card or filler plate. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N·m).

Step 8. Check the Power LED on the adapter card faceplate. If the adapter card is properly inserted and the 7705 SAR-8 has valid power, the Power LED is lit blue. See LED Descriptions for a description of LED activity.

Step 9. If you replaced the adapter card, reconnect all cable connections to the card.

Serial Data Interface Card Connectors

In This Chapter

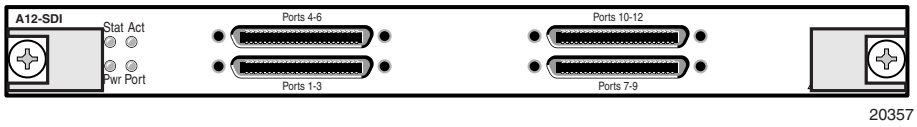
This chapter provides information about the cables and connector panels used with the 12-port Serial Data Interface card.

This chapter provides information on the following topics:

Serial Data Interface Card Connectors

The 12-port Serial Data Interface card has four 68-pin mini-Champ connectors on its faceplate. Each connector supports three data ports. The connectors are labeled Ports 1-3, 4-6, 7-9, and 10-12. See Figure 4.

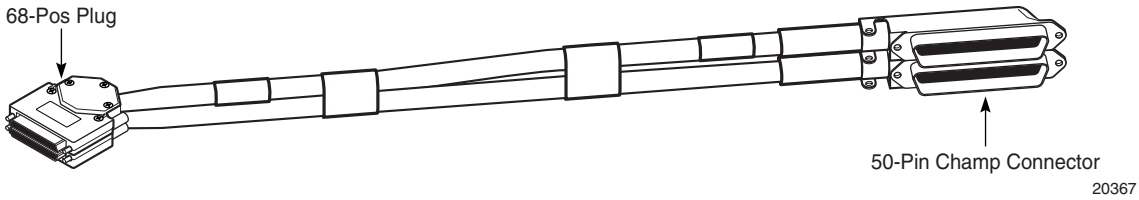
Figure 4: 12-port Serial Data Interface Card



The 12-port Serial Data Interface card can be connected to a V.35 distribution panel using a 2 m (6.5 ft) V.35 cable, to an RS-232 distribution panel using a 2 m (6.5 ft) RS-232 cable, and to an X.21 distribution panel using a 2 m (6.5 ft) X.21 cable. The card can also be connected to a customer-supplied distribution panel using a 10 m (32.8 ft) open-ended cable; the unterminated end connects to the distribution panel. Each cable assembly consists of two cables bundled into a single assembly.

The cable assemblies have a 68-Pos plug that attaches to the 68-pin mini-Champ connectors on the Serial Data Interface card faceplate, and a 50-pin Champ connector that attaches to the rear of the distribution panel. See Figure 5.

Figure 5: Serial Data Interface Card Cable Assembly



The Serial Data Interface card cables are identical in appearance, but have different connector pinouts to match the corresponding distribution panel. On the V.35 distribution panel, the cable connects to two 25-pair connectors on the rear and the panel breaks out to six M34 female connectors on the front. On the RS-232 distribution panel, the cable connects to two 25-pair connectors on the rear and the panel breaks out to six DB25 female connectors on the front. On the X.21 distribution panel, the cable connects to two 25-pair connectors on the rear and the panel breaks out to six usable DB15 connectors on the front.

Note: The X.21 distribution panel has eight DB15 connectors (two sets of four), but only the first three connectors in each set are used.

See Table 4 for a description of the Alcatel-Lucent approved cables and distribution panels used with the 12-port Serial Data Interface card. See Table 5 for the cable pinouts for each interface type. See the 7705 SAR-8 Installation Guide for more information on the V.35, RS-232, and X.21 distribution panels.

Notes:

- The cables use small diameter 30 AWG copper. Use of the open-ended cable for punch-block applications is not recommended due to the potential for wire breakage. Other connection methods, such as screw type panels, should be used.
- The pinouts shown in Table 5 are for a typical DCE connection.

Table 4: 12-port Serial Data Interface Card Cables and Distribution Panels

Part Number	Type	Description
3HE04506AB	V.35 cable, 2 m (6.5 ft)	Connects the Serial Data Interface card to the 3HE04510AA V.35 distribution panel
3HE04507AB	RS-232 cable, 2 m (6.5 ft)	Connects the Serial Data Interface card to the 3HE04511AA RS-232 distribution panel
3HE04508AB	X.21 cable, 2 m (6.5 ft)	Connects the Serial Data Interface card to the 3HE04512AA X.21 distribution panel
3HE04509AD	Open-ended SDI cable, 10 m (32.8 ft)	Connects the Serial Data Interface card to a customer-supplied external connector panel. The mini-SCSI connector attaches to the Serial Data Interface card and the open end can be directly attached to other telecom equipment.
3HE04510AA	6-port V.35 distribution panel	Breakout panel with six M34 connectors for V.35 access; requires a 3HE04506AB V.35 cable to connect to the Serial Data Interface card
3HE04511AA	6-port RS-232 distribution panel	Breakout panel with six DB25 connectors for RS-232 access; requires a 3HE04507AB RS-232 cable to connect to the Serial Data Interface card

Table 4: 12-port Serial Data Interface Card Cables and Distribution Panels (Continued)

Part Number	Type	Description
3HE04512AA	6-port X.21 distribution panel	Breakout panel with six usable DB15 connectors for X.21 access; requires a 3HE04508AB X.21 cable to connect to the Serial Data Interface card

Connector Pinouts

Table 5 shows the pinouts for the 12-port Serial Data Interface card connectors according to interface type. Table 6 describes the Serial Data Interface card connector cable twisted pairs.

Table 5: 12-port Serial Data Interface Card Connector Pinout Options

Pin Number on 68-Pin Connector	SDI Card Net Name	Signal Direction (SDIC - DCE)	V.35 Port Signal Name	RS-232 Port Signal Name	X.21 Port Signal Name
1	PA_SCT_B	Bi-Dir	SCT (B)	—	XCLK (B)
35	PA_SCT_A	Bi-Dir	SCT (A)	SCT	XCLK (A)
2	PA_TXD_A	Input	TXD (A)	TXD	T (A)
36	PA_TXD_B	Input	TXD (B)	—	T (B)
3	PA_SCR_B	Output - Tri	SCR (B)	—	S (B)
37	PA_SCR_A	Output - Tri	SCR (A)	SCR	S (A)
4	PA_CTS	Output	CTS	CTS	—
38	PA_DSR	Output	DSR	DSR	—
5	PA_TXCE_B	Input	TXCE (B)	—	—
39	PA_TXCE_A	Input	TXCE (A)	XCLK1	—
6	PA_RXD_A	Output	RXD (A)	RXD	R (A)
40	PA_RXD_B	Output	RXD (B)	—	R (B)
7	PA_DCD_B	Output	—	—	I (B)
41	PA_DCD_A	Output	DCD	DCD	I (A)
8	PA_RTS_A	Input	RTS	RTS	C (A)
42	PA_RTS_B	Input	—	—	C (B)

Table 5: 12-port Serial Data Interface Card Connector Pinout Options (Continued)

Pin Number on 68-Pin Connector	SDI Card Net Name	Signal Direction (SDIC - DCE)	V.35 Port Signal Name	RS-232 Port Signal Name	X.21 Port Signal Name
9	PA_ALB	Input	ALB	ALB	—
43	PA_DTR	Input	DTR	DTR	—
10	PA_RDL	Input	—	RDL	—
44	PA_XCLK2	Input	—	XCLK2	—
11	PA_GND	Isolated ground	—	GND	—
45	PA_RI	Output	—	RI	—
12	PB_SCT_B	Bi-Dir	SCT (B)	—	XCLK (B)
46	PB_SCT_A	Bi-Dir	SCT (A)	SCT	XCLK (A)
13	PB_TXD_A	Input	TXD (A)	TXD	T (A)
47	PB_TXD_B	Input	TXD (B)	—	T (B)
14	PB_SCR_B	Output - Tri	SCR (B)	—	S (B)
48	PB_SCR_A	Output - Tri	SCR (A)	SCR	S (A)
15	PB_CTS	Output	CTS	CTS	—
49	PB_DSR	Output	DSR	DSR	—
16	PB_TXCE_B	Input	TXCE (B)	—	—
50	PB_TXCE_A	Input	TXCE (A)	XCLK1	—
17	PB_RXD_A	Output	RXD (A)	RXD	R (A)
51	PB_RXD_B	Output	RXD (B)	—	R (B)
18	PB_DCD_B	Output	—	—	I (B)
52	PB_DCD_A	Output	DCD	DCD	I (A)
19	PB_RTS_A	Input	RTS	RTS	C (A)
53	PB_RTS_B	Input	—	—	C (B)
20	PB_ALB	Input	ALB	ALB	—
54	PB_DTR	Input	DTR	DTR	—
21	PB_RDL	Input	—	RDL	—

Table 5: 12-port Serial Data Interface Card Connector Pinout Options (Continued)

Pin Number on 68-Pin Connector	SDI Card Net Name	Signal Direction (SDIC - DCE)	V.35 Port Signal Name	RS-232 Port Signal Name	X.21 Port Signal Name
55	PB_XCLK2	Input	—	XCLK2	—
22	PB_GND	Isolated ground	—	GND	—
56	PB_RI	Output	—	RI	—
23	PC_SCT_B	Bi-Dir	SCT (B)	—	XCLK (B)
57	PC_SCT_A	Bi-Dir	SCT (A)	SCT	XCLK (A)
24	PC_TXD_A	Input	TXD (A)	TXD	T (A)
58	PC_TXD_B	Input	TXD (B)	—	T (B)
25	PC_SCR_B	Output - Tri	SCR (B)	—	S (B)
59	PC_SCR_A	Output - Tri	SCR (A)	SCR	S (A)
26	PC_CTS	Output	CTS	CTS	—
60	PC_DSR	Output	DSR	DSR	—
27	PC_TXCE_B	Input	TXCE (B)	—	—
61	PC_TXCE_A	Input	TXCE (A)	XCLK1	—
28	PC_RXD_A	Output	RXD (A)	RXD	R (A)
62	PC_RXD_B	Output	RXD (B)	—	R (B)
29	PC_DCD_B	Output	—	—	I (B)
63	PC_DCD_A	Output	DCD	DCD	I (A)
30	PC_RTS_A	Input	RTS	RTS	C (A)
64	PC_RTS_B	Input	—	—	C (B)
31	PC_ALB	Input	ALB	ALB	—
65	PC_DTR	Input	DTR	DTR	—
32	PC_RDL	Input	—	RDL	—
66	PC_XCLK2	Input	—	XCLK2	—
33	PC_GND	Isolated ground	—	GND	—
67	PC_RI	Output	—	RI	—

Table 5: 12-port Serial Data Interface Card Connector Pinout Options (Continued)

Pin Number on 68-Pin Connector	SDI Card Net Name	Signal Direction (SDIC - DCE)	V.35 Port Signal Name	RS-232 Port Signal Name	X.21 Port Signal Name
34	CGND	—	—	—	—
68	CGND	—	—	—	—

Table 6: 12-port Serial Data Interface Card Cable Twisted Pair Description

Pin Number on 68-Pin Connector	SDI Card Port Number	Port Signal Name	Signal Direction (DCE Electrical Interface)	Conductor Color Code (Base/Stripe)	SDI Cable Twisted Pair Number	Twisted Cable Pair Conductor Number
1	1, 4, 7, 10	PA_SCT_B	Bi-Dir	White/Tan	1	1
35	1, 4, 7, 10	PA_SCT_A	Bi-Dir	Tan/White	1	2
2	1, 4, 7, 10	PA_TXD_A	Input	White/Brown	2	1
36	1, 4, 7, 10	PA_TXD_B	Input	Brown/White	2	2
3	1, 4, 7, 10	PA_SCR_B	Output - Tri	White/Pink	3	1
37	1, 4, 7, 10	PA_SCR_A	Output - Tri	Pink/White	3	2
4	1, 4, 7, 10	PA_CTS	Output	White/Orange	4	1
38	1, 4, 7, 10	PA_DSR	Output	Orange/White	4	2
5	1, 4, 7, 10	PA_TXCE_B	Input	White/Yellow	5	1
39	1, 4, 7, 10	PA_TXCE_A	Input	Yellow/White	5	2
6	1, 4, 7, 10	PA_RXD_A	Output	White/Green	6	1
40	1, 4, 7, 10	PA_RXD_B	Output	Green/White	6	2
7	1, 4, 7, 10	PA_DCD_B	Output	White/Blue	7	1
41	1, 4, 7, 10	PA_DCD_A	Output	Blue/White	7	2
8	1, 4, 7, 10	PA_RTS_A	Input	White/Violet	8	1
42	1, 4, 7, 10	PA_RTS_B	Input	Violet/White	8	2
9	1, 4, 7, 10	PA_ALB	Input	White/Gray	9	1
43	1, 4, 7, 10	PA_DTR	Input	Gray/White	9	2

Table 6: 12-port Serial Data Interface Card Cable Twisted Pair Description (Continued)

Pin Number on 68-Pin Connector	SDI Card Port Number	Port Signal Name	Signal Direction (DCE Electrical Interface)	Conductor Color Code (Base/Stripe)	SDI Cable Twisted Pair Number	Twisted Cable Pair Conductor Number
10	1, 4, 7, 10	PA_RDL	Input	Tan/Brown	10	1
44	1, 4, 7, 10	PA_XCLK2	Input	Brown/Tan	10	2
11	1, 4, 7, 10	PA_GND	Isolated Ground	Tan/Pink	11	1
45	1, 4, 7, 10	PA_RI	Output	Pink/Tan	11	2
12	2, 5, 8, 11	PB_SCT_B	Bi-Dir	Tan/Orange	12	1
46	2, 5, 8, 11	PB_SCT_A	Bi-Dir	Orange/Tan	12	2
13	2, 5, 8, 11	PB_TXD_A	Input	Tan/Yellow	13	1
47	2, 5, 8, 11	PB_TXD_B	Input	Yellow/Tan	13	2
14	2, 5, 8, 11	PB_SCR_B	Output - Tri	Tan/Green	14	1
48	2, 5, 8, 11	PB_SCR_A	Output - Tri	Green/Tan	14	2
15	2, 5, 8, 11	PB_CTS	Output	Tan/Blue	15	1
49	2, 5, 8, 11	PB_DSR	Output	Blue/Tan	15	2
16	2, 5, 8, 11	PB_TXCE_B	Input	Tan/Violet	16	1
50	2, 5, 8, 11	PB_TXCE_A	Input	Violet/Tan	16	2
17	2, 5, 8, 11	PB_RXD_A	Output	Tan/Gray	17	1
51	2, 5, 8, 11	PB_RXD_B	Output	Gray/Tan	17	2
18	2, 5, 8, 11	PB_DCD_B	Output	Brown/Pink	18	1
52	2, 5, 8, 11	PB_DCD_A	Output	Pink/Brown	18	2
19	2, 5, 8, 11	PB_RTS_A	Input	Brown/Orange	19	1
53	2, 5, 8, 11	PB_RTS_B	Input	Orange/Brown	19	2
20	2, 5, 8, 11	PB_ALB	Input	Brown/Yellow	20	1
54	2, 5, 8, 11	PB_DTR	Input	Yellow/Brown	20	2
21	2, 5, 8, 11	PB_RDL	Input	Brown/Green	21	1

Table 6: 12-port Serial Data Interface Card Cable Twisted Pair Description (Continued)

Pin Number on 68-Pin Connector	SDI Card Port Number	Port Signal Name	Signal Direction (DCE Electrical Interface)	Conductor Color Code (Base/Stripe)	SDI Cable Twisted Pair Number	Twisted Cable Pair Conductor Number
55	2, 5, 8, 11	PB_XCLK2	Input	Green/Brown	21	2
22	2, 5, 8, 11	PB_GND	Isolated Ground	Brown/Blue	22	1
56	2, 5, 8, 11	PB_RI	Output	Blue/Brown	22	2
23	3, 6, 9, 12	PC_SCT_B	Bi-Dir	Brown/Violet	23	1
57	3, 6, 9, 12	PC_SCT_A	Bi-Dir	Violet/Brown	23	2
24	3, 6, 9, 12	PC_TXD_A	Input	Brown/Gray	24	1
58	3, 6, 9, 12	PC_TXD_B	Input	Gray/Brown	24	2
25	3, 6, 9, 12	PC_SCR_B	Output - Tri	Pink/Orange	25	1
59	3, 6, 9, 12	PC_SCR_A	Output - Tri	Orange/Pink	25	2
26	3, 6, 9, 12	PC_CTS	Output	Pink/Yellow	26	1
60	3, 6, 9, 12	PC_DSR	Output	Yellow/Pink	26	2
27	3, 6, 9, 12	PC_TXCE_B	Input	Pink/Green	27	1
61	3, 6, 9, 12	PC_TXCE_A	Input	Green/Pink	27	2
28	3, 6, 9, 12	PC_RXD_A	Output	Pink/Blue	28	1
62	3, 6, 9, 12	PC_RXD_B	Output	Blue/Pink	28	2
29	3, 6, 9, 12	PC_DCD_B	Output	Pink/Violet	29	1
63	3, 6, 9, 12	PC_DCD_A	Output	Violet/Pink	29	2
30	3, 6, 9, 12	PC_RTS_A	Input	Pink/Gray	30	1
64	3, 6, 9, 12	PC_RTS_B	Input	Gray/Pink	30	2
31	3, 6, 9, 12	PC_ALB	Input	Orange/Yellow	31	1
65	3, 6, 9, 12	PC_DTR	Input	Yellow/Orange	31	2
32	3, 6, 9, 12	PC_RDL	Input	Orange/Green	32	1
66	3, 6, 9, 12	PC_XCLK2	Input	Green/Orange	32	2

Table 6: 12-port Serial Data Interface Card Cable Twisted Pair Description (Continued)

Pin Number on 68-Pin Connector	SDI Card Port Number	Port Signal Name	Signal Direction (DCE Electrical Interface)	Conductor Color Code (Base/Stripe)	SDI Cable Twisted Pair Number	Twisted Cable Pair Conductor Number
33	3, 6, 9, 12	PC_GND	Isolated Ground	Orange/Blue	33	1
67	3, 6, 9, 12	PC_RI	Output	Blue/Orange	33	2
34		CGND	Chassis Ground	Orange/Violet	34	1
68		CGND	Chassis Ground	Violet/Orange	34	2

Notes:
The signal direction is relative to the Serial Data Interface card ports.
The conductor color code names are based on Madison Cable (Tyco Electronics) part number 68KBKLF065.
The conductor cable size is 30 AWG stranded (7 x 38).
The conductor cable contains an inner shield of aluminum with an outer shield of copper braid. The copper braid is connected to the metal back shell housing of the mini-Champ connector.
The port signal names PA_xxx map to ports 1, 4, 7 and 10; the port signal names PB_xxx map to ports 2, 5, 8 and 11; the port signal names PC_xxx map to ports 3, 6, 9 and 12.

Distribution Panels Pinouts for the Serial Data Interface Card

For V-35, RS-232, and X.21 distribution panels pinout information, refer to the 7705 SAR-8 Installation Guide, “Distribution Panels and Cables”.

7705 SAR-8 Overview

In This Chapter

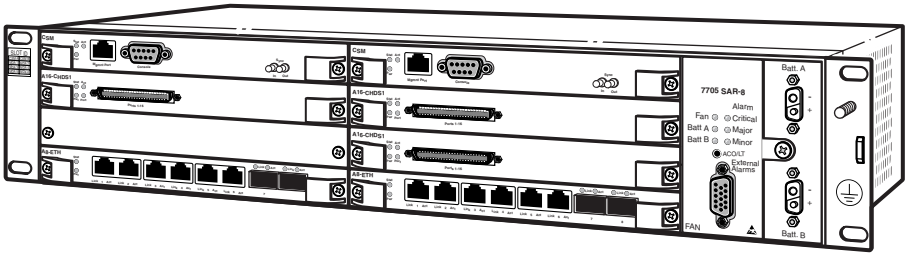
This chapter provides an introduction to the Alcatel-Lucent 7705 SAR-8:

7705 SAR-8 Components

The main components of the 7705 Service Aggregation Router (SAR) are the chassis, Control and Switching Module (CSM), adapter cards, and Fan module. In addition, there are optional distribution panels to connect the adapter cards to the customer equipment.

Figure 6 shows the front view of the 7705 SAR-8. There are eight horizontal slots for the CSMs and adapter cards, and one vertical slot for the Fan module. The connectors for the DC power feeds are located to the right of the Fan module and are factory-installed. The CSM, adapter cards, and Fan module are installed by the customer. All physical connections are made from the front of the unit, including the chassis ground point. There are no back panel connections.

Figure 6: 7705 SAR-8 Front View



19634

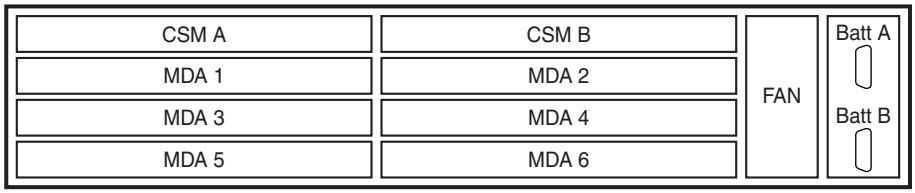
Note: The 7705 SAR-F and the 7705 SAR-8 are products in the SAR product line. The main difference between these products is their hardware configuration. The 7705 SAR-F has a fixed, single circuit board configuration while the 7705 SAR-8 is an 8-slot modular configuration. Refer to Notes on 7705 SAR-8 and 7705 SAR-F for more information.

Chassis

The chassis is shipped with a backplane, card cage, and connectors for the DC power feeds. Mounting brackets for the 7705 SAR-8 chassis are factory-installed so the unit can be mounted in a recommended 19-inch wide rack. The chassis grounding stud is on the right-hand side bracket. Filler plates are also factory-installed.

Figure 7 identifies the slots used for the CSMs, adapter cards (MDA), and Fan module. In redundant systems, the CSMs are installed in slots CSM A and CSM B, and the adapter cards are installed in slots MDA 1 through MDA 6. In simplex systems, the CSM is installed in slot CSM A, a filler plate is installed on slot CSM B, and the adapter cards are installed in slots MDA 1 through MDA 6.

Figure 7: 7705 SAR-8 Slot Identification



CSM

The 7705 SAR-8 supports two variants of the CSM: a –48 VDC variant and a +24 VDC variant.

The Control and Switching Module (CSM) has three main functions:

- it provides the management and console interfaces to the 7705 SAR-8
- it provides system synchronization interfaces for external synchronization input and output signals
- it controls the routing, switching, and services functions for the entire system

Each CSM is shipped with one compact flash memory device that stores system boot software, OS software, and configuration files and logs. The compact flash device is field-replaceable; see Compact Flash in Installing Components.

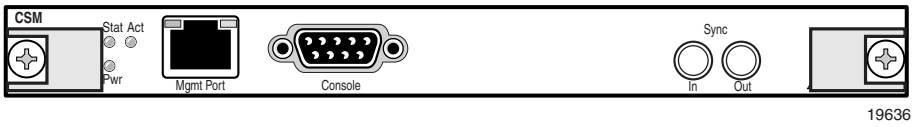
The installed compact flash is 256 Mb. Larger-capacity compact flashes are also orderable as listed in Table 7.

Table 7: Orderable Compact Flashes

Part Number	Description
3HE01619AA	2 Gb compact flash
3HE04707AA	4 Gb compact flash
3HE04708AA	8 Gb compact flash

Figure 8 shows the CSM faceplate. Refer to CSM Connectors and LEDs for identification and description of the CSM faceplate features.

Figure 8: 7705 SAR-8 CSM Features



There must be at least one CSM installed in the 7705 SAR-8. Install two CSMs for system redundancy. The redundant CSM operates in standby mode and takes over system operation if the active (primary) CSM fails. CSMs are field-replaceable and hot-swappable. Refer to the 7705 SAR OS Basic System Configuration Guide for information on CSM redundancy.

The CSM connects directly to the backplane and carries traffic between adapter cards. The switch fabric portion of the CSM receives and directs traffic to the appropriate destinations according to the routing information.

The CSM also provides 1.0/2.3 coaxial connectors for an external synchronization input and output. For redundant CSM configurations, a Y-cable can be used to connect the Sync In connectors on the two CSMs to the same external synchronization source.

Note: There is an IOM software module on the CSM that must be activated before any adapter card and port parameter can be provisioned and configured. The IOM is activated using the `card` and `card-type` CLI commands to specify its slot number and card type. See Provisioning CSM and Adapter Card Parameters for more information.

Adapter Cards

Adapter cards on the 7705 SAR-8 provide a wide variety of interfaces of different speed and type:

- T1/E1 interfaces (channelized and unchannelized)
- Ethernet interfaces (10/100/1000 Base-T and optical)
- SONET/SDH (OC3/STM1) interfaces (channelized and unchannelized)
- DS3/E3 interfaces
- E&M analog voice interfaces
- V.35, RS-232 (also known as EIA/TIA-232), and X.21 serial data interfaces

The 7705 SAR-8 Adapter cards are hot-swappable and field-replaceable by qualified personnel. Adapter cards are installed in slots MDA 1 through MDA 6. Refer to Figure 7 for adapter card slot locations on the 7705 SAR-8, and to the appropriate adapter card installation guide for installation and LED information. The 7705 SAR-8 supports the following adapter cards:

- 16-port T1/E1 ASAP Adapter card
- 8-port Ethernet Adapter card (version 1 and version 2)
- 4-port OC3/STM1 Clear Channel Adapter card
- 2-port OC3/STM1 Channelized Adapter card
- 4-port DS3/E3 Adapter card
- 6-port E&M Adapter card
- 12-port Serial Data Interface card

The 16-port T1/E1 ASAP Adapter card supports 16 individual T1/E1 ports through a single cable connection to a distribution panel. The 8-port Ethernet Adapter card supports six 10/100 Base-T ports and two SFP ports for 10/100/Gigabit Ethernet SFPs (optical or electrical) and T3 SFPs.

Notes:

- The two versions of the 8-port Ethernet Adapter card are identical except that version 2 adds support for Synchronous Ethernet as a timing source, has more memory for storage of MPLS labels, and supports a +24 VDC variant. For more information on Synchronous Ethernet, see the 7705 SAR OS Basic System Configuration Guide.
- The electrical SFP (part number 3HE00062AA) does not support Synchronous Ethernet. For a list of supported SFPs, refer to the 7705 SAR 8-port Ethernet Adapter Card Installation Guide.

The T1/E1 ASAP Adapter card and the Ethernet Adapter card (version 2) are available in either a –48 VDC variant or a +24 VDC variant.

The 4-port OC3/STM1 Clear Channel Adapter card has four hot-pluggable SFP-based ports (optical or electrical) that can be configured for ATM in access mode or for Packet over SONET/SDH (POS) in network mode. The port type can be independently configured to be SONET (OC3) or SDH (STM1). The 4-port OC3/STM1 Clear Channel Adapter card supports –48 VDC only.

The 2-port OC3/STM1 Channelized Adapter card has two hot-pluggable SFP-based ports (optical or electrical) that can be configured for ATM/IMA or TDM in access mode or for MLPPP in network mode. The port type must be configured to be either SONET (OC3) or SDH (STM1). The 2-port OC3/STM1 Channelized Adapter card supports –48 VDC only.

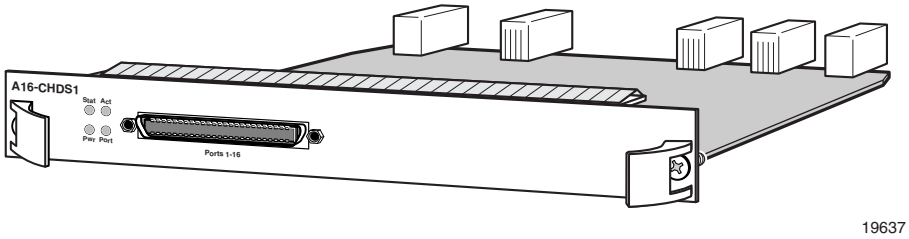
The 4-port DS3/E3 Adapter card has four TDM DS3/E3 clear channel ports. In access mode, the DS3 ports can be configured for ATM (E3 ports do not support ATM in Release 3.0). In network mode, the DS3/E3 ports can be configured for PPP. The 4-port DS3/E3 Adapter card is available in either a –48 VDC variant or a +24 VDC variant.

The 6-port E&M Adapter card has six RJ-45 combined signaling and analog voice ports on its faceplate. Each port contains a voice band interface which can be configured in either a two-wire or four-wire (default) mode to provide audio transmission with signaling capabilities, or in a 4-wire transmission-only mode to provide an audio path without signaling capabilities. Each port also contains E&M signaling leads that support Types I, II, and V signaling modes. The 6-port E&M Adapter card supports access mode only, and is available only in the –48 VDC model.

The 12-port Serial Data Interface card has four 68-pin connectors on its faceplate. Each connector supports three data ports. The connectors are labeled Ports 1-3, 4-6, 7-9, and 10-12. The data ports operate in access mode only and can be configured for a V.35, RS-232, or X.21 interface. The Serial Data Interface card is connected to a V.35, RS-232, or X.21 distribution panel, or to a customer-supplied distribution panel. The card supports –48 VDC only.

Figure 9 shows a sample 7705 SAR-8 adapter card.

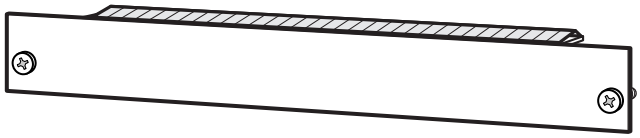
Figure 9: 7705 SAR-8 Adapter Card



Filler Plates

Figure 10 shows a filler plate. Filler plates (blank panels) are required on all empty slots to prevent dust accumulation, help control airflow, help confine electromagnetic interference, and for safety reasons. Filler plates do not have board components or connector pins. Figure 6 shows a filler plate on slot MDA 3.

Figure 10: 7705 SAR-8 Filler Plate



19638

Power System

The 7705 SAR-8 has two power connectors mounted on the front of the chassis. These connectors provide access for two independent –48/–60 VDC power feeds, providing power redundancy for the system. When only one power feed is used, the system does not have power supply redundancy. The 7705 SAR-8 has a distributed power design, where each CSM and adapter card provides independent power for its own functionality. The power system has no field-replaceable parts.

The 7705 SAR-8 can also be used for +24 VDC operation. This requires that +24 VDC variants of the Fan module, CSM, and adapter cards be installed in the chassis. The +24 VDC variants are identified by a yellow label located on the faceplate.

The Fan module and all cards in the chassis must have the same voltage type.

The DC power LEDs are located on the Fan module (see Figure 11). Refer to Fan Module Connectors and LEDs for a description of the Fan module LEDs.

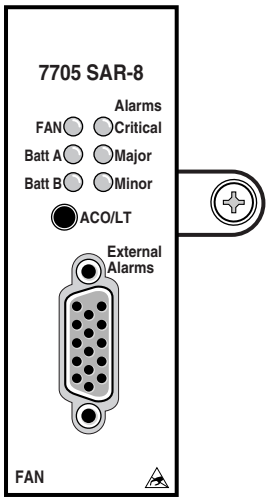
Refer to DC Power Connections for requirements and information regarding preparing DC power cables.

Fan Module

Figure 11 shows the Fan module. The Fan module provides cooling for the system, as well as alarm indicators (LEDs), an external alarm I/O connector, and an Audible Alarm Cutoff/Lamp Test (ACO/LT) pushbutton.

Warning: The Fan module is hot-swappable and field-replaceable by qualified personnel. It must always be installed and fully operational while the 7705 SAR-8 is powered up. During routine maintenance and Fan module replacement, the system can operate safely for up to 4 minutes.

Figure 11: Fan Module



19639

The 7705 SAR-8 supports three variants of the fan module:

- –48 VDC variant, which does not support an extended temperature range (version 1 – introduced in Release 1.0)
- –48 VDC variant, which supports an extended temperature range (version 2 – introduced in Release 2.0)
- +24 VDC variant, which supports an extended temperature range (version 2 – introduced in Release 2.0)

Note: The –48 VDC and +24 VDC variants of the fan module (version 2) introduced in Release 2.0 are not compatible with previous software releases of the 7705 SAR.

Fan Operation

The Fan module houses eight fans. Air enters from the intake vent on the right side of the chassis and exits through the exhaust vent on the left side. The fans have one operating speed (full speed). The fans on the –48 VDC variant (version 1), are always on. The fans on the extended temperature –48 VDC variant and on the +24 VDC variant (version 2) are either all on or all off, depending on the temperature monitoring described in Monitoring Temperature.

Warning: Individual fans are not field-replaceable. If a Fan Fail alarm is raised, replace the Fan module as soon as possible. If a second Fan Fail alarm is raised, the Fan module must be replaced immediately.

The FAN LED on the Fan module provides the following indications:

- green: normal operation
- amber: fans have turned off due to a low temperature or a fan has failed (the 7705 SAR software can detect which situation has occurred and will raise an alarm if a fan failure exists)
- unlit: fan power failure

Monitoring Temperature

The operation of the fans in the version 2 fan modules (introduced in Release 2.0) are controlled by software and hardware based on the following temperature monitoring.

- The air temperature inside the 7705 SAR-8 is continually monitored by a hardware-controlled temperature switch on the fan module. Fans turn ON when the temperature at the switch exceeds 107°F (42°C) and OFF when the temperature drops below 89°F (32°C). This temperature monitoring is present even in the absence of the CSMs.
- During normal operation, the CSMs and adapter card temperatures are monitored by temperature sensors on each card. Fans are forced ON if any of the sensors exceeds 131°F (55°C). Fans will remain forced on (regardless of what the hardware-controlled temperature switch on the fan module indicates) until all the card temperatures reach or drop below 50°F (10°C).

  An overheat alarm is raised if any card sensor temperature reaches or exceeds 167°F (75°C).

Card Temperatures

Each CSM and adapter card has temperature sensors to continuously monitor its own temperature and report the temperature to the CSM. The CSM continuously monitors the temperature reported from any card that is in the system abnormal temperature state.

- If the temperature of any adapter card exceeds 185ºF (85ºC), the card is rebooted by software. When the card comes up, it will display as being in the failed state, with the reason “Card has overheated”. Once the temperature drops to 158°F (70°C) or below, the card will go into the “booting” state and complete its reboot cycle.
- If the temperature of any card exceeds 243°F (117°C), the card is shut down until the temperature drops to an operationally safe temperature. At that point, the card will automatically reboot and be brought back into service.

Alarm Cables

The Fan module requires an alarm cable to provides access to the four alarm inputs and three alarm outputs on the External Alarm port. See Fan Module Alarm Cables for more details.

Distribution Panels and Cables

Distribution panels are used with 16-port T1/E1 ASAP Adapter cards to connect to T1/E1 circuits. There are three distribution panels that are used with the T1/E1 ASAP Adapter cards:

- BNC
- mini-coaxial
- RJ-45

Note: The connector on the faceplate of the 16-port T1/E1 ASAP Adapter card is a 68-pin AMP connector that is typically associated with SCSI-2 interfaces. Although the connector is sometimes referred to as a SCSI-2 connector, this document refers to it as a 68-pin AMP connector. This naming convention applies to the connector on any T1/E1 cable that attaches to the 16-port T1/E1 ASAP Adapter card.

Distribution panels are used with the 12-port Serial Data Interface card to connect to a V.35, RS-232, or X.21 distribution panel or to a customer-supplied distribution panel.

T1/E1 ASAP Adapter Card BNC Distribution Panel

Figure 12 shows the BNC Distribution panel. Table 8 lists the panel features.

The BNC panel provides 75-ohm E1 access for up to 32 ports. On the customer side, each access port has separate transmit and receive BNC female connectors. On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see T1/E1 Cables). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.

Note: A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to 16-port T1/E1 ASAP Adapter cards, always use the (bottom) connectors labeled MAIN.

Figure 12: BNC Distribution Panel

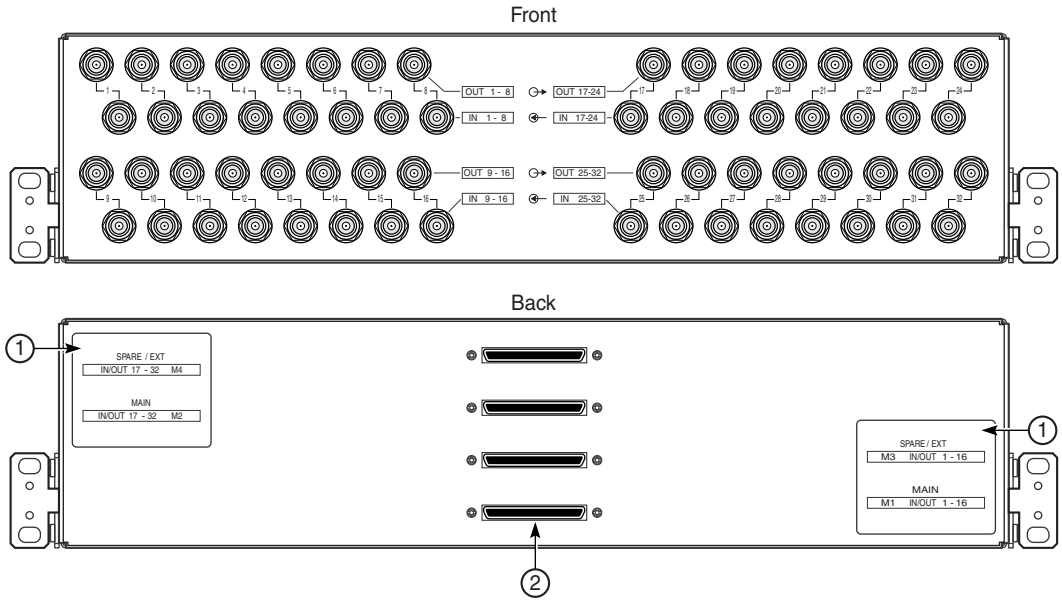


Table 8: Distribution Panel Features

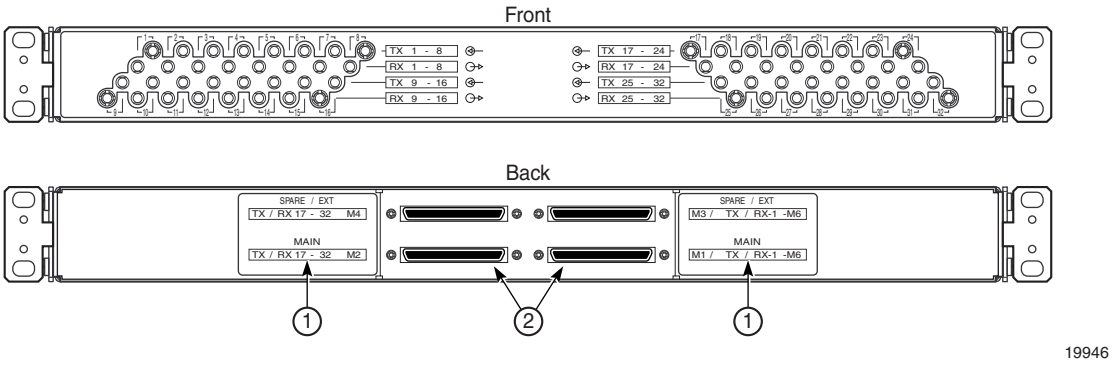
Key	Description
1	Label
2	68-pin AMP connectors

T1/E1 ASAP Adapter Card 1.0/2.3 Mini-Coaxial Distribution Panel

Figure 13 shows the Mini-Coaxial Distribution panel. Table 8 lists the panel features. The mini-coaxial panel provides 75-ohm E1 access for up to 32 ports. On the customer side, each access port has separate transmit and receive 1.0/2.3 mini-coaxial, female connectors. On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see T1/E1 Cables). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.

Note: A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to 16-port T1/E1 ASAP Adapter cards, always use the (bottom) connectors labeled MAIN.

Figure 13: Mini-Coaxial Distribution Panel



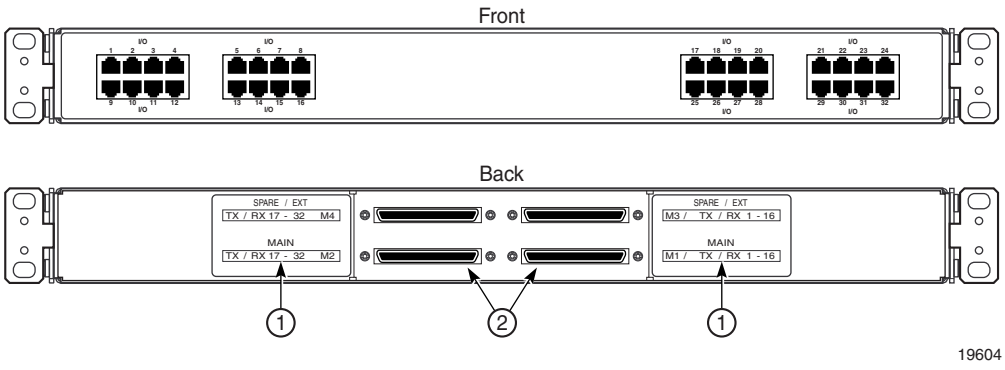
T1/E1 ASAP Adapter Card RJ-45 Distribution Panel

Figure 14 shows the RJ-45 Distribution panel. Table 8 lists the panel features.

The RJ-45 panel provides 100-ohm T1 or 120-ohm E1 access to 32 ports. On the customer side, each port has an RJ-45 connector (see RJ-45 Distribution Panel for pinout information). On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see T1/E1 Cables). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.

Note: A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to 16-port T1/E1 ASAP Adapter cards, always use the (bottom) connectors labeled MAIN.

Figure 14: RJ-45 Distribution Panel



Serial Data Interface Card V.35 Distribution Panel

Figure 15 shows a front and rear view of the 6-port V.35 distribution panel. It has six M34 female connectors on the front faceplate (A1 to A3 and B1 to B3) and two 25-pair connectors on the rear faceplate (A and B). The V.35 interfaces A1 to A3 are associated with 25-pair connector A; interfaces B1 to B3 are associated with 25-pair connector B. Figure 16 shows the M34 connector pinouts.

Note: The pinouts shown in Figure 16 and Figure 18 are for a typical DCE connection.

Figure 15: 6-Port V.35 Distribution Panel

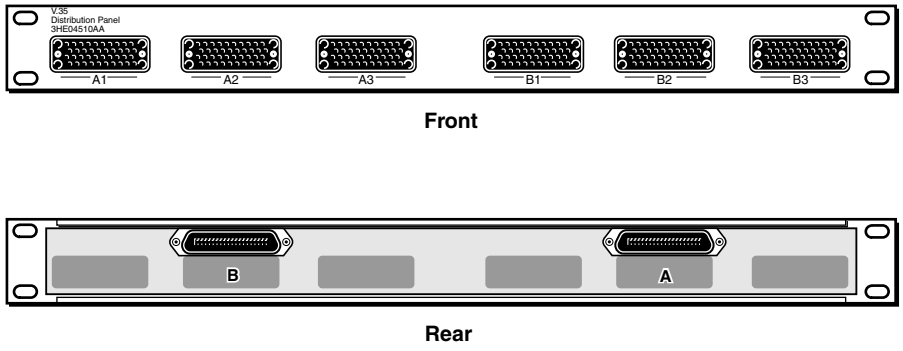
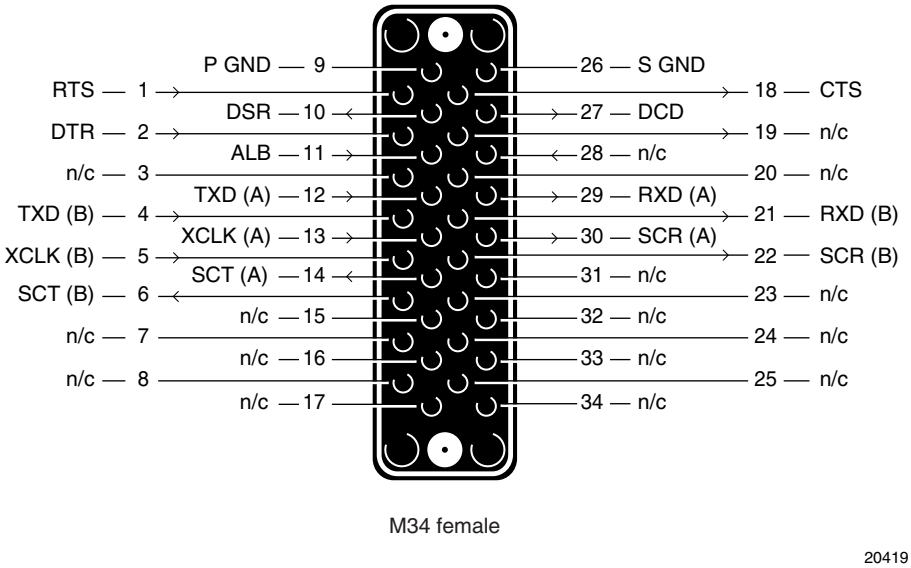


Figure 16: 6-Port V.35 Distribution Panel M34 Pinouts (Female)



Serial Data Interface Card RS-232 Distribution Panel

Figure 17 shows a front and rear view of the 6-port RS-232 distribution panel. It has six DB25 female connectors on the front faceplate (A1 to A3 and B1 to B3) and two 25-pair connectors on the rear faceplate (A and B). The RS-232 interfaces A1 to A3 are associated with 25-pair connector A; interfaces B1 to B3 are associated with 25-pair connector B. Figure 18 shows the DB25 connector pinouts.

Figure 17: 6-Port RS-232 Distribution Panel

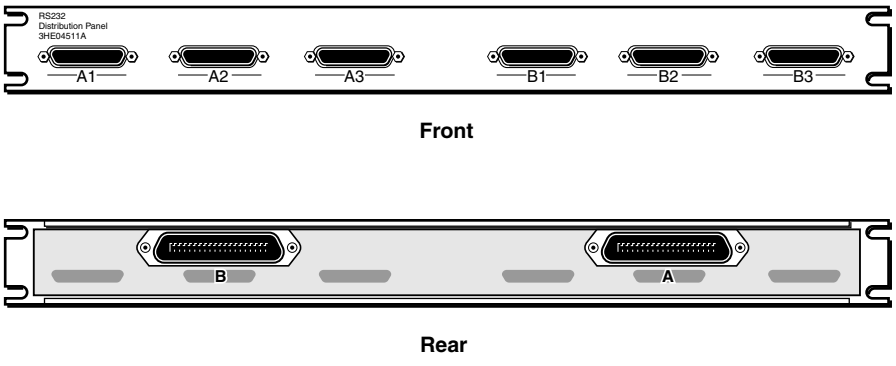
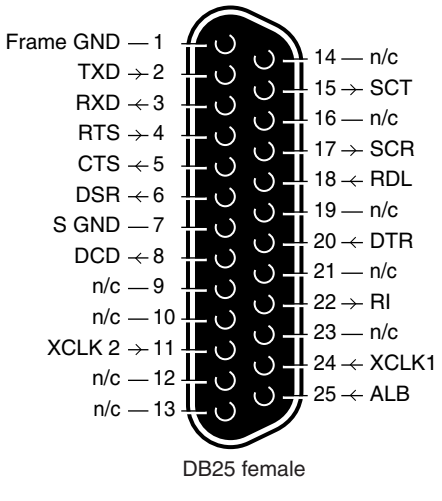


Figure 18: 6-Port RS-232 Distribution Panel DB25 Pinouts (Female)



Serial Data Interface Card X.21 Distribution Panel

Figure 19 shows a front and back view of the X.21 distribution panel. It has eight DB15 female connectors on the front faceplate (A1 to A4 and B1 to B4) and two 25-pair connectors on the rear faceplate (A and B). Only the first three connectors in each set (A1 to A3 and B1 to B3) are used. The X.21 interfaces A1 to A3 are associated with 25-pair connector A; interfaces B1 to B3 are associated with 25-pair connector B. Figure 20 shows the DB15 connector pinouts.

Figure 19: X.21 Distribution Panel

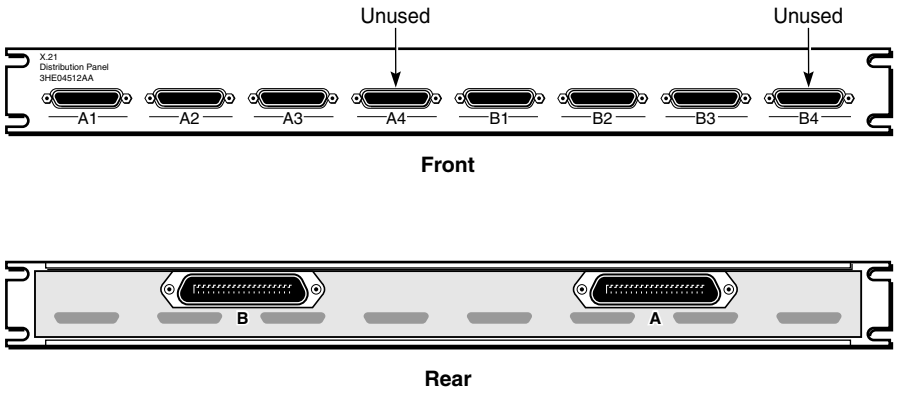
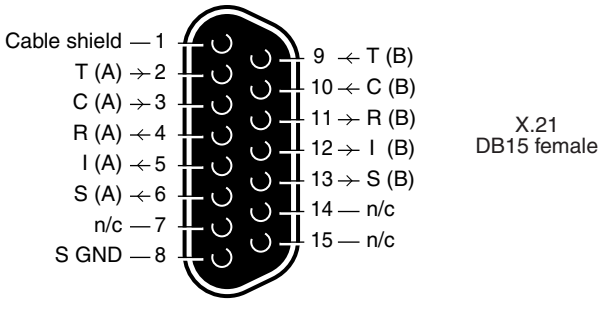


Figure 20: X.21 Distribution Panel DB15 Pinouts (Female)



T1/E1 Cables

Table 9 describes the T1/E1 cables that are available for the 7705 SAR-8, and gives the name used in the various installation guides as well as the name used in the orderable parts catalog. These cables are used to make the connection between the equipment (7705 SAR-8) and the distribution panel.

Table 9: T1/E1 Cables

Name used in Installation Guide	Name used in Orderable Parts Catalog
68-pin AMP connector to open-ended T1/E1 cable	T1/E1 Cable 28 AWG Open-ended 30m T1/E1 Cable 28 AWG Open-ended 15m T1/E1 Cable 26 AWG Open-ended 30m T1/E1 Cable 26 AWG Open-ended 15m
68-pin AMP to 68-pin AMP T1/E1 cable (1)	T1/E1 Cable for Distribution Panel, 1m

Note:
1. The T1/E1 cables with 68-pin Amp connectors at both ends have their connectors attached such that when connected to a card or distribution panel, the cable can run to the left or the right side depending on which connector is used.

For pinout information on the cables listed above, refer to the 7705 SAR T1/E1 ASAP Adapter Card Installation Guide. For information about wire identification by color, see Wire Identification by Color.

Serial Data Interface Card Cables

The 12-port Serial Data Interface card can be connected to a V.35 distribution panel using a 2 m (6.5 ft) V.35 cable, to an RS-232 distribution panel using a 2 m (6.5 ft) RS-232 cable, or to an X.21 distribution panel using a 2 m (6.5 ft) X.21 cable. The card can also be connected to a customer-supplied distribution panel using a 10 m (32.8 ft) open-ended cable; the unterminated end connects to the distribution panel. The cable assemblies consist of two cables bundled into a single assembly.

Note: The Serial Data Interface card cables use small diameter 30 AWG copper. Use of the open-ended cable for punch-block applications is not recommended due to the potential for wire breakage. Other connection methods, such as screw type panels, should be used.

The cable assemblies have a 68-Pos plug that attaches to the 68-pin mini-Champ connectors on the 12-port Serial Data Interface card faceplate and a 50-pin Champ connector that attaches to the rear of the distribution panel.

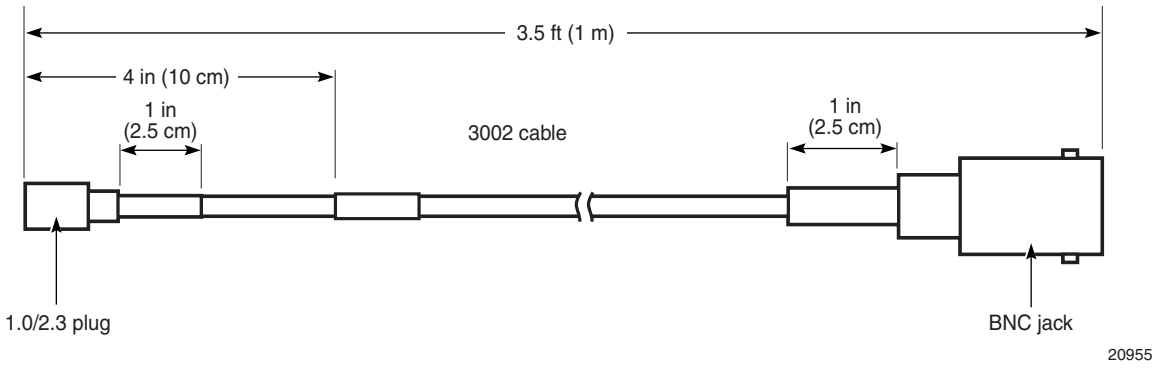
For pinout information on the Serial Data Interface card V.35, RS-232, and X.21 cables, refer to “Connector Pinouts” in the 7705 SAR Serial Data Interface Card Installation Guide.

DS3/E3 Cables

Each DS3/E3 port on the 4-port DS3/E3 Adapter card has a set of two DIN 1.0/2.3 connectors, one transmit (TX) and one receive (RX). The 3.5 ft (1 m) double-shielded 1.0/2.3 plug-to-BNC-jack cable (90-9772-01) is used to connect the port connectors to the attached equipment. See Figure 21.

Note: A cable extraction tool (3CC50079AAAA) is required to disconnect the plug end of the cable from the 4-port DS3/E3 Adapter card. See DS3/E3 Connections for details.

Figure 21: DS3/E3 Cable



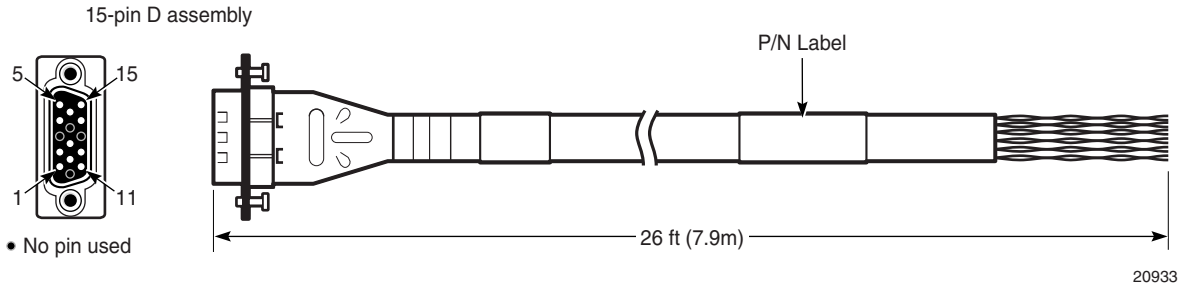
E&M Cables

For two-wire transmission, the 6-port E&M Adapter card can use standard RJ-45 Category 5 shielded cables to connect directly to the end equipment (such as Land Mobile Radio or teleprotection equipment). For four-wire transmission the E&M TR/RR inputs must be cross-connected to the connecting equipment's four-wire output pair and the E&M T/R output to the connecting equipment's four-wire input pair.

Fan Module Alarm Cables

Alcatel-Lucent supplies a shielded alarm cable (3EM24105) that is used to connect to the DB15 External Alarm port on the 7705 SAR-8 Fan module. This cable is an open-ended cable which is 26 ft (7.9 m) in length and is designed to be connected to a standard punch-down or wire-wrap panel. See Figure 22. Also see External Alarms Port Pinouts for a description of the Fan module External Alarm port pinouts.

Figure 22: Fan Module Alarm Cable



Notes on 7705 SAR-8 and 7705 SAR-F

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

The 7705 SAR-8 has an 8-slot chassis that supports two CSMs, a Fan module and six adapter cards. See Adapter Cards for more information.

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 10.

The fixed configuration of the 7705 SAR-F means that card slot and type provisioning 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 10: 7705 SAR-8 and 7705 SAR-F Comparison

7705 SAR-8	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	
16-port T1/E1 ASAP Adapter card	16 individual T1/E1 ports on the faceplate	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, except that the 16 T1/E1 ports on the 7705 SAR-F support multiple synchronization sources to support two timing references. On the 7705 SAR-8, the CLI indicates the MDA type for the 16-port T1/E1 ASAP Adapter card as `a16-chds1`. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F ports as `a16-chds1v2`.

Table 10: 7705 SAR-8 and 7705 SAR-F Comparison (Continued)

7705 SAR-8	7705 SAR-F	Notes
8-port Ethernet Adapter card	8 individual Ethernet ports on the faceplate	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 Ethernet ports on the 7705 SAR-F are 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. The +24 VDC version of the 7705 SAR-8 only supports version 2 of the 8-port Ethernet Adapter card. On the 7705 SAR-8, the CLI indicates the MDA type for the 8-port Ethernet Adapter card as `a8-eth` or `a8-ethv2`. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F Ethernet ports as `a8-ethv3`, to distinguish it from the actual version 2 of the 8-port Ethernet Adapter card.
Configuration at card (IOM) and MDA (adapter card) levels is done by the user	Configuration at card (IOM) and MDA (adapter card) levels is preset and users cannot change these types	

SAR System Installation Process

To install the 7705 SAR-8 system, perform the installation procedures in the following order:

Step 1. Prepare the site.

Step 2. Unpack the chassis.

Step 3. Mount and ground the chassis.

Step 4. Prepare and connect the DC input power cables.

Step 5. Install the components.

Step 6. Power up the system.

Step 7. Connect the network cables.

Step 8. Provision (preconfigure) the system.

7705 SAR Interfaces

In This Chapter

This chapter provides information about configuring chassis slots, cards, and ports.

Topics in this chapter include:

Configuration Overview

This guide uses the term “preprovisioning” in the context of preparing or preconfiguring entities such as chassis slots, the IOM, adapter cards, ports, and interfaces, prior to hardware actually being installed in the chassis. These entities can be installed but not enabled. When the entity is in a `no shutdown` state (administratively enabled), the entity is considered to be provisioned.

Alcatel-Lucent 7705 SAR routers provide the capability to configure chassis slots to accept specific adapter card types and set the relevant configurations before the equipment is actually installed. The preprovisioning ability allows you to plan your configurations as well as monitor and manage your router hardware inventory. Ports and interfaces can also be preprovisioned. When the functionality is needed, the card(s) can be inserted into the appropriate chassis slots as required.

The following sections are discussed:

- Configuring the IOM and Card Slot
- Configuring Adapter Cards
- Configuring Ports

Configuring the IOM and Card Slot

The 7705 SAR card slot ID is always **1** and the card type for the IOM is always **iom-1g**.

On the 7705 SAR-8, the CSM, which can only be installed in slot A or B of the chassis, does not need to be provisioned. However, the IOM, which is virtualized in the 7705 SAR software, must be activated before the adapter cards and ports can be preprovisioned and configured. The IOM is activated by designating it a card slot ID and card type. This enables the chassis slots to accept the adapter cards.

The 7705 SAR-F has a fixed physical configuration and uses only one control and switching functional block, which is referred to on the CLI as CSM A. The CSM and IOM do not need to be provisioned in order to provision the interface on the adapter cards.

The slot ID (1) is used as part of the adapter card and port identifier on the CLI.

Configuring Adapter Cards

A chassis slot and card type must be specified and provisioned before an adapter card can be preprovisioned. A chassis slot is a physical slot designated with an MDA ID from 1 to 6. An adapter card is provisioned when a card designated from the allowed adapter card types is inserted. A preprovisioned adapter card slot can remain empty without conflicting with populated slots.

A maximum of six adapter cards can be installed in the 7705 SAR-8 chassis. The following adapter cards are supported:

- 16-port T1/E1 ASAP Adapter card (maximum of six)
- 12-port Serial Data Interface card (maximum of six)
- 8-port Ethernet Adapter cards, version 1 and version 2 (maximum of six)
- 6-port E&M Adapter card (maximum of six)
- 4-port DS3/E3 Adapter card (maximum of six)
- 4-port OC3/STM1 Clear Channel Adapter card (maximum of six)
- 2-port OC3/STM1 Channelized Adapter card (maximum of two)

The adapter cards can be installed in the chassis in any combination that does not exceed the maximum number. However, network applications require at least one network-capable adapter card to be installed as part of the mix.

Once installed and enabled, the system verifies that the installed adapter card type matches the configured parameters. If the parameters do not match, the adapter card remains offline.

On the CLI, the adapter cards are referred to as MDAs. The adapter card is identified using the format *slot/mda*, where *slot* identifies the IOM card slot ID (always 1) and *mda* identifies the physical slot in the chassis for the adapter card; for example, 1/5.

The 7705 SAR-F has a fixed physical configuration that includes T1/E1 and Ethernet ports based on the 16-port T1/E1 ASAP Adapter card and the 8-port Ethernet Adapter card (version 2). These cards do not need to be provisioned in order to provision the T1/E1 and Ethernet ports.

The following output displays the administrative and operational states of all cards in the 7705 SAR-8 chassis. A similar output for the 7705 SAR-F is also shown.

For the 7705 SAR-8:

```
ALU-1>config# show card state

===============================================================================
Card State
===============================================================================
Slot/  Provisioned      Equipped         Admin Operational   Num   Num Comments
Id     Type             Type             State State         Ports MDA
-------------------------------------------------------------------------------
1      iom-1g           iom-1g           up    up                  6
1/1    a6-em                             up    provisioned   6
1/2    a4-oc3                            up    provisioned   4
1/3    a16-chds1                         up    provisioned   16
1/4    a4-chds3                          up    provisioned   4
1/5    a8-eth                            up    provisioned   8
1/6    a2-choc3                          up    provisioned   6
A      csm-1g           csm-1g           up    up                        Active
B      csm-1g                            up    down                      Standby
===============================================================================
ALU-1>config#
```

For the 7705 SAR-F:

```
ALU-1# show card

===============================================================================
Card State
===============================================================================
Slot/  Provisioned      Equipped         Admin Operational   Num   Num Comments
Id     Type             Type             State State         Ports MDA
-------------------------------------------------------------------------------
1      iom-1g           iom-1g           up    up            2
1/1    a16-chds1v2      a16-chds1v2      up    provisioned   16
1/2    a8-ethv3         a8-ethv3         up    provisioned   8
A      csm-1g           csm-1g           up    up                        Active
===============================================================================
ALU-1#
```

Channelized Adapter Card Support

Each 16-port T1/E1 ASAP Adapter card, 12-port Serial Data Interface card, 6-port E&M Adapter card, and 2-port OC3/STM1 Channelized Adapter card supports channelization down to channel group DS0.

On the 16-port T1/E1 ASAP Adapter card and 2-port OC3/STM1 Channelized Adapter card, up to 24 channel groups are supported on a DS1 circuit and up to 32 channel groups on an E1 circuit. The 12-port Serial Data Interface card supports a single channel group on a channelized V.35 circuit, RS-232 (also known as EIA/TIA-232) circuit, or X.21 circuit. The 6-port E&M Adapter card supports a single channel group on a channelized E&M voice interface.

Configuring Ports

Before a port can be configured, the slot must be provisioned with a card type and the adapter card type must be specified.

The 7705 SAR supports the following port types:

- Ethernet — the 8-port Ethernet Adapter cards have six RJ-45 ports for 10/100BASE-T (Ethernet and Fast Ethernet) connections. The cards also have two SFP ports for fiber or copper SFPs. Fast Ethernet and Gigabit (100 Mb/s and 1000 Mb/s) fiber connections and 10/100/1000BASE-T copper connections are supported. This variety of connections enables the 8-port Ethernet Adapter card to be connected to different devices at the customer site, including wireless base stations, DSL modems, microwave boxes, and other auxiliary equipment. As well, with fiber connections, the adapter card can be directly connected to the Metro Ethernet Provider (MEP) central office. Version 2 of the 8-port Ethernet Adapter card also supports synchronous Ethernet timing.
- TDM — the 16-port T1/E1 ASAP Adapter card, 2-port OC3/STM1 Channelized Adapter card, and 4-port DS3/E3 Adapter card support TDM ports.

  On the 16-port T1/E1 ASAP Adapter card, channelization is supported down to the DS0 level. To change port types, all ports must first be shut down. The ports on these cards can be configured for DS1 or E1 operation. All ports on the 16-port T1/E1 ASAP Adapter card must be either T1 or E1; there cannot be a mix of the two types. When the first port is configured, all other ports on the 16-port T1/E1 ASAP Adapter card must be set to the same type.

  For the 2-port OC3/STM1 Channelized Adapter card, OC3 port bandwidth can be channelized into multiple DS3 channels. Within the channel, you must have all DS1 or E1 subchannels.

  The 4-port DS3/E3 Adapter card has four DS3/E3 clear channel ports. In access mode, the DS3 ports can be configured for ATM (E3 ports do not support ATM in Release 3.0). In network mode, the DS3/E3 ports can be configured for PPP. All ports must be set to DS3 or E3. Once the first port has been configured, all other ports on the same 4-port DS3/E3 Adapter card must be set to the same type. To change between types, the ports must first be deleted. DS3 ports provide B3ZS (bipolar with three-zero substitution) zero code suppression and E3 ports provide HDB3 (high density bipolar of order 3) zero code suppression. B3ZS and HDB3 zero code suppression are line coding techniques used to maintain proper clock rate synchronization.
- serial (TDM) — the 12-port Serial Data Interface card has four connectors, which support three serial data ports each. Each port grouping may be configured for V.35, RS-232, or X.21 operation. When a port has been configured for a specific interface type, the other two ports in that same grouping can only be configured for the same type.

Channelization on the 12-port Serial Data Interface card is supported down to the DS0 level. By setting the encapsulation type to circuit emulation (cem), the card can be configured to support TDM pseudowires.

- multilink bundles — the 16-port T1/E1 ASAP Adapter card and the 2-port OC3/STM1 Channelized Adapter card support multilink bundles. A multilink bundle is a collection of channels on channelized ports that physically reside on the same adapter card. All member links of an MLPPP group must reside on the same T1/E1 ASAP card or the same port on a 2-port OC3/STM1 Channelized Adapter card, and they must be of the same type (either E1 or DS1). Multilink bundles are used by providers who offer either bandwidth-on-demand services or fractional bandwidth (DS3) services. Multilink bundles are supported over PPP channels (MLPPP).
- IMA — the 16-port T1/E1 ASAP Adapter card and the 2-port OC3/STM1 Channelized Adapter card support Inverse Multiplexing over ATM (IMA). IMA is a standard developed to address the increasing need for bandwidth greater than the DS1 or E1 link speeds (1.544 or 2.048 Mb/s, respectively) but less than higher link speeds such as DS3 (44.736 Mb/s). IMA combines the transport bandwidth of multiple DS1 or E1 channels in a logical link (called an IMA group) to provide scalable bandwidth.
- SONET/SDH — the 4-port OC3/STM1 Clear Channel Adapter card has four hot-pluggable SFP-based ports that can be independently configured to be SONET (OC3) or SDH (STM1). The 2-port OC3/STM1 Channelized Adapter card has two hot-pluggable SFP-based ports that can be configured to be SONET (OC3) or SDH (STM1).
- voice — the 6-port E&M Adapter card card has six RJ-45 ports that support the transport of an analog voiceband signal between two analog devices over a digital network. The analog signals are converted into a 64 kb/s digital Pulse Code Modulation (PCM) format using either Mu-Law (North America) or A-Law (Rest of World) companding. The type of companding is selectable on a per-card basis. Companding conversion (that is, Mu-Law to A-Law or vice versa) is not supported.

  The signaling type is selectable on a per-card basis depending on companding type. When A-Law companding is configured, the signaling type is automatically Type V. When Mu-Law companding is configured, either Type I or Type II signaling can be selected.

  Each voice port can be configured to operate in either a two-wire or four-wire (default) mode. The ports (in groups of three – ports 1 to 3 and ports 4 to 6) can also be configured to operate in transmission-only mode, which provides a four-wire audio path with no signaling. A transmit and receive transmission level point (the analog-to-digital decibel level) can be configured for each port. See Table 11 for the signaling type, companding law and audio wires configuration options on the 6-port E&M Adapter card.

Table 11: Configuration Options for the 6-port E&M Adapter Card

Signaling Type	Companding Type	Number of Wires
Type I, Type II	Mu-Law	Two-wire or four-wire
Type V	A-Law	Two-wire or four-wire
Transmission-only (no signaling)	Mu-Law or A-Law	Four-wire

On the CLI, a port is identified using the format *slot/mda/port*, where *slot* identifies the IOM card slot ID (always 1), *mda* identifies the physical slot in the chassis for the adapter card, and *port* identifies the physical port on the adapter card; for example, 1/5/1.

Channelized ports are identified using the format *slot/mda/port.channel-group-id*, where *slot* identifies the IOM card slot ID (always 1), *mda* identifies the physical slot in the chassis for the adapter card, *port* identifies the physical port on the adapter card, and *channel-group-id* identifies the channel group ID.

For the 2-port OC3/STM1 Channelized Adapter card and the T1/E1 ASAP Adapter card, the *channel-group-id* identifies the DS1 or E1 channel group; for example, 1/5/1.20. For the 12-port Serial Data Interface card, the *channel-group-id* identifies the V.35, RS-232, or X.21 channel group; only one channel group is supported on the card, so the format would be 1/1/1.1. For the 6-port E&M Adapter card, the *channel-group-id* identifies the E&M voice channel group; only one channel group is supported on the card, so the format would be 1/1/1.1.

Access and Network Ports

All ports on adapter cards must be set to either access (customer-facing) or network mode:

- access ports — configured for customer-facing traffic on which services are configured. If a Service Access Point (SAP) is to be configured on the port or channel, the port or channel must be configured as an access port or channel. When a port is configured for access mode, the appropriate encapsulation type must be configured to distinguish the services on the port or channel.

  The encapsulation type on the 16-port T1/E1 ASAP Adapter card can be ipcp, cem, or atm.

  On the 12-port Serial Data Interface card and 6-port E&M Adapter card, the encapsulation type must be cem.

  The encapsulation type on the 8-port Ethernet Adapter card can be set as null or dot1q.

On the 4-port DS3/E3 Adapter card (DS3 ports only) and 4-port OC3/STM1 Clear Channel Adapter card, the encapsulation type must be atm.

On the 2-port OC3/STM1 Channelized Adapter card, the encapsulation type can be cem or atm.

- network ports — configured for network-facing traffic. Network ports are used as uplinks for Ethernet, ATM, PPP, and TDM pseudowires. On Ethernet cards, the encapsulation type can be set as null or dot1q. On the T1/E1 ASAP Adapter card and 2-port OC3/STM1 Channelized Adapter card, the encapsulation type must be ppp-auto for PPP/MLPPP bundles. On the 4-port OC3/STM1 Clear Channel Adapter card configured for POS and on the 4-port DS3/E3 Adapter card, the encapsulation type must be ppp-auto.

The default mode for the T1/E1 ASAP Adapter card, 8-port Ethernet Adapter card, 4-port DS3/E3 Adapter card, and 2-port OC3/STM1 Channelized Adapter card is access. The default mode for the 4-port OC3/STM1 Clear Channel Adapter card is access; it must be set to network mode for Packet over SONET (POS). The 12-port Serial Data Interface card and 6-port E&M Adapter card can operate in access mode only.

All channel groups on a port must either be all access or all network channel groups; there cannot be a mix. When the first channel group is configured, all other channel groups on that port must be set to the same mode. To change modes, all channel groups must first be shut down.

Access Ports

Access ports on the 16-port T1/E1 ASAP Adapter card can be configured for PPP/MLPPP channel groups. Customer IP traffic can be transported directly over PPP or MLPPP links. The access ports can also be configured for TDM to transport 2G traffic from BTSs or ATM/IMA to transport 3G UMTS traffic from Node Bs.

In access mode, PPP channels on the T1/E1 ASAP Adapter card can be associated with n × DS0 channel groups. Although multiple PPP channel groups are supported per T1/E1 port, all the channel groups must be the same encapsulation type. For example, if one channel group on a given port is set for ipcp encapsulation, another channel group on the same port cannot be set to cem. If MLPPP channels are used, an MLPPP channel group fills up an entire DS1 or E1 link.

The data ports on the 12-port Serial Data Interface card provide transport between two data devices. Each data stream that is transported across the network can be mapped into a TDM pseudowire (Cpipe) for transport across an MPLS network. The other end can terminate either on another 7705 SAR or a multiplexer capable of terminating the pseudowire.

The 12-port Serial Data Interface card can also be part of a system architecture where a circuit originates on an SDI port on the 7705 SAR, transits over an MPLS network, and terminates on a 3600 MainStreet node connected to a 7705 SAR over a T1/E1 connection. In addition to the MPLS network functionality, the 12-port Serial Data Interface card can also operate in a TDM SAP-to-SAP mode where the other SAP can be another port on the 12-port Serial Data Interface card or on a T1/E1 ASAP card.

Access ports on the 8-port Ethernet Adapter card can transport traffic from sources such as e911 locators, site surveillance equipment, VoIP phones, and video cameras. The Ethernet traffic is transported over the PSN using Ethernet VLLs.

Note: For information on VLLs, refer to the 7705 SAR OS Services Guide, “VLL Services”.

The voice ports on the 6-port E&M Adapter card provide voice band transmission between two analog devices over a digital network. The 7705 SAR terminates the voice circuit and then transmits the data over a TDM-based network interface (SAP-to-SAP) or an MPLS packet-based network interface (SAP-to-SDP). For standard TDM, a T1 or E1 interface is used to transmit the data across the network. For MPLS, any network interface (that is, Ethernet or T1/E1 MLPPP, or OC3/STM1) can be used. The traffic originating from the 6-port E&M Adapter card can be mapped into a TDM pseudowire (Cpipe) for transport across the MPLS network. The 6-port E&M Adapter card supports one TDM pseudowire per port.

A voice circuit originating on the 7705 SAR can terminate on another 7705 SAR over an MPLS or T1/E1 TDM connection, on other TDM-capable equipment (such as a 3600 MainStreet node) over a T1/E1 TDM connection, or on other MPLS-capable equipment over an MPLS pseudowire emulation (PWE) connection.

Typical analog E&M applications are:

- electrical utilities, which utilize teleprotection equipment to relay protection control signals along portions of an electrical grid. When analog signaling is used, specific voice band tones are continuously transmitted between the protection devices. When a fault occurs, the tone frequency is changed, causing the far-end protection device to perform an action.
- railways, to connect remote radio base stations used for train control and train-to-train voice communications (similar to LMR radio)
- air traffic control networks, to interconnect remote radar and air/ground radio locations back to a regional air traffic control center. The air/ground radios use analog E&M voice interfaces between the central switch and the remote sites.
- utilities and police and fire departments, to interconnect LMR radio networks over an MPLS backbone

The DS3 access ports on the 4-port DS3/E3 Adapter card can be configured for ATM PW services (categories CBR, VBR-rt, VBR-nrt, UBR, and UBR+MCR).

SONET/SDH ports in access mode on a 4-port OC3/STM1 Clear Channel Adapter card can be configured for ATM (such as for 3G UMTS Node Bs).

Access ports on the 2-port OC3/STM1 Channelized Adapter card can be configured for TDM to transport 2G traffic from BTSs or ATM/IMA to transport 3G UMTS traffic from Node Bs.

All member links of the IMA group must reside on the same card. The 2G traffic is transported across the PSN encapsulated in a TDM VLL. The 3G traffic is transported using ATM VLLs.

For PPP/MLPPP channel groups, the encapsulation type must be ipcp. For Ethernet VLLs, the encapsulation type can be null or dot1q. For TDM VLLs, the encapsulation type must be cem. For ATM VLLs, the encapsulation type must be atm.

Network Ports

For network uplinks on the 16-port T1/E1 ASAP Adapter card and the 2-port OC3/STM1 Channelized Adapter card, standalone PPP ports can be used or MLPPP can be configured on a number of T1/E1 ports or channels. For MLPPP groups, all member links of an MLPPP group must reside on the same T1/E1 ASAP card or the same port on a 2-port OC3/STM1 Channelized Adapter card, and they must be of the same type (either E1 or DS1). The encapsulation type for MLPPP must be ppp-auto.

Ethernet uplinks can also be used as a cost-effective alternative to T1/E1 links.

For network uplinks on the 4-port OC3/STM1 Clear Channel Adapter card, a clear channel port can be configured for POS to connect to the packet network. PPP can be enabled on a port by setting the encapsulation type to ppp-auto.

On the 4-port DS3/E3 Adapter card, a DS3/E3 clear channel port can be configured for PPP as the network uplink. The encapsulation type must be set to ppp-auto.

The 7705 SAR supports both copper and fiber uplinks.

Rate Limiting on Network Ethernet Ports

The 7705 SAR supports egress rate limiting on uplink Ethernet ports. Rate limiting sets a hard limit on the amount of traffic that can leave the Ethernet port, which is useful when a mobile operator has leased a fixed amount of bandwidth.

Configuring Channelized Ports

Channelized ports are supported on the 16-port T1/E1 ASAP Adapter card, the 12-port Serial Data Interface card, the 6-port E&M Adapter card, and the 2-port OC3/STM1 Channelized Adapter card. Ethernet ports cannot be channelized.

When configuring channelized ports, the port ID is specified in different ways depending on the TDM type and level of channelization, as follows:

N × DS0 in DS1 port.*channel-group*, where *channel-group* is {1 to 24}

N × DS0 in E1 port.*channel-group*, where *channel-group* is {1 to 32}

1 × DS0 in V.35, RS-232, or X.21 port.*channel-group*, where *channel-group* is 1

1 × DS0 in E&M voice port.*channel-group*, where *channel-group* is 1

Verifying the Adapter Card Type

To ensure that you have a channel-capable adapter card, verify the adapter card you are configuring by using the `show mda` command.

In the following example, mda 1, mda 3, and mda 6 show channelized adapter cards.

```
*A:ALU-1# show mda
===============================================================================
MDA Summary
===============================================================================
Slot  Mda   Provisioned           Equipped              Admin     Operational
            Mda-type              Mda-type              State     State
-------------------------------------------------------------------------------
1     1     a12-sdi               a12-sdi               up        up
      2     a4-oc3                a4-oc3                up        up
      3     a16-chds1             a16-chds1             up        up
      4     a4-chds3              a4-chds3              up        up
      5     a8-eth                a8-eth                up        up
      6     a2-choc3              a2-choc3              up        up
===============================================================================
*A:ALU-1
```

Use the `show mda detail` command to show detailed information for the channelized adapter cards shown in the previous sample.

```
*A:ALU-1# show mda 1/1 detail
===============================================================================
MDA 1/1 detail
===============================================================================
Slot  Mda   Provisioned           Equipped              Admin     Operational
            Mda-type              Mda-type              State     State
-------------------------------------------------------------------------------
1     1     a12-sdi                                     up        provisioned

MDA Specific Data
    Maximum port count            : 12
    Number of ports equipped      : 12
    Network ingress queue policy  : default
    Network ingress fabric policy : 1
    Access ingress fabric policy  : 1
    Fabric Stats Enabled          : TRUE
    Capabilities                  : Serial, CEM
    Min channel size              : PDH DS0 Group
    Max channel size              : Serial RS-232
    Max number of channels        : 12
    Channels in use               : 2

CEM MDA Specific Data
    Clock Mode                    : n/a

Hardware Data
    Part number                   :
    CLEI code                     :
    Serial number                 :
    Manufacture date              :
    Manufacturing string          :
    Manufacturing deviations      :
    Administrative state          : up
    Operational state             : provisioned
    Software version              : N/A
    Time of last boot             : N/A
    Current alarm state           : alarm cleared
    Base MAC address              :
===============================================================================
*A:ALU-1#
```

```
*A:ALU-1# show mda 1/3 detail
===============================================================================
MDA 1/3 detail
===============================================================================
Slot  Mda   Provisioned           Equipped              Admin     Operational
            Mda-type              Mda-type              State     State
-------------------------------------------------------------------------------
1     3     a16-chds1             a16-chds1             up        up

MDA Specific Data
    Maximum port count            : 16
    Number of ports equipped      : 16
    Network ingress queue policy  : default
    Network ingress fabric policy : 1
    Access ingress fabric policy  : 1
    Fabric Stats Enabled          : FALSE
    Capabilities                  : TDM, PPP, ATM, CEM
    Min channel size              : PDH DS0 Group
    Max channel size              : PDH DS1
    Max number of channels        : 256
    Channels in use               : 3

CEM MDA Specific Data
    Clock Mode                    : adaptive

Hardware Data
    Part number                   : Sim Part#
    CLEI code                     : Sim CLEI
    Serial number                 : mda-3
    Manufacture date              : 01012003
    Manufacturing string          : Sim MfgString mda-3
    Manufacturing deviations      : Sim MfgDeviation mda-3
    Administrative state          : up
    Operational state             : up
    Software version              : N/A
    Time of last boot             : N/A
    Current alarm state           : alarm active
    Base MAC address              : a4:58:01:03:00:01
===============================================================================
*A:ALU-1#
```

```
*A:ALU-1# show mda 1/6 detail

===============================================================================
MDA 1/5 detail
===============================================================================
Slot  Mda   Provisioned           Equipped              Admin     Operational
            Mda-type              Mda-type              State     State
-------------------------------------------------------------------------------
1     5     a2-choc3              a2-choc3              up        up

MDA Specific Data
    Maximum port count            : 2
    Number of ports equipped      : 2
    Network ingress queue policy  : default
    Network ingress fabric policy : 1
    Access ingress fabric policy  : 1
    Fabric Stats Enabled          : FALSE
    Capabilities                  : Sonet, TDM, PPP, ATM, cHDLC
    Min channel size              : PDH DS0 Group
    Max channel size              : PDH DS3
    Max number of channels        : 512
    Channels in use               : 0

Hardware Data
    Part number                   : 3HE03127AAAB0102
    CLEI code                     : IPU3AFPEAA
    Serial number                 : NS092040281
    Manufacture date              : 05192009
    Manufacturing string          : ECO C03759
    Manufacturing deviations      :
    Administrative state          : up
    Operational state             : up
    Temperature                   : 37C
    Temperature threshold         : 75C
    Software version              : N/A
    Time of last boot             : 2009/06/28 18:47:04
    Current alarm state           : alarm cleared
    Base MAC address              : 00:23:3e:99:7a:12
===============================================================================
*A:ALU-1#
```

On the 16-port T1/E1 ASAP Adapter card and 2-port OC3/STM1 Channelized Adapter card, DS0 channel groups and their parameters are configured in the DS1 or E1 context. For a DS1 channel group, up to 24 timeslots can be assigned (numbered 1 to 24). For an E1 channel group, up to 31 timeslots can be assigned (numbered 2 to 32). For ATM, all timeslots are auto-configured when a channel group gets created.

On the 6-port E&M Adapter card, a single DS0 channel group and its parameters are configured in the E&M context. On the 12-port Serial Data Interface card, DS0 channel groups and their parameters are configured in the V.35, RS-232, or X.21 context. For RS-232, a single timeslot is auto-configured when a channel group is created. For V.35 and X.21, the number of timeslots auto-configured when a channel group is created depends on the interface speed.

Note: Encapsulation type on the T1/E1 ASAP Adapter card and 2-port OC3/STM1 Channelized Adapter card is configured at the DS1 or E1 level; on the 12-port Serial Data Interface card, the encapsulation type is configured at the RS-232, V.35, or X.21 level. A port can support only one encapsulation type. When the first channel group is configured for encap-type, all other channel groups on the port are automatically configured with that encap-type. To change an encapsulation type, the channel group must be deleted and then recreated with the new encap-type.

The following is an example of an E1 channel group configuration.

```
ALU-A>config>port>tdm# e1
ALU-A>config>port>tdm>e1# channel-group 1
ALU-A>config>port>tdm>e1>channel-group# timeslots 2
ALU-A>config>port>tdm>e1>channel-group# no shutdown
ALU-A>config>port>tdm>e1>channel-group#
ALU-A>config>port>tdm>e1# no shutdown
ALU-A>config>port>tdm>e1# channel-group 2
ALU-A>config>port>tdm>e1>channel-group# timeslots 3,4
ALU-A>config>port>tdm>e1>channel-group# encap-type cem
ALU-A>config>port>tdm>e1>channel-group# no shutdown
ALU-A>config>port>tdm>e1>channel-group# exit
```

The following is an example of an RS-232 channel group configuration.

```
ALU-A>config>port 1/1/2
ALU-A>config>port# serial
ALU-A>config>port>serial# rs232
ALU-A>config>port>serial>rs232# channel-group 1
ALU-A>config>port>serial>rs232>channel-group# description "RS232GRP1"
ALU-A>config>port>serial>rs232>channel-group# encap-type cem
ALU-A>config>port>serial>rs232>channel-group# idle-payload-fill all-ones
ALU-A>config>port>serial>rs232>channel-group# no shutdown
ALU-A>config>port>serial>rs232>channel-group# exit
```

The following is an example of an E&M channel group configuration.

```
ALU-A>config>port 1/1/1
ALU-A>config>port# voice
ALU-A>config>port>voice# em
ALU-A>config>port>voice# em# channel-group 1
ALU-A>config>port>voice# em>channel-group# description "DS0GRP"
ALU-A>config>port>voice# em>channel-group# encap-type cem
ALU-A>config>port>voice# em>channel-group# mode access
ALU-A>config>port>voice# em>channel-group# no shutdown
ALU-A>config>port>voice# em>channel-group# exit
```

Services can now be applied to the configured channelized ports.

Card, Adapter Card, and Port Command Reference

Command Hierarchies

- Configuration Commands
  - → Serial Commands

Serial Commands

```
config
    — [no] port {port-id}
        — serial
            — [no] rs232
                — [no] channel-group channel-group-id
                    — description description-string
                    — no description
                    — encap-type cem
                    — no encap-type
                    — idle-payload-fill {all-ones | pattern pattern}
                    — no idle-payload-fill
                    — mode {access | network}
                    — [no] shutdown
                — character-length {6 | 7 | 8}
                — clock-source {slave}
                — control-lead {input | output}
                    — input
                        — dtr-dsr {high | low}
                        — rts-dcd {high | low | end-to-end}
                        — alb-cts {high | low | end-to-end}
                        — rdl-ri {high | low}
                    — output
                        — dsr-dtr {high | low}
                        — dcd-rts {high | low | end-to-end}
                        — cts-alb {high | low | end-to-end}
                        — ri-rdl {high | low}
                — data-position {F0-B5 | F0-B6}
                — device-gender {dte | dce}
                — device-mode {synchronous | asynchronous}
                — duplex {half | full}
                — loopback {bidir-b | bidir-e}
                — no loopback
                — multi-drop {disabled | slave}
                — parity {odd | even | mark | space}
                — no parity
                — [no] report-alarm [hcmOof | hcmRai]
                — s-bit signaling {on | off}
                — [no] shutdown
                — speed {1200 | 2400 | 9600 | 19200 | 38400 | 56000}
                — stop-bits {1 | 2}
            — [no] v35
                — [no] channel-group channel-group-id
                    — description description-string
                    — no description
                    — encap-type {cem}
                    — no encap-type
                    — idle-payload-fill {all-ones | pattern pattern}
                    — no idle-payload-fill
                    — mode {access | network}
                    — [no] shutdown
                — clock-source {slave}
                — control-lead {input | output}
```

```
                    — input
                        — dtr-dsr {high | low}
                        — rts-dcd {high | low | end-to-end}
                        — alb-cts {high | low | end-to-end}
                    — output
                        — dsr-dtr {high | low}
                        — dcd-rts {high | low | end-to-end}
                        — cts-alb {high | low | end-to-end}
                — device-gender {dte | dce}
                — device-mode {synchronous}
                — duplex {half | full}
                — loopback {bidir-b | bidir-e}
                — no loopback
                — [no] shutdown
                — speed {64k | 128k | 256k | 384k | 512k | 640k | 768k | 896k | 1024k |
                  1152k | 1280k | 1408k | 1536k | 1664k | 1792k | 1920k}
        — [no] x21
                — [no] channel-group channel-group-id
                    — description description-string
                    — no description
                    — encap-type {cem}
                    — no encap-type
                    — idle-payload-fill {all-ones | pattern pattern}
                    — no idle-payload-fill
                    — mode {access | network}
                    — [no] shutdown
                — clock-source {slave}
                — control-lead {input | output}
                    — input
                        — c-i {high | low | end-to-end}
                    — output
                        — i-c {high | low | end-to-end}
                — device-gender {dte | dce}
                — device-mode {synchronous}
                — duplex {half | full}
                — loopback {bidir-b | bidir-e}
                — no loopback
                — [no] shutdown
                — speed {64k | 128k | 256k | 384k | 512k | 640k | 768k | 896k | 1024k |
                  1152k | 1280k | 1408k | 1536k | 1664k | 1792k | 1920k}
```

Generic Commands

description

Syntax **description** *description-string*
no description

Context config>port
config>port>tdm>ds1>channel-group
config>port>tdm>ds3
config>port>tdm>e3
config>port>tdm>e1>channel-group
config>port>sonet-sdh>path
config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group
config>port>voice>em>channel-group

Description This command creates a text description for a configuration context to help identify the content in the configuration file.

The **no** form of this command removes any description string from the context. For the serial context, the **no** form of this command restores the default value.

Default **none**

"DS0GRP" (for the serial context and the voice context)

Parameters *description-string* — 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>card
config>card>mda
config>port
config>port>ethernet>efm-oam
config>port>ethernet>ssm
config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21
config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group

config>port>sonet-sdh>path
config>port>tdm>ds1
config>port>tdm>ds1>channel-group
config>port>tdm>ds3
config>port>tdm>e1
config>port>tdm>e1>channel-group
config>port>tdm>e3
config>port>voice>em>
config>port>voice>em>channel-group

Description This command administratively disables an entity. When disabled, an entity does not change, reset, or remove any configuration settings or statistics.

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.

When used with the **ethernet>efm-oam** command, **shutdown** enables tunneling on the port (see tunneling), and **no shutdown** enables Ethernet EFM OAM 802.3ah.

The **no** form of this command administratively enables an entity.

Default **card — no shutdown**

mda — no shutdown

port — shutdown

Serial Commands

serial

Syntax **serial**

Context config>port

Description This command enables the context to configure RS-232, V.35, or X.21 parameters for a port on a channelized 12-port Serial Data Interface card. This context cannot be accessed by any other card.

A serial port configuration allows some or all of the bandwidth to be dedicated to a port by aggregating a number of DS0s into a single bundle.

Serial data transmission rates below the rate of a single DS0, that is, less than 64 kb/s, are achieved using a proprietary protocol called High Capacity Multiplexing (HCM). These speeds, known as subrate speeds, are supported only on RS-232 ports.

Default **none**

rs232

Syntax [**no**] **rs232**

Context config>port>serial

Description This command enables the context to configure RS-232 parameters for a channel. Once one of the three ports on a connector has been configured for an RS-232 channel, the other two ports on the connector can only be configured for RS-232.

The **no** form of this command deletes the RS-232 channel.

Default **none**

v35

Syntax [**no**] **v35**

Context config>port>serial

Description This command enables the context to configure V.35 parameters for a channel. Once one of the three ports on a connector has been configured for a V.35 channel, the other two ports on the connector can only be configured for V.35.

The **no** form of this command deletes the V.35 channel.

Default **none**

x21

Syntax **[no] x21**

Context config>port>serial

Description This command enables the context to configure X.21 parameters for a channel. When one of the three ports on a connector has been configured for an X.21 channel, the other two ports on the connector can only be configured for X.21.

The **no** form of this command deletes the X.21 channel.

Default **none**

character-length

Syntax **character-length** {**6** | **7** | **8**}

Context config>port>serial>rs232

Description This command configures the number of data bits used to transmit a character. This command is valid only if device-mode is asynchronous. The value for this command cannot be 8 if the value for parity is anything other than **no parity** (that is, anything other than none) and the value for stop-bits is 2.

Default **8**

Parameters **6** — specifies six bits in a character

7 — specifies seven bits in a character

8 — specifies eight bits in a character

clock-source

Syntax **clock-source** {**slave**}

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command configures the source of the transmit clock. This command is valid only if device-mode is synchronous, and only the slave mode is supported.

Default **slave**

Parameters see Table 12

Table 12: Synchronous Clocking Options

Attached Device Gender		Circuit Gender		Transmit Clock Option	Description
DTE*	DCE**	DTE*	DCE**		
√			√	Slave	DCE slave — the transmit and receive clocks are derived from the BRG locked to the system timing
	√	√		Slave	DTE slave — the transmit clock and the receive clock are supplied by the attached DCE device (this is the default mode)
*Data Terminal Equipment **Data Communications Equipment					

control-lead

Syntax **control-lead {input | output}**

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command enables access to the context to configure the input and output leads that carry control signals. Control signals provide the handshaking for call setup, tear-down, and synchronization.

Default **none**

input

Syntax **input**

Context config>port>serial>rs232>control-lead
config>port>serial>v35>control-lead
config>port>serial>x21>control-lead

Description This command enables access to the context to configure the input control leads.

Default **none**

output

Syntax **output**

Context config>port>serial>rs232>control-lead
config>port>serial>v35>control-lead
config>port>serial>x21>control-lead

Description This command enables access to the context to configure the output control leads.

Default **none**

dtr-dsr

Syntax **dtr-dsr** {**high** | **low**}

Context config>port>serial>rs232>control-lead>input
config>port>serial>v35>control-lead>input

Description This command configures the Data Terminal Ready (DTR) or Data Set Ready (DSR) input control lead. The input signal that is sent depends on the device-gender setting. For a DCE device, the input signal is DTR. For a DTE device, the input signal is DSR.

Default **high**

Parameters **high** — the input control lead is assumed to be on

low — the input control lead is assumed to be off

rts-dcd

Syntax **rts-dcd** {**high** | **low** | **end-to-end**}

Context config>port>serial>rs232>control-lead>input
config>port>serial>v35>control-lead>input

Description This command configures the Request To Send (RTS) or Data Carrier Detect (DCD) input control lead. The input signal that is sent depends on the device-gender setting. For a DCE device, the input signal is RTS. For a DTE device, the input signal is DCD.

Default **high**

Parameters **high** — the input control lead is assumed to be on

low — the input control lead is assumed to be off

end-to-end — the input control lead follows that of the remote end. This parameter is not supported for interface speeds ≥ 64 kb/s.

alb-cts

Syntax **alb-cts** {**high** | **low** | **end-to-end**}

Context config>port>serial>rs232>control-lead>input
config>port>serial>v35>control-lead>input

Description This command configures the Analog Loopback (ALB) or Clear To Send (CTS) input control lead. The input signal that is sent depends on the device-gender setting. For a DCE device, the input signal is ALB. For a DTE device, the input signal is CTS.

Default **high**

Parameters **high** — the input control lead is assumed to be on

low — the input control lead is assumed to be off

end-to-end — the input control lead follows that of the remote end. This parameter is not supported for interface speeds ≥ 64 kb/s.

rdl-ri

Syntax **rdl-ri** {**high** | **low**}

Context config>port>serial>rs232>control-lead>input

Description This command configures the Remote Digital Loopback (RDL) or Ring Indicator (RI) input control lead. The input signal that is sent depends on the device-gender setting. For a DCE device, the input signal is RDL. For a DTE device, the input signal is RI.

This command is valid only for an RS-232 interface.

Default **high**

Parameters **high** — the input control lead is assumed to be on

low — the input control lead is assumed to be off

c-i

Syntax **c-i** {**high** | **low** | **end-to-end**}

Context config>port>serial>x21>control-lead>input

Description This command configures the Control (C) or Indication (I) input control lead. The input signal that is sent depends on the device-gender setting. For a DCE device, the input signal is C. For a DTE device, the input signal is I.

This command is valid only for an X.21 interface.

Default **high**

Parameters **high** — the input control lead is forced on

low — the input control lead is forced off

end-to-end — the input control lead follows that of the remote end

dsr-dtr

Syntax **dsr-dtr** {**high** | **low**}

Context config>port>serial>rs232>control-lead>output
config>port>serial>v35>control-lead>output

Description This command configures the Data Set Ready (DSR) or Data Terminal Ready (DTR) output control lead. The output signal that is sent depends on the device-gender setting. For a DCE device, the outputs signal is DSR. For a DTE device, the output signal is DTR.

Default **high**

Parameters **high** — the output control lead is forced on

low — the output control lead is forced off

dcd-rts

Syntax **dcd-rts** {**high** | **low** | **end-to-end**}

Context config>port>serial>rs232>control-lead>output
config>port>serial>v35>control-lead>output

Description This command configures the Data Carrier Detect (DCD) or Request To Send (RTS) output control lead. The output signal that is sent depends on the device-gender setting. For a DCE device, the output signal is DCD. For a DTE device, the output signal is RTS.

Default **high**

Parameters **high** — the output control lead is forced on

low — the output control lead is forced off

end-to-end — the output control lead follows that of the remote end

cts-alb

Syntax **cts-alb** {**high** | **low** | **end-to-end**}

Context config>port>serial>rs232>control-lead>output
config>port>serial>v35>control-lead>output

Description This command configures the Clear To Send (CTS) or Analog Loopback (ALB) output control lead. The output signal that is sent depends on the device-gender setting. For a DCE device, the output signal is CTS. For a DTE device, the output signal is ALB.

Default **high**

Parameters **high** — the output control lead is forced on

low — the output control lead is forced off

end-to-end — the output control lead follows that of the remote end

ri-rdl

Syntax **ri-rdl** {**high** | **low**}

Context config>port>serial>rs232>control-lead>output

Description This command configures the Ring Indicator (RI) or Remote Digital Loopback (RDL) output control lead. The output signal that is sent depends on the device-gender setting. For a DCE device, the output signal is RI. For a DTE device, the output signal is RDL.

This command is valid only for an RS-232 interface.

Default **high**

Parameters **high** — the output control lead is forced on

low — the output control lead is forced off

i-c

Syntax **i-c** {**high** | **low** | **end-to-end**}

Context config>port>serial>x21>control-lead>output

Description This command configures the Indication (I) or Control (C) output control lead. The output signal that is sent depends on the device-gender setting. For a DCE device, the output signal is I. For a DTE device, the output signal is C.

This command is valid only for an X.21 interface.

Default **high**

Parameters **high —** the output control lead is forced on

low — the output control lead is forced off

end-to-end — the output control lead follows that of the remote end

data-position

Syntax **data-position** {**F0-B5** | **F0-B6**}

Context config>port>serial>rs232

Description This command configures the HCM data start position for the RS-232 interface.

When s-bit signaling is on, the F0-B6 option is blocked. When the data position is set to F0-B6, S-bit signaling cannot be turned on.

Note: the HCM frame (10-row by 8-column matrix) cannot be displayed on the CLI.

Default **F0-B5**

Parameters **F0-B5 —** HCM data start position is F0-B5

F0-B6 — HCM data start position is F0-B6

device-gender

Syntax **device-gender** {**dte** | **dce**}

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command configures the gender of the device.

Data and control signals are transmitted and received over wire pairs. The gender of a device indicates which wire in the pair is used to send and receive the signal.

Default **dce**

Parameters **dte —** the device is performing the role of the data terminal equipment

dce — the device is performing the role of the data communications equipment

device-mode

Syntax **device-mode** {**synchronous** | **asynchronous**}

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command configures the mode of operation for the device. An RS-232 channel can be configured for either synchronous or asynchronous mode. Asynchronous mode is not supported on a V.35 or X.21 channel; these channels can only be configured for synchronous mode.

Default **synchronous**

Parameters **synchronous —** transmits data continuously based on timing

asynchronous — transmits data one character at a time

duplex

Syntax **duplex** {**half** | **full**}

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command configures the duplex mode. Half-duplex mode uses a single transmission path. Full-duplex mode uses two independent transmission paths, one in each direction, allowing two connected devices to transmit and receive data simultaneously.

Half-duplex mode is not user-selectable; an error message is displayed if this option is selected. Half-duplex mode is selected automatically if multidrop data bridge is enabled (applies to RS-232 only).

Default **full**

Parameters **half —** uses a single transmission path

full — uses two independent transmission paths, one in each direction

loopback

Syntax **loopback** {**bidir-b** | **bidir-e**}
no loopback

Context config>port>serial>rs232
config>port>serial>v35
config>port>serial>x21

Description This command puts the specified interface into a loopback mode. The corresponding interface must be in a shutdown state in order for the loopback mode to be enabled.

In the serial context, a bidirectional loopback B or E may be configured. A bidirectional loopback is a circuit loopback that loops traffic from the line back to the line and simultaneously loops traffic from the system back to the system. Bidirectional loopback B takes place on the control card (CSM) side of the adapter card, and is closer to the system. Loopback E takes place on the data device side of the adapter card, and is closer to the line.

This command is not saved in the system configuration between boots.

The **no** form of this command disables loopback on the interface.

Default **no loopback**

Parameters **bidir-b —** bidirectional loopback B is closer to the system side of the adapter card

bidir-e — bidirectional loopback E is closer to the line side of the adapter card

multi-drop

Syntax **multi-drop** {**disabled** | **slave**}

Context config>port>serial>rs232

Description This command configures the multidrop data bridge (MDDB) mode. MDDB is a polling scheme used on SCADA networks (supervisory or control systems used in utility, oil and gas, and other vertical applications) to communicate with multiple remote terminal units (RTUs) over a single RS-232 link.

In an MDDB, several circuits take turns using the same bandwidth to communicate with one circuit. Each slave device transmits data in that bandwidth when requested by the master device. The master device sends polling messages to, and looks for data from, the slave devices in that bandwidth.

One example of a multidrop data bridge is several terminals taking turns to communicate with a host computer. The circuit that all the other circuits communicate with is connected to a master device (a computer) and is designated the master; the rest of the circuits are connected to slave devices (terminals) and are designated slaves.

When multidrop data bridge is enabled as slave, the duplex mode is automatically set to half-duplex and s-bit signaling is forced off. When multidrop data bridge is disabled, the duplex mode is set back to the default of full-duplex and S-bit signaling is turned on (but can be set back to off).

In Release 3.0, the Serial Data Interface card on the 7705 SAR can act only as a slave device; the master device is the 3600 MainStreet node.

Default **disabled**

Parameters **disabled —** MDDB mode is off

slave — the port is operating as an MDDB slave device

parity

Syntax **parity** {**odd** | **even** | **mark** | **space**}
no parity

Context config>port>serial>rs232

Description This command configures the parity bit in a character. Parity is an error detection method that adds an extra bit to each character, based on the number of 0s or 1s in the character.

This command is valid only if device-mode is asynchronous. The value for this command must be **no parity** (that is, none) if the character-length value is 8 and the stop-bits value is 2.

The **no** form of this command disables the parity bit in a character.

Default **no parity**

Parameters **odd —** the parity bit set to 0 or 1 to make the total number of 1s in the set of bits odd

even — the parity bit set to 0 or 1 to make the total number of 1s in the set of bits even

mark — the parity bit is present but not used and always set to 1

space — the parity bit is present but not used and always set to 0

report-alarm

Syntax [**no**] **report-alarm** [**hcmOof** | **hcmRai**]

Context config>port>serial>rs232

Description This command enables logging of HCM alarms for RS-232 interfaces. HCM alarms are not generated for V.35 or X.21 interfaces, since those interfaces do not operate at subrate speeds.

The **no** form of this command disables the logging of the specified alarms.

Parameters **hcmOof —** reports local HCM out-of-frame errors. When configured, hcmOof events are raised and cleared.

Default HCM out-of-frame alarms are issued

hcmRai — reports remote HCM alarm indications. When configured, hcmRai events are raised and cleared.

Default HCM alarm indications are issued

s-bit signaling

Syntax **s-bit-signaling** {**on** | **off**}

Context config>port>serial>rs232

Description This command configures the S-bit signaling option on the RS-232 interface.

If multi-drop is configured as slave, the system automatically turns S-bit signaling off. The signaling mode cannot then be changed.

If multi-drop is disabled, the system automatically turns S-bit signaling on. When multi-drop is in disabled mode, S-bit signaling can be turned off or on.

Default **on**

Parameters **on** — enables S-bit signaling

off — disables S-bit signaling

speed

Syntax **speed** {**1200** | **2400** | **9600** | **19200** | **38400** | **56000**}

Context config>port>serial>rs232

Description This command configures the speed of the RS-232 interface.

The maximum speed for an RS-232 interface is 56000 b/s.

The rate of 56000 b/s is valid only if the device-mode is set to synchronous.

Default **9600**

Parameters **1200** — sets the link to 1200 b/s speed

2400 — sets the link to 2400 b/s speed

9600 — sets the link to 9600 b/s speed

19200 — sets the link to 19200 b/s speed

38400 — sets the link to 38400 b/s speed

56000 — sets the link to 56000 b/s speed

speed

Syntax **speed** {**64k** | **128k** | **256k** | **384k** | **512k** | **640k** | **768k** | **896k** | **1024k** | **1152k** | **1280k** | **1408k** | **1536k** | **1664k** | **1792k** | **1920k**}

Context config>port>serial>v35
config>port>serial>x21

Description This command configures the speed of the V.35 or X.21 interface. The speed also determines the DS0 timeslots assigned to the channel group.

The super-rate speeds (that is, higher than 64 kb/s) operate in transparent mode and are valid only if the device-mode is set to synchronous.

Default **64k**

Parameters **64k** — sets the link to 64 kb/s speed

128k — sets the link to 128 kb/s speed

256k — sets the link to 256 kb/s speed

384k — sets the link to 384 kb/s speed

512k — sets the link to 512 kb/s speed

640k — sets the link to 640 kb/s speed

768k — sets the link to 768 kb/s speed

896k — sets the link to 896 kb/s speed

1024k — sets the link to 1024 kb/s speed

1152k — sets the link to 1152 kb/s speed

1280k — sets the link to 1280 kb/s speed

1408k — sets the link to 1408 kb/s speed

1536k — sets the link to 1536 kb/s speed

1664k — sets the link to 1664 kb/s speed

1792k — sets the link to 1792 kb/s speed

1920k — sets the link to 1920 kb/s speed

stop-bits

Syntax **stop-bits** {**1** | **2**}

Context config>port>serial>rs232

Description This command configures the number of stop bits used to signify the end of a character.

This command is valid only if the device-mode is asynchronous.

This command cannot have a value of 2 if the character-length value is 8 and the parity value is anything other than **no parity** (that is, anything other than none).

Default **1**

Parameters **1** — specifies one stop bit in a character

2 — specifies two stop bits in a character

RS-232, V.35, and X.21 Channel Group Commands

channel-group

Syntax [**no**] **channel-group** *channel-group-id*

Context config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group

Description This command creates a DS0 channel group on a channelized RS-232, V.35, or X.21 circuit.

Channel groups cannot be further subdivided.

The **no** form of this command deletes the specified RS-232, V.35, or X.21 channel group.

Default **none**

Parameters *channel-group-id* — specifies the channel group ID number

Values RS-232: 1
V.35: 1
X.21: 1

encap-type

Syntax **encap-type** {**cem**}
no encap-type

Context config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group

Description This command configures the encapsulation method used for the channel group.

Once **encap-type** is specified, the channel group must be deleted before **encap-type** can be changed.

The **no** form of this command restores the default value.

Default **no encap-type**

Parameters **cem** — specifies the encapsulation type as circuit emulation mode

idle-payload-fill

Syntax **idle-payload-fill** {**all ones** | **pattern** *pattern*}
no idle-payload-fill

Context config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group

Description This command defines the data pattern to be transmitted when the circuit emulation service is not operational or temporarily experiences underrun conditions.

This command is valid only if encap-type is cem.

The **no** form of this command restores the default value.

Default **all ones**

Parameters **all ones —** defines the 8-bit value to be transmitted as 11111111

pattern — defines the 8-bit value to be transmitted as a user-defined pattern (0 to 255)

mode

Syntax **mode** {**access** | **network**}

Context config>port>serial>rs232>channel-group
config>port>serial>v35>channel-group
config>port>serial>x21>channel-group

Description This command configures a serial port for access mode operation. Serial ports do not support network mode; if the user selects the network option, the CLI returns an error message.

An access port or channel is used for customer-facing traffic on which services are configured. SAPs can only be configured on an access port or channel. When a serial port is configured for access mode, multiple services can be configured on the port.

This command is valid only if encap-type is cem.

Default **access**

Parameters **access —** configures the serial channel as service access

network — configures the serial channel for transport network use

Show Port Commands

port

Syntax **port** *port-id* [**count**] [**detail**]
port *port-id* **acr** [**detail**]
port *port-id* **description**
port *port-id* **associations**
port *port-id* **ppp** [**detail**]
port *port-id* **ethernet** [**efm-oam** | **detail**]

Context show

Description This command displays port or channel information. If no command line options are specified, the **show port** command displays summary information for all ports on provisioned adapter cards.

Parameters *port-id* — specifies the physical port ID

Syntax	port-id	*slot*[/*mda*[/*port*]] or *slot*/*mda*/*port*[.*channel*]
Values	slot	1
	mda	1 to 6
	port	1 to 2 (2-port OC3/STM1 Channelized Adapter card ports)
		1 to 4 (4-port OC3/STM1 Clear Channel Adapter card ports or 4-port DS3/E3 Adapter card ports)
		1 to 16 (T1/E1 ASAP Adapter card ports)
		1 to 6 (6-port E&M Adapter card ports)
		1 to 8 (Ethernet Adapter card ports)
		1 to 12 (12-port Serial Data Interface card ports)
	channel	ds1 or e1 (for **config>port>tdm** information)
		em (for **config>port>voice** information)
		rs232, v35, or x21 (for **config>port>serial** information)
		1 to 24 (DS1) or 1 to 32 (E1) (for **config>port>tdm>channel-group** information)
		1 (E&M) (for **config>port>voice>em>channel-group** information)
		1 (RS-232, V.35, or X.21) (for **config>port>serial>channel-group** information)

acr — displays ACR-capable port information

associations — displays a list of current router interfaces to which the port is associated

count — displays only port counter summary information

description — displays port description strings

ethernet — displays Ethernet port information

efm-oam — displays EFM OAM information

detail — displays detailed information about the Ethernet port

ppp — displays PPP protocol information for the port

detail — provides detailed information

Output The following outputs are examples of port information:

- Serial Channel (Sample Output, Table 38)

Sample Output

```
*A:ALU-1># show port 1/1/4.v35

===============================================================================
Serial RS-232 Interface
===============================================================================
Description        : V35
Interface          : 1/1/4.v35
Type               : v35
Admin Status       : down                    Oper Status          : down
Physical Link      : no                      Clock Source         : slave
Device Mode        : synchronous             Speed                : 256k
Character Length   : N/A                     Parity               : N/A
Stop Bits          : N/A
Device Gender      : dce                     Duplex               : full
Last State Change  : 04/30/2009 13:49:50     Channel IfIndex      : 572653572
Loopback           : bidir-b
Cfg Alarm          :
Alarm Status       :
===============================================================================

===============================================================================
Serial Control Leads
===============================================================================
Inputs                                       Outputs
-------------------------------------------------------------------------------
dtr-dsr [DTR]      : high                    dsr-dtr [DSR]        : high
rts-dcd [RTS]      : high                    dcd-rts [DCD]        : high
alb-cts [ALB]      : high                    cts-alb [CTS]        : high
===============================================================================

===============================================================================
Traffic Statistics
===============================================================================
                                                    Input                Output
-------------------------------------------------------------------------------
Octets                                                 0                     0
Packets                                                0                     0
Errors                                                 0                     0

===============================================================================
Port Statistics
===============================================================================
                                                    Input                Output
-------------------------------------------------------------------------------
Packets                                                0                     0
Discards                                               0                     0
Unknown Proto Discards                                 0
===============================================================================
```

```
*A:ALU-1># show port 1/1/2.rs232

===============================================================================
Serial RS-232 Interface
===============================================================================
Description        : RS232
Interface          : 1/1/2.rs232
Type               : rs232
Admin Status       : down                    Oper Status          : down
Physical Link      : no                      Clock Source         : slave
Device Mode        : synchronous             Speed                : 9600
Character Length   : N/A                     Parity               : N/A
Stop Bits          : N/A                     Multi-Drop           : slave
Device Gender      : dce                     Duplex               : half
Data Position      : F0-B5                   S-Bit-Signaling      : on
Last State Change  : 04/30/2009 13:49:49     Channel IfIndex      : 572588034
Loopback           : bidir-b
Cfg Alarm          : hcmOof hcmRai
Alarm Status       :
===============================================================================

===============================================================================
Serial Control Leads
===============================================================================
Inputs                                       Outputs
-------------------------------------------------------------------------------
dtr-dsr [DTR]      : high                    dsr-dtr [DSR]        : high
rts-dcd [RTS]      : end-to-end              dcd-rts [DCD]        : end-to-end
alb-cts [ALB]      : end-to-end              cts-alb [CTS]        : end-to-end
rdl-ri  [RDL]      : low                     ri-rdl  [RI]         : low
===============================================================================

===============================================================================
Traffic Statistics
===============================================================================
                                                    Input                Output
-------------------------------------------------------------------------------
Octets                                                 0                     0
Packets                                                0                     0
Errors                                                 0                     0

===============================================================================
Port Statistics
===============================================================================
                                                    Input                Output
-------------------------------------------------------------------------------
Packets                                                0                     0
Discards                                               0                     0
Unknown Proto Discards                                 0
===============================================================================
```

```
*A:ALU-1># show port 1/1/5.x21

===============================================================================
Serial RS-232 Interface
===============================================================================
Description        : X21
Interface          : 1/1/5.x21
Type               : x21
Admin Status       : down                    Oper Status          : down
Physical Link      : no                      Clock Source         : slave
Device Mode        : synchronous             Speed                : 256k
Character Length   : N/A                     Parity               : N/A
Stop Bits          : N/A
Device Gender      : dce                     Duplex               : full
Last State Change  : 04/30/2009 13:49:50     Channel IfIndex      : 572653572
Loopback           : bidir-b
Cfg Alarm          :
Alarm Status       :
===============================================================================

===============================================================================
Serial Control Leads
===============================================================================
Inputs                                       Outputs
-------------------------------------------------------------------------------
c-i [C]      : high                          i-c [I]        : high
===============================================================================

===============================================================================
Traffic Statistics
===============================================================================
                                                        Input                Output
-------------------------------------------------------------------------------
Octets                                                      0                     0
Packets                                                     0                     0
Errors                                                      0                     0

===============================================================================
Port Statistics
===============================================================================
                                                        Input                Output
-------------------------------------------------------------------------------
Packets                                                     0                     0
Discards                                                    0                     0
Unknown Proto Discards                                      0
===============================================================================
```

Table 38: Show Port Serial Channel Output Fields

Label	Description
Description	The description of the port
Interface	The port ID displayed in the *slot/mda/port.channel* format
Type	The type of serial interface
Admin Status	up — the administrative state is up
	down — the administrative state is down
Oper Status	up — the operational state is up
	down — the operational state is down
Physical Link	yes — a physical link is present
	no — a physical link is not present
Clock source	The source of the transmit clock: slave — the source is remote
Device Mode	The operational mode of the device: synchronous — the device transmits data continuously based on timing
	asynchronous — the device transmits data one character at a time; applies to RS-232 interfaces only
Speed	The speed of the interface: 1200, 2400, 9600, 19200, 38400, 56000 — for RS-232 interfaces, in b/s
	64k, 128k, 256k, 384k, 512k, 640k, 768k, 896k, 1024k, 1152k, 1280k, 1408k, 1536k, 1664k, 1792k, 1920k — for V.35 and X.21 interfaces, in kb/s
Character Length	The number of data bits used to transmit a character; for asynchronous devices only
Parity	The parity bit in a character; for asynchronous devices only
Stop Bits	The number of stop bits used signify the end of a character; for asynchronous devices only

Table 38: Show Port Serial Channel Output Fields (Continued)

Label	Description
Multi-Drop	The MDDB mode: disabled – MDDB mode is off
	slave – device operates as an MDDB slave device
Device Gender	The gender of the device: dce – the device is performing the role of the data communications equipment
	dte – the device is performing the role of the data terminal equipment
Duplex	The duplex mode: half – single transmission path (supported only if multidrop data bridge is enabled)
	full – two independent transmission paths, one in each direction
Data Position	The HCM data start position
S-Bit-Signaling	Indicates whether S-bit signaling is turned on or off
Last State Change	The last time the operational status of the port changed state
Channel IfIndex	The channel group index number
Loopback	The loopback mode for the port or channel: bidir-b – bidirectional loopback B takes place on the control card (CSM) side of the adapter card, and is closer to the system
	bidir-e – bidirectional loopback E takes place on the data device side of the adapter card, and is closer to the line
	none – there is no loopback done at the associated port or channel
Cfg Alarm	The HCM alarms to be reported for RS-232 interfaces: hcmOof – local HCM out-of-frame errors are raised and cleared
	hcmRai – HCM remote alarm indication events are raised and cleared
Alarm Status	The current alarm status

Table 38: Show Port Serial Channel Output Fields (Continued)

Label	Description
Serial Control Leads	The input and output leads, which carry control signals
Inputs	The input control leads
dtr-dsr [DTR]	The Data Terminal Ready/Data Set Ready input control lead: high – the input control lead is assumed to be on
	low – the input control lead is assumed to be off
rts-dcd [RTS]	The Request To Send/Data Carrier Detect input control lead: high – the input control lead is assumed to be on
	low – the input control lead is assumed to be off
	end-to-end – the input control lead follows that of the remote end. This lead is not supported for interface speeds ≥ 64 kb/s.
alb-cts [ALB]	The Analog Loopback/Clear To Send input control lead: high – the input control lead is assumed to be on
	low – the input control lead is assumed to be off
	end-to-end – the input control lead follows that of the remote end. This lead is not supported for interface speeds ≥ 64 kb/s.
rdl-ri [RDL]	The Remote Digital Loopback/Ring Indicator input control lead; applicable only for RS-232 interfaces: high – the input control lead is assumed to be on
	low – the input control lead is assumed to be off
c-i [C]	The Control/Indication input control lead; applicable only for X.21 interfaces: high – the input control lead is assumed to be on
	low – the input control lead is assumed to be off
	end-to-end – the input control lead follows that of the remote end
Outputs	The output control leads

Table 38: Show Port Serial Channel Output Fields (Continued)

Label	Description
dsr-dtr [DSR]	The Data Set Ready/Data Terminal Ready output control lead: high – the output control lead is forced on
	low – the output control lead is forced off
dcd-rts [DCD]	The Data Carrier Detect/Request To Send output control lead: high – the output control lead is forced on
	low – the output control lead is forced off
	end-to-end – the output control lead follows that of the remote end
cts-alb [CTS]	The Clear To Send/Analog LoopBack output control lead: high – the output control lead is forced on
	low – the output control lead is forced off
	end-to-end – the output control lead follows that of the remote end
ri-rdl [RI]	The Ring Indicator (RI)/Remote Digital Loopback (RDL) output control lead; applicable only for RS-232 interfaces: high – the output control lead is forced on
	low – the output control lead is forced off
i-c [I]	The Indication/Control output control lead; applicable only for X.21 interfaces: high – the output control lead is forced on
	low – the output control lead is forced off
	end-to-end – the output control lead follows that of the remote end
Traffic Statistics	
Octets Input/Output	The total number of octets received and transmitted on the port

Table 38: Show Port Serial Channel Output Fields (Continued)

Label	Description
Packets Input/Output	The number of packets, delivered by this sub-layer to a higher (sub-) layer, which were not addressed to a multicast or broadcast address at this sub-layer. The total number of packets that higher-level protocols requested be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent.
Errors Input/Output	For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol. For character-oriented or fixed-length interfaces, the number of inbound transmission units that contained errors preventing them from being deliverable to a higher-layer protocol. For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors. For character-oriented or fixed-length interfaces, the number of outbound transmission units that could not be transmitted because of errors.
Port Statistics	
Packets Input/Output	The number of packets, delivered by this sub-layer to a higher (sub-) layer, which were not addressed to a multicast or broadcast address at this sub-layer. The total number of packets that higher-level protocols requested be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent.
Discards Input/Output	The number of inbound packets chosen to be discarded to possibly free up buffer space
Unknown Proto Discards Input/Output	For packet-oriented interfaces, the number of packets received at the interface that were discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces that support protocol multiplexing, the number of transmission units received at the interface that were discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter will always be 0.

Customer documentation and product support

Customer documentation

http://www.alcatel-lucent.com/myaccess

Product manuals and documentation updates are available at 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://www.alcatel-lucent.com/support

Documentation feedback

documentation.feedback@alcatel-lucent.com

3HE 06007 AAAA TQZZA Edition 01