



# Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER | RELEASE 4.0  
SAR-18 CHASSIS INSTALLATION GUIDE

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# Table of Contents

|   |           |
|---|-----------|
| <b>Preface</b>  | <b>29</b> |
| <b>Mandatory Requirements</b>                                   | <b>33</b> |
| List of Terms   | 34        |
| General Requirements  | 35        |
| Canada Regulations  | 41        |
| United States Regulations                                       | 43        |
| European Union Regulations                                      | 45        |
| Australia/New Zealand Regulations                               | 49        |
| China Regulations   | 50        |
| <b>7705 SAR-18 Overview</b>                                     | <b>51</b> |
| 7705 SAR-18 Components  | 52        |
| Chassis   | 52        |
| Control and Switching Module                                    | 53        |
| Alarm Module  | 55        |
| Fan Module  | 56        |
| Adapter Cards   | 57        |
| Filler Plates   | 61        |
| Power System  | 63        |
| Distribution Panels and Cables                                  | 65        |
| T1/E1 ASAP Adapter Card BNC Distribution Panel                  | 65        |
| T1/E1 ASAP Adapter Card 1.0/2.3 Mini-Coaxial Distribution Panel | 67        |
| T1/E1 ASAP Adapter Card RJ-45 Distribution Panel                | 68        |
| T1/E1 Cables  | 69        |
| DS3/E3 Cables   | 69        |
| Alarm Module External Alarm Cable                               | 70        |
| Auxiliary Alarm Card Cables                                     | 71        |
| 7705 SAR-18 System Installation Process                         | 72        |
| Notes on the 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F            | 73        |
| <b>Site Preparation</b>   | <b>75</b> |
| Warnings and Notes  | 76        |
| System Specifications   | 78        |
| Chassis Specifications  | 78        |
| Environmental Specifications                                    | 79        |
| CSM Specifications  | 80        |
| Alarm Module Specifications                                     | 80        |
| Fan Module Specifications                                       | 80        |
| Adapter Card Specifications                                     | 81        |
| Distribution Panel Specifications                               | 81        |
| Power Consumption   | 82        |
| Operating Requirements  | 83        |
| Installation Locations  | 84        |
| Chassis Location Requirements                                   | 84        |

## Table of Contents

|  |            |
|--|------------|
| Safety Considerations . . . . .  | 86         |
| Placement . . . . .  | 86         |
| Grounding . . . . .  | 86         |
| CBN and IBN Support. . . . .   | 87         |
| Power . . . . .  | 87         |
| DC Power Requirements . . . . .  | 87         |
| Cabling . . . . .  | 88         |
| Fan Module . . . . .   | 88         |
| Storage . . . . .  | 89         |
| Compliance . . . . .   | 90         |
| <b>Installing the Chassis . . . . .</b>  | <b>91</b>  |
| Unpacking the Chassis . . . . .  | 92         |
| Unpacking Precautions . . . . .  | 92         |
| Installation Warnings . . . . .  | 92         |
| Unpacking Instructions . . . . .   | 93         |
| Installing the Chassis in a Rack . . . . .   | 95         |
| Chassis Ground Wiring . . . . .  | 98         |
| Making the Ground Connection . . . . .   | 99         |
| <b>DC Power Connections . . . . .</b>  | <b>103</b> |
| Wiring and Connecting DC Power . . . . .   | 104        |
| Warnings and Notes . . . . .   | 104        |
| DC-Input Power Connections . . . . .   | 105        |
| Removing the Protective Overlays from the DC Power Cables Side-Wall Access Locations . . . . . | 109        |
| Wiring the DC Inputs. . . . .  | 110        |
| <b>Installing the Components . . . . .</b>   | <b>113</b> |
| Installing Components. . . . .   | 115        |
| Warnings and Notes . . . . .   | 115        |
| Installing a CSM . . . . .   | 116        |
| Compact Flash 3 Card . . . . .   | 118        |
| Installing the Fan Module . . . . .  | 119        |
| Warnings and Notes . . . . .   | 119        |
| Installing the Fan Filter . . . . .  | 122        |
| Installing the Alarm Module . . . . .  | 124        |
| Installing Adapter Cards . . . . .   | 125        |
| Installing SFPs . . . . .  | 128        |
| Installing a Filler Plate . . . . .  | 129        |
| Installing a Distribution Panel in a Rack . . . . .  | 131        |
| Rack-Mounting a Distribution Panel . . . . .   | 131        |
| Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel . . . . .                 | 133        |
| Managing Cable Connections to Adapter Cards and Modules . . . . .                              | 135        |
| Warnings and Notes . . . . .   | 135        |
| Ethernet and Copper Cables . . . . .   | 138        |
| Fiber Cables . . . . .   | 139        |
| Modifying the Cable Management Area for a Dense Cable Deployment . . . . .                     | 140        |
| Making a Shield Ground Connection . . . . .  | 141        |
| T3/E3 SFP Connections . . . . .  | 142        |

|  |            |
|--|------------|
| DS3/E3 Connections . . . . .   | 142        |
| Alarm Module Alarm Port Connections . . . . .                                    | 143        |
| Auxiliary Alarm Card Connections . . . . .                                       | 143        |
| Wire Identification by Color . . . . .   | 144        |
| Making External Synchronization Connections Using the RJ-45 BITS Ports . . . . . | 145        |
| <b>Initializing and Provisioning . . . . .</b>                                   | <b>147</b> |
| Powering Up the 7705 SAR-18 . . . . .  | 148        |
| Powering Up and Initializing the 7705 SAR-18 . . . . .                           | 148        |
| Troubleshooting the Initial Startup . . . . .                                    | 150        |
| Automatic Discovery Protocol . . . . .   | 152        |
| Establishing 7705 SAR-18 Management Connections . . . . .                        | 154        |
| Console Connection . . . . .   | 154        |
| Telnet Connection . . . . .  | 155        |
| Running Telnet . . . . .   | 156        |
| Provisioning CSM and Adapter Card Parameters . . . . .                           | 157        |
| Provisioning Requirements . . . . .  | 157        |
| Card and Card-Type Commands . . . . .  | 157        |
| MDA and MDA-Type Commands . . . . .  | 158        |
| Example . . . . .  | 158        |
| Removing an Adapter Card Configuration . . . . .                                 | 160        |
| <b>LEDs . . . . .</b>  | <b>161</b> |
| Alarm Module LEDs . . . . .  | 162        |
| CSM LEDs . . . . .   | 165        |
| Adapter Card LEDs . . . . .  | 167        |
| <b>Field-Replaceable Units . . . . .</b>   | <b>169</b> |
| Warnings and Notes . . . . .   | 170        |
| Removing and Replacing a CSM . . . . .   | 171        |
| Warnings and Notes . . . . .   | 171        |
| Removing a CSM . . . . .   | 172        |
| Replacing a CSM . . . . .  | 174        |
| Replacing a Compact Flash 3 Card . . . . .                                       | 175        |
| Replacing a Compact Flash 1 and Compact Flash 2 Card . . . . .                   | 177        |
| Removing and Replacing the Alarm Module . . . . .                                | 178        |
| Warnings and Notes . . . . .   | 178        |
| Removing the Alarm Module . . . . .  | 178        |
| Replacing the Alarm Module . . . . .   | 180        |
| Removing and Replacing the Fan Module . . . . .                                  | 181        |
| Warnings and Notes . . . . .   | 181        |
| Removing the Fan Module . . . . .  | 182        |
| Replacing the Fan Module . . . . .   | 184        |
| Removing and Replacing the Fan Filter . . . . .                                  | 185        |
| Removing and Replacing an Adapter Card . . . . .                                 | 187        |
| Warnings and Notes . . . . .   | 187        |
| Removing an Adapter Card . . . . .   | 188        |
| Replacing an Adapter Card . . . . .  | 190        |

Table of Contents

**Pinout Assignments . . . . . 193**

    CSM Ports and Pinouts. . . . . 194

        Management Port Pinouts . . . . . 194

        Console Port Pinouts . . . . . 195

    Alarm Module Ports and Pinouts. . . . . 197

        BITS Ports and Pinouts . . . . . 197

        External Alarms Connector Pinouts . . . . . 199

    RJ-45 Distribution Panel Pinouts . . . . . 200

    Adapter Card Pinouts . . . . . 201

**Standards and Protocol Support . . . . . 203**

# List of Tables

|  |            |
|--|------------|
| <b>Preface</b>   | <b>29</b>  |
| Table 1: Information Symbols                                   | 31         |
| <b>Mandatory Requirements</b>                                  | <b>33</b>  |
| Table 2: List of Terms   | 34         |
| <b>7705 SAR-18 Overview</b>                                    | <b>51</b>  |
| Table 3: Orderable Compact Flashes                             | 54         |
| Table 4: 7705 SAR-18 Adapter Cards                             | 57         |
| Table 5: Distribution Panel Features                           | 66         |
| Table 6: T1/E1 Cables  | 69         |
| Table 7: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison    | 73         |
| <b>Site Preparation</b>  | <b>75</b>  |
| Table 8: 7705 SAR-18 Chassis Specifications                    | 78         |
| Table 9: Environmental Specifications                          | 79         |
| Table 10: CSM Specifications                                   | 80         |
| Table 11: Alarm Module Specifications                          | 80         |
| Table 12: Fan Module Specifications                            | 80         |
| Table 13: Adapter Card Specifications                          | 81         |
| Table 14: Distribution Panel Specifications                    | 81         |
| Table 15: Power Consumption                                    | 82         |
| Table 16: 7705 SAR-18 Hardware for DC Operational Requirements | 83         |
| Table 17: Chassis Clearance Specifications                     | 85         |
| Table 18: Storage Specifications                               | 89         |
| <b>Installing the Chassis</b>                                  | <b>91</b>  |
| Table 19: Rack-Mounting Parts                                  | 97         |
| Table 20: Ground Wiring Features                               | 99         |
| Table 21: Ground Wire Connection Features                      | 100        |
| <b>Installing the Components</b>                               | <b>113</b> |
| Table 22: CSM Installation Features                            | 116        |
| Table 23: Fan Module Installation Features                     | 120        |
| Table 24: Fan Filter Installation Features                     | 122        |
| Table 25: Alarm Module Installation Features                   | 124        |
| Table 26: Adapter Card Installation Features                   | 127        |
| Table 27: SFP Installation Features                            | 128        |

## List of Tables

|  |   |            |
|--|---|------------|
| Table 28:                                  | Rack-Mounting the Distribution Panel .....          | 132        |
| Table 29:                                  | Quad Identification Wire Color .....                | 144        |
| <b>Initializing and Provisioning .....</b> |   | <b>147</b> |
| Table 30:                                  | ADP Front Panel Interface Commands .....            | 152        |
| Table 31:                                  | ADP Stage LED Indicators .....                      | 153        |
| Table 32:                                  | Console Port Settings .....                         | 154        |
| <b>LEDs .....</b>                          |   | <b>161</b> |
| Table 33:                                  | Alarm Module LEDs .....                             | 163        |
| Table 34:                                  | CSM LEDs .....                                      | 165        |
| <b>Field-Replaceable Units .....</b>       |   | <b>169</b> |
| Table 35:                                  | CSM Removal and Replacement Features .....          | 172        |
| Table 36:                                  | Alarm Module Removal and Replacement Features ..... | 179        |
| Table 37:                                  | Fan Module Removal and Replacement Features .....   | 182        |
| Table 38:                                  | Fan Filter Removal Features .....                   | 186        |
| Table 39:                                  | Adapter Card Removal and Replacement Features ..... | 188        |
| <b>Pinout Assignments .....</b>            |   | <b>193</b> |
| Table 40:                                  | Ethernet Management Port Pinouts—RJ-45 Female ..... | 195        |
| Table 41:                                  | Console Port Pinouts—DB9 Male .....                 | 196        |
| Table 42:                                  | BITS Port Pinouts—RJ-45 Female .....                | 198        |
| Table 43:                                  | External Alarms Port Pinouts .....                  | 199        |
| Table 44:                                  | RJ-45 Distribution Panel Pinout Assignments .....   | 200        |

# List of Figures

|  |            |
|--|------------|
| <b>Mandatory Requirements</b>  | <b>33</b>  |
| Figure 1: ESD Awareness Label  | 35         |
| Figure 2: Protective Earth (Ground)  | 40         |
| Figure 3: Earth (Ground)   | 40         |
| Figure 4: WEEE Symbol for post-August 13, 2005 Product                           | 47         |
| <b>7705 SAR-18 Overview</b>  | <b>51</b>  |
| Figure 5: 7705 SAR-18 Chassis Layout   | 52         |
| Figure 6: 7705 SAR-18 CSM  | 53         |
| Figure 7: 7705 SAR-18 Alarm Module   | 55         |
| Figure 8: 7705 SAR-8/7705 SAR-18 Single Adapter Card Filler Plate                | 62         |
| Figure 9: 7705 SAR-8/7705 SAR-18 Triple Adapter Card Plate                       | 63         |
| Figure 10: Power Terminal Access   | 64         |
| Figure 11: BNC Distribution Panel  | 66         |
| Figure 12: Mini-Coaxial Distribution Panel                                       | 67         |
| Figure 13: RJ-45 Distribution Panel  | 68         |
| Figure 14: Alarm Module External Alarm Cable                                     | 70         |
| Figure 15: 68-pin AMP to Open-Ended Wire Cable                                   | 71         |
| Figure 16: SCSI-2 to 64-pin AMP Cable  | 71         |
| <b>Site Preparation</b>  | <b>75</b>  |
| Figure 17: 7705 SAR-18 Chassis Clearance   | 85         |
| <b>Installing the Chassis</b>  | <b>91</b>  |
| Figure 18: Unpacking the 7705 SAR-18 Chassis                                     | 93         |
| Figure 19: Installing the 7705 SAR-18 Chassis in a Rack                          | 96         |
| Figure 20: Preparing the Ground Wire   | 99         |
| Figure 21: Attaching the Chassis Ground Connector                                | 100        |
| <b>DC Power Connections</b>  | <b>103</b> |
| Figure 22: DC Power Terminal Connectors  | 106        |
| Figure 23: DC Power Terminal Circuit Breakers                                    | 107        |
| Figure 24: DC Power Cable Access Openings  | 108        |
| Figure 25: Removing the Protective Strip from the DC Power Cable Access Location | 109        |
| Figure 26: Connecting the Power Cables to the Terminal Block                     | 111        |

|   |            |
|---|------------|
| <b>Installing the Components</b>  | <b>113</b> |
| Figure 27: Installing the CSM   | 116        |
| Figure 28: Unlocking the Locking Button on the CSM Ejector Latch                | 118        |
| Figure 29: Installing the Fan Module  | 120        |
| Figure 30: Releasing the Fan Filter Latches                                     | 122        |
| Figure 31: Installing the Fan Filter  | 123        |
| Figure 32: Installing the Alarm Module  | 124        |
| Figure 33: Installing an Adapter Card   | 126        |
| Figure 34: Installing an SFP  | 128        |
| Figure 35: Installing a 7705 SAR-18 Filler Plate                                | 130        |
| Figure 36: Installing a Distribution Panel in a Rack                            | 131        |
| Figure 37: Mini-Coaxial Connector Extraction Tool                               | 133        |
| Figure 38: Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel | 133        |
| Figure 39: Cable Management   | 137        |
| Figure 40: Unscrewing a Cable Management Guide                                  | 140        |
| <b>Initializing and Provisioning</b>  | <b>147</b> |
| Figure 41: Files on the Compact Flash   | 151        |
| Figure 42: 7705 SAR-18 Console Port Connection                                  | 154        |
| Figure 43: 7705 SAR-18 Management Port Connection                               | 155        |
| <b>LEDs</b>   | <b>161</b> |
| Figure 44: Alarm Module LEDs  | 162        |
| Figure 45: CSM LEDs   | 165        |
| <b>Field-Replaceable Units</b>  | <b>169</b> |
| Figure 46: Removing a CSM   | 172        |
| Figure 47: Replacing a CSM  | 174        |
| Figure 48: Location of the CF3  | 176        |
| Figure 49: Removing the Alarm Module  | 178        |
| Figure 50: Replacing the Alarm Module   | 180        |
| Figure 51: Removing the Fan Module  | 182        |
| Figure 52: Replacing the Fan Module   | 184        |
| Figure 53: Releasing the Fan Filter Latches                                     | 185        |
| Figure 54: Removing the Fan Filter  | 186        |
| Figure 55: Removing an Adapter Card   | 188        |
| Figure 56: Replacing an Adapter Card  | 190        |

|   |            |
|---|------------|
| <b>Pinout Assignments</b>                                 | <b>193</b> |
| Figure 57: 7705 SAR-18 CSM Ports                          | 194        |
| Figure 58: Management Port Pin Numbers                    | 194        |
| Figure 59: Console Port Pin Numbers                       | 195        |
| Figure 60: 7705 SAR-18 Alarm Module Ports                 | 197        |
| Figure 61: RJ-45 BITS Port Pin Numbers                    | 197        |
| Figure 62: External Alarms Port Pin Numbers               | 199        |
| Figure 63: RJ-45 Distribution Panel Connector Pin Numbers | 200        |



# List of Acronyms

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## About This Guide

This guide provides site preparation recommendations, step-by-step procedures to install the Alcatel-Lucent 7705 Service Aggregation Router (7705 SAR-18 chassis) in a standard 19-inch utility rack, and instructions to install, provision, and remove the Control and Switching Module (CSM), adapter cards, Alarm module, and Fan module.

After the hardware installation process is completed, see 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.

## 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 in this guide 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.

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## Audience





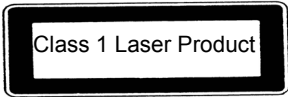
This guide is intended for network installers and system administrators who are responsible for installing, configuring, or maintaining networks. This guide assumes you are familiar with electronic and networking technologies.

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## 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. An electric shock hazard could exist. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be familiar with 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.  |
|  |         | Class 1 laser products are identified in the adapter card installation guides. Only approved Class 1 replaceable laser transceivers should be used with this product.   |

## Multiple PDF File Search

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



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

To search multiple PDF files for a term:

**Step 1.** Open Adobe Reader.

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

**Step 3.** Enter the term to search for.

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

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

**Step 6.** Select the following criteria if required:

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

**Step 7.** Click on the Search button.

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

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

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## Technical Support

If you purchased a service agreement for your 7705 SAR-18 and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, check this link for instructions to contact Support personnel:

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

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# Mandatory Requirements

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## In This Chapter

The following sections describe the mandatory regulations that govern the installation and operation of the 7705 SAR-18:

- [List of Terms on page 34](#)
- [General Requirements on page 35](#)
- [Canada Regulations on page 41](#)
- [United States Regulations on page 43](#)
- [European Union Regulations on page 45](#)
- [Australia/New Zealand Regulations on page 49](#)
- [China Regulations on page 50](#)

## List of Terms

[Table 2](#) lists the terms used in this chapter.

**Table 2: List of Terms**

| <b>Term</b>       | <b>Expansion</b>                                       |
|-------------------|--|
| ACMA              | Australian Communications and Media Authority          |
| ACTA              | Administrative Council for Terminal Attachments        |
| ANSI              | American National Standards Institute                  |
| AS/NZ             | Australian/New Zealand standard                        |
| CE                | Conformité Européene                                   |
| CFR               | Code of Federal Regulations                            |
| CSA International | Canadian Standards Association International           |
| EEC               | European Economic Community                            |
| EMC               | Electromagnetic Compatibility                          |
| EMI               | Electromagnetic Interference                           |
| EN                | European Standards                                     |
| ETSI              | European Telecommunications Standards Institute        |
| FCC               | Federal Communications Commission                      |
| ICES              | Interference Causing Equipment Standard                |
| IEC               | International Electrotechnical Commission              |
| IEE               | Institute of Electrical Engineers (UK)                 |
| LVD               | Low Voltage Directive                                  |
| NRTL              | Nationally Recognized Testing Laboratory               |
| OSHA (USA)        | Occupational Safety and Health Administration (USA)    |
| RoHS              | Restriction of the use of certain Hazardous Substances |
| SELV              | Safety Extra Low Voltage                               |
| UL                | Underwriters Laboratories                              |
| WEEE              | Waste Electrical and Electronic Equipment              |

## General Requirements

The sections that follow outline the mandatory regulations that govern the installation and operation of the 7705 SAR-18. The information in this section also describes instructions and information related to overall conformance with the mandatory regulations. You must adhere to these instructions so that your system meets regulatory requirements.



**Danger:** When removing adapter cards from a shelf under power, some of the components, such as the DC converters, may be extremely hot. Handle the adapter cards by their faceplates and/or edges so that you do not burn yourself on the components.



**Warnings:**

- The compliance and long-term reliability of this product is wholly dependent on using the product within the environmental limits and restrictions described in the [Site Preparation](#) chapter.
- There are no user-serviceable parts in this product. Refer servicing to qualified personnel.
- To prevent accidental electrical short circuits, align the card correctly between the card guides on the shelf before inserting it in the slot.

## Anti-static Measures

[Figure 1](#) shows the ESD awareness label used on Alcatel-Lucent products to alert personnel to the presence of ESD-sensitive devices in the product. The necessary ESD precautions must be taken whenever this symbol is present on the product.

**Figure 1: ESD Awareness Label**



17658

This guide uses the following icon and associated text to provide special information relating to ESD-sensitive activities or situations.



### Warnings:

- The 7705 SAR-18 chassis and equipment rack must be properly grounded. ESD damage can occur if components are mishandled. A typical grounding point is one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench.
- ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-18 (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).

The risk of damage to an ESD-sensitive device is reduced considerably after assembly in a circuit designed to protect sensitive components; however, the following basic precautions should be taken to reduce ESD to harmless levels.

- Handle all units as if they contained ESD-sensitive devices unless they are known not to contain ESD-sensitive parts.
- Wear an anti-static ESD strap on your wrist or heel prior to and while touching or handling units containing ESD-sensitive devices.
- For surfaces with resistance to ground in excess of 100 MΩ, such as ordinary tile, either cover them with properly grounded static dissipative runners or wax them with a static dissipative wax.
- Store (even temporarily), pack, and ship units in anti-static bags or containers.
- Do not handle units and components unnecessarily. Use the plastic faceplate to handle circuit boards.
- Do not use synthetic bristled brushes or acid brushes to clean units.
- Handle failed units with the same precautions as working units.

## Grounding

When a 7705 SAR-18 chassis is properly installed in a grounded equipment rack, the rack provides ESD grounding for the chassis. Before a 7705 SAR-18 chassis is installed, connect the ESD wrist strap to a grounded rack or other ground point. After the 7705 SAR-18 chassis is installed in a grounded rack or cabinet, connect the anti-static wrist strap to the ESD strap ground point on one of the ground studs identified by the wrist strap label.

## Unit Repair

The following stringent precautions are recommended to protect ESD-sensitive devices during repair to the 7705 SAR-18.

- Ground the work bench to the earth and cover the work surface with an anti-static or static dissipative material bonded to the bench. A field service kit or equivalent can be used if an adequate work bench is not available.
- Use a wrist strap of 250 k $\Omega$  to 2 M $\Omega$  that contacts your skin and is connected to the bolt that bonds the covering to the bench or safety ground.
- Ground all electrical equipment through a 3-wire power cord.
- Do not allow clothing to touch the unit or ESD-sensitive device under repair.
- Keep units in their original containers until actually needed, as units containing ESD-sensitive devices are delivered from the manufacturer with protective packing (containers or conductive foam).
- Keep containers that have units with ESD-sensitive devices in contact with the anti-static work surface, and make sure your anti-static wrist strap is connected before removing parts from containers. Devices should be handled by their bodies. Contact the lead only when necessary.
- Ensure test setups have the correct voltage polarity.
- Do not use VOM-type meters to measure resistance, as this can damage electrostatic-sensitive devices.
- Use only anti-static (metallized) desoldering tools.

## Interconnection Points

The interconnection points on the 7705 SAR-18 are defined as the following SELV connectors:

- external alarm output contacts and alarm inputs (provided by the Alarm module)
- management port (provided by the active CSM)
- external clock inputs and clock outputs (provided by two T1/E1 or G.703 clause 13 BITS ports on the Alarm module)
- T1/E1 ports (provided by the 16-port T1/E1 ASAP Adapter card version 1 and version 2 and 32-port T1/E1 ASAP Adapter card version 2)
- Ethernet ports (provided by the 8-port Ethernet Adapter card, version 2)
- DS3/E3 ports (provided by the 4-port DS3/E3 Adapter card)
- SONET/SDH ports (provided by the 4-port OC3/STM1 Clear Channel Adapter card and 2-port OC3/STM1 Channelized Adapter card)

- alarm inputs and output relays (provided by the Auxiliary Alarm card)

[Figure 5](#) in the [Chassis](#) section identifies these interconnection points.

## SELV

Connect SELV circuits on this equipment only to other circuits that comply with the requirements of SELV circuits as defined in CSA C22.2 No. 60950-1, UL 60950-1, EN 60950-1, AS/NZS 60950-1, and IEC 60950-1.

## Prevention of Access

The 7705 SAR-18 must be accessible only to authorized, trained service personnel. Install this apparatus in a restricted access location or similar environment to prevent unauthorized access.

## Environmental Requirements for Installation

For information on the environmental requirements for installing the 7705 SAR-18, see [Installation Locations](#).

## Laser Interface

The 7705 SAR-18 uses a fiber-optic communications method and is an FDA and IEC Class 1 Laser product. Only trained service personnel thoroughly familiar with laser radiation hazards should install or remove the fiber-optic cables and cards in this system.

## Protective Safety Ground (Earth)

The cable used for safety ground should be at least the same gauge as the supply conductors, green, or green and yellow, in color, and of sufficient length to connect the building earth point to the chassis ground connection (see [Chassis Ground Wiring](#) for specific instructions on connecting the chassis ground).

## EMC Compliance

EMC compliance may require the use of ferrites, shielded cables, or other special accessories. Where required, these special accessories must be installed as per the instructions.

To maintain EMC compliance, cables that are shielded and grounded at both ends must be used on the following cards, interfaces, and ports:

- CSM card
  - Ethernet management port
- Alarm module
  - Synchronization interfaces (BITS1 and BITS2), external alarms
- 4-port DS3/E3 Adapter card
  - DS3 and E3 interface
- 8-port Ethernet Adapter card version 2
  - Fast Ethernet interface (CAT5 shielded cable)
  - Gigabit Ethernet interface (CAT5E shielded cable)
- 16-port T1/E1 ASAP Adapter card version 1 and version 2, 32-port T1/E1 ASAP Adapter card version 2
  - T1 and E1 interface
- Auxiliary Alarm card
  - alarm inputs and output relays
- 32-port BNC, 32-port RJ-45, or 32-port Mini-Coaxial distribution panel
  - 68-pin AMP to 68-pin AMP T1/E1 cable to connect the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card to the customer equipment in cases where high-density connectors cannot be used

## Regulatory Symbols

The 7705 SAR-18 uses various regulatory approvals symbols. They may be used on product markings such as approvals labels. These symbols are described in IEC 417.

[Figure 2](#) and [Figure 3](#) show symbols of a terminal that you must connect to earth ground before you make any other connections to the equipment.

**Figure 2: Protective Earth (Ground)**



9717

**Figure 3: Earth (Ground)**



9718

## Canada Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-18 in Canada.

### Industry Canada Regulations

#### **ICES-003: Interference-Causing Equipment Standard Digital Apparatus**



**Note:** Changes or modifications not expressly approved by Alcatel-Lucent could void the user's authority, granted by Alcatel-Lucent's certification by Industry Canada, to operate the equipment.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

#### **IC CS-03: Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility**

This product meets the applicable Industry Canada technical specifications with respect to IC CS-03: Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility.

Registration number: 1737F-0014A

## EMC Compliance

EMC compliance may require the use of ferrites, shielded cables, or other special accessories. Where required, these special accessories must be installed as per the instructions.

## **Safety Approval for DC Systems**

The DC source for the system must meet the requirements of a SELV source to comply with CSA standard C22.2 No. 60950-1. Use the system with a SELV secondary source that is electrically isolated from the AC source and that is reliably grounded.

The 7705 SAR-18 is safety certified according to CSA standard C22.2 No. 60950-1 by CSA.

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## United States Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-18 in the United States.

### Federal Communications Commission

#### FCC Part 15



**Note:** Changes or modifications not expressly approved by Alcatel-Lucent could void the user's authority, granted by Alcatel-Lucent's certification by the FCC, to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's expense.

#### FCC Part 68

The T1 network interface on this equipment meets the FCC specifications.

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA.

Identification Number: GQ6DENAN7705SAR18

In the event that repairs to this equipment are needed, contact Technical Support.

### **NRTL**

This equipment is certified by the NRTL as meeting the requirements of UL 60950-1, Safety of Information Technology Equipment.

### **NRTL Approval for External DC Supplies**

When the system is equipped with an AC rectifier, the rectifier must have NRTL-accredited approval. In addition, the DC outputs must meet UL 60950-1 SELV requirements.

### **Safety Approval for DC Systems**

The DC source for the system must meet the requirements of a SELV source in accordance with UL 60950-1. You must use the system with a SELV secondary source that is electrically isolated from the AC source and that is reliably grounded.

### **Food and Drug Administration**

This product complies with 21 CFR 1040.10 and 1040.11 regulations, which govern the safe use of lasers. Only qualified service personnel, thoroughly familiar with laser radiation hazards, should install or remove the fiber-optic cables used in this system. You can find information about the safe use of lasers in ANSI Z 136.1: Safe Use of Lasers and ANSI Z 136.2: Safe Use of Lasers in Optical Fiber Communications Systems. You can obtain these documents and other instructional material from:

Laser Institute of America  
13501 Ingenuity Drive, Suite 128  
Orlando, FL 32826

<http://www.laserinstitute.org>

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## European Union Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-18 in the European Union.

## Declaration of Conformity

Hereby, Alcatel-Lucent declares that the equipment documented in this publication is in compliance with the essential requirements and other relevant provisions of Directive 1999/05/EC and 2004/108/EC.

The technical documentation as required by the Conformity Assessment procedure is kept at the Alcatel-Lucent location that is responsible for this product. For more information, please contact your local Alcatel-Lucent Customer Service Organization.

## EU Compliance Statement

This product has been CE marked in accordance with the requirements of European Directive 1999/05/EC, the Radio and Telecommunications Terminal Equipment Directive (R&TTE), and 2004/108/EC, the Electromagnetic Compatibility (EMC) Directive.

## EMC/EMI Compliance

The equipment complies with the following EMC and EMI specification: EN 300 386 Class A.

## General

This equipment must be permanently grounded.

## Laser Interface

The system uses laser devices that are rated in accordance with IEC 60825-1 as Class 1 devices.

## Safety Approval for DC Systems

The DC source for the system must meet the requirements of a SELV source as defined in EN 60950-1. For 60V station battery systems, the source is considered TNV-2 as per IEC/EN 60950-1 and must have reinforced insulation from the AC mains.

The equipment complies with the following Product Safety specification: EN 60950-1.

## Protective Earth

Protective earth is referred to as chassis ground in this document. A green, or green and yellow, colored earth wire must be connected from the site equivalent of the mains earth connection to all shelves in accordance with IEE Wiring Regulations (16th edition). This connection is made via the chassis ground connection (see [Chassis Ground Wiring](#) for specific instructions on connecting the protective earth). The protective earth is also carried by the mains plug and socket (for AC systems only).

## Approval for External AC Rectifiers

When the system is equipped with an external AC rectifier, the rectifier must meet EN 60950-1 SELV DC output requirements. Make sure that the rectifier is rated and adjusted for the appropriate AC input voltage and frequency for the country where it is installed. Set the output of the rectifier according to the installation and operating instructions of the manufacturer, to provide output levels that coincide with the nominal DC input ratings of the system.

## Eco-Environmental

### Packaging Collection and Recovery Requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the appropriate environmental health and safety organization.

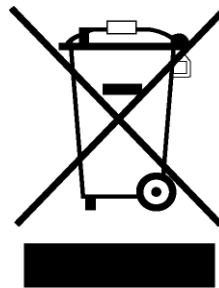
**Recycling / Take-back / Disposal of Product**

Electronic products bearing or referencing the symbol shown in [Figure 4](#), when put on the market within the European Union, shall be collected and treated at the end of their useful life in compliance with applicable European Union and local legislation. They shall not be disposed of as part of unsorted municipal waste. Due to materials that may be contained in the product, such as heavy metals or batteries, the environment and human health may be negatively impacted as a result of inappropriate disposal.



**Note:** In the European Union, the WEEE symbol (a wheeled trash bin that has been crossed out and is positioned above a solid bar) indicates that the product was put on the market after 13 August 2005. This product is compliant with the WEEE marking requirements of DIRECTIVE 2002/96/EC Waste Electrical and Electronic Equipment (WEEE).

**Figure 4: WEEE Symbol for post-August 13, 2005 Product**



Moreover, in compliance with legal requirements and contractual agreements, where applicable, Alcatel-Lucent will offer to provide for the collection and treatment of Alcatel-Lucent products bearing the logo at the end of their useful life, or products displaced by Alcatel-Lucent equipment offers. For information regarding take-back of equipment by Alcatel-Lucent, or for more information regarding the requirements for recycling/disposal of product, please contact your Alcatel-Lucent Account Manager or Alcatel-Lucent Takeback Support at [takeback@alcatel-lucent.com](mailto:takeback@alcatel-lucent.com).

## **Material Content Compliance**

European Union (EU) Directive 2002/95/EC, “Restriction of the use of certain Hazardous Substances” (RoHS), restricts the use of lead, mercury, cadmium, hexavalent chromium, and certain flame retardants in electrical and electronic equipment. This Directive applies to electrical and electronic products placed on the EU market after 1 July 2006, with various exemptions, including an exemption for lead solder in network infrastructure equipment. Alcatel-Lucent products shipped to the EU after 1 July 2006 comply with the EU RoHS Directive.

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## Australia/New Zealand Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-18 in Australia and New Zealand.

### ACMA Regulations

The 7705 SAR-18 complies with the ACMA requirements, and the product is marked with the 'A Tick' under the Supplier Code N594.

#### **EMC**

This Class A digital apparatus complies with AS/NZS CISPR22.

#### **Telecom**

This product meets the applicable ACMA technical specifications: AS/ACIF S016.

#### **Safety**

All products supplied in Australia are to be safe and are to comply with an applicable Australian Standard electrical safety standard.

The 7705 SAR-18 complies with the AS/NZS 60950 – Business Equipment, Computers, Telecommunications requirements.

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## China Regulations

The statements that follow are the product conformance statements that apply to the 7705 SAR-18 when deployed in China.

## Safety

The equipment complies with the Product Safety specification of IEC 60950-1:Eco-Environmental.

## Packaging Collection and Recovery Requirements

Jurisdictions in China may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the appropriate environmental health and safety organization.

## Material Content Compliance

The People's Republic of China Ministry of Information Industry has published a regulation (Order #39) and associated standards regarding restrictions on hazardous substances (China RoHS). Currently, the legislation requires all Electronic and Information Products (EIP) to comply with certain labeling and documentation requirements. Alcatel-Lucent products manufactured on or after 1 March 2007, that are intended for sale to customers in the China market, comply with these requirements.

In accordance with the People's Republic of China Electronic Industry Standard "Marking for the Control of Pollution Caused by Electronic Information Products" (SJ/T11364-2006), customers may access the Alcatel-Lucent Hazardous Substances Table, in Chinese, from the following location:

<http://www.alcatel-sbell.com.cn/wwwroot/images/upload/private/1/media/ChinaRoHS.pdf>

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# 7705 SAR-18 Overview

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## In This Chapter

This chapter provides an introduction to the Alcatel-Lucent 7705 SAR-18:

- [7705 SAR-18 Components on page 52](#)
  - [Chassis on page 52](#)
  - [Control and Switching Module on page 53](#)
  - [Alarm Module on page 55](#)
  - [Fan Module on page 56](#)
  - [Adapter Cards on page 57](#)
  - [Filler Plates on page 61](#)
  - [Power System on page 63](#)
  - [Distribution Panels and Cables on page 65](#)
    - [T1/E1 ASAP Adapter Card BNC Distribution Panel on page 65](#)
    - [T1/E1 ASAP Adapter Card 1.0/2.3 Mini-Coaxial Distribution Panel on page 67](#)
    - [T1/E1 ASAP Adapter Card RJ-45 Distribution Panel on page 68](#)
    - [T1/E1 Cables on page 69](#)
    - [DS3/E3 Cables on page 69](#)
    - [Alarm Module External Alarm Cable on page 70](#)
    - [Auxiliary Alarm Card Cables on page 71](#)
- [7705 SAR-18 System Installation Process on page 72](#)
- [Notes on the 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F on page 73](#)

## 7705 SAR-18 Components

The main components of the 7705 SAR-18 are the chassis, Control and Switching Module (CSM), Alarm module, Fan module, adapter cards, and power system. In addition, there are optional distribution panels to connect the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card to the customer equipment.

### Chassis

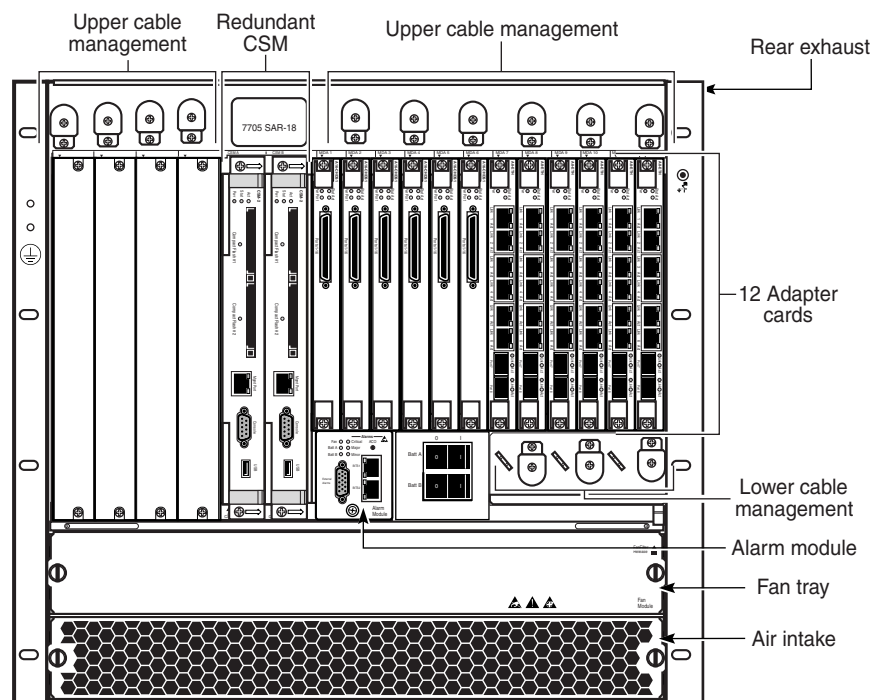
The 7705 SAR-18 chassis is intended for a Central Office operation; it meets all ETSI and ANSI requirements for a 19-inch rack for Central Office applications and meets all NEBS compliances for air flow.

Figure 5 shows the front view of the 7705 SAR-18 chassis.



**Note:** The 7705 SAR-18 does not support 10 Gb adapter cards in Release 4.0. The four slots for these cards, located at the left of the chassis, are covered by filler plates.

**Figure 5: 7705 SAR-18 Chassis Layout**



21359

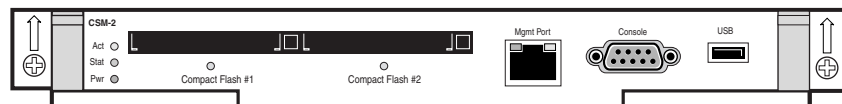
In Release 4.0, the 7705 SAR-18 chassis supports up to 2 CSMs, up to 12 1-Gb adapter cards, an Alarm module, and a Fan module. The 12 adapter card slots are 2.5-Gb slots which support the existing set of 1-Gb adapter cards. All components are field-replaceable and hot-swappable. All user interface ports, controls, and LEDs are forward-facing. The Fan module and power feeds are also accessible from the front of the chassis. The power terminals are installed directly on the backplane with access from the front.

The chassis provides 70 Gb full-duplex switching capacity, and supports both -48 and -60 VDC normal operation.

## Control and Switching Module

Figure 6 shows the front view of the 7705 SAR-18 CSM.

**Figure 6: 7705 SAR-18 CSM**



21384

The CSM is the centralized module that provides the main control and fabric functions within the 7705 SAR-18. The 7705 SAR-18 can have a simplex CSM configuration or a redundant configuration for applications that require high-availability services. In redundant systems, the CSMs are installed in slots CSM A and CSM B. In simplex systems, the CSM can be installed in slot CSM A or CSM B; a 7705 SAR-18 CSM filler plate is installed in the empty CSM slot.

The CSM faceplate has an RJ-45 connector that provides a 10/100 Mb/s Ethernet management interface that supports full/half duplex and is capable of autonegotiation. This connection allows out-of-band management using the CLI or a 5620 SAM. You must provide a CAT5 Ethernet cable to connect to the port.

The CSM faceplate also has a 9-pin D-sub (DB9) serial interface console port. The port can be used as a local craft interface and can be configured for a baud rate of 9600, 19200, 38400, 57600, or 115200 b/s. This port supports eight data bits, no parity and one stop bit (8N1 setup). It is enabled by default and configured for DTE. You must provide an EIA/TIA-232 serial cable to connect to the console port.

See [CSM Ports and Pinouts](#) for management port and console port pinout information.

The CSM faceplate has two optional compact flash slots, labeled Compact Flash #1 and Compact Flash #2. The flash cards that are installed in these slots can be used for software upgrades and statistics collection, and to store scripts and configuration data. A third compact flash slot, labeled CF3, is hidden behind the faceplate. CF3 contains a flash card that is shipped with the CSM and is preloaded with the software image required for system startup and operation, including the application load. CF3 is accessible only on the base board when the CSM is removed from the chassis. CF3 is field-replaceable by qualified trained personnel as described in the procedures in [Field-Replaceable Units](#).

The installed compact flash is 2 Gbytes. You can replace an existing compact flash or order a larger-capacity compact flashes listed in [Table 3](#).

**Table 3: Orderable Compact Flashes**

| Part Number | Description            |
|-------------|------------------------|
| 3HE01619AA  | 2 Gbytes compact flash |
| 3HE04707AA  | 4 Gbytes compact flash |
| 3HE04708AA  | 8 Gbytes compact flash |

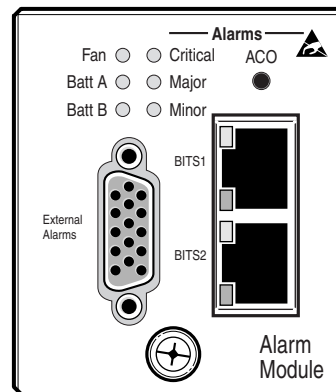


**Note:** The CSM has an input/output module (IOM) that must be activated before any adapter card and port parameters can be provisioned and configured. The IOM is activated using the `card` and `card-type` CLI commands to specify its slot number and card type. See [Provisioning CSM and Adapter Card Parameters](#) for more information.

## Alarm Module

Figure 7 shows the front view of the 7705 SAR-18 Alarm module

**Figure 7: 7705 SAR-18 Alarm Module**



21385

The Alarm module provides functions that apply to both CSM cards, but where the status monitoring and reporting, and input and output access, are only required for the active CSM.

The Alarm module has a single 15-pin D-sub connector that provides access to three sets of alarm output contacts and four alarm inputs. Customers can optionally order a shielded alarm cable from Alcatel-Lucent (part number 3EM24105) to connect to an alarm panel. See [Alarm Module External Alarm Cable](#). Also see [External Alarms Connector Pinouts](#) for pinout information. The alarm severity for each of the four inputs can be customer-defined as critical, major, or minor. The state of these alarm inputs can be viewed using the CLI or SNMP.



**Note:** For applications where additional alarm outputs and alarm inputs, including analog inputs, are required, the Auxiliary Alarm card can be used. See the Auxiliary Alarm Card Installation Guide for more information.

The Alarm module has two RJ-45 BITS ports, labeled BITS1 and BITS2, that provide redundant clocking sources. Each BITS port provides access to both input and output timing signals and can be configured for a T1 (100  $\Omega$ ), E1 (120  $\Omega$ ), or G.703 Clause 13 synchronization interface, with a single setting for both the input and the output. Both BITS inputs are available as two separate synchronization reference options for the node (SSU) and are available to both CSMs. Both BITS ports outputs are always active and driven by the active CSM to the frequency of its SSU.

The Alarm module has LEDs that show the fan status, power status, and critical, major, and minor alarm indications. It also has an Audible Alarm Cutoff/Lamp Test button (labeled ACO) that verifies LED operation. See [Alarm Module LEDs](#) for a description of the LEDs and more information on the ACO button.

The Alarm module field-replaceable by qualified trained personnel as described in the procedures in [Field-Replaceable Units](#).



### Warnings:

- Removal of the Alarm module may result in thermal and EMC requirements not being met.
- Removal of the Alarm module will prevent the BITS input port signals from being used for synchronization. Fall-back mechanisms, such as implementing line timing, IEEE1588v2, ACR, SyncE, or entering a hold-over state, will take effect. See the 7705 SAR OS Basic System Configuration Guide, “Node Timing”, for more information. Additionally, the external alarm inputs will be prevented from being used.

## Fan Module

The Fan module provides the cooling for the 7705 SAR-18 system. The Fan module consists of eight fans housed on one field-replaceable tray. The fan speed is self-regulated by sensors built into each fan. These sensors continually monitor the air intake temperature of the 7705 SAR-18 chassis. Fans start to ramp up at 77°F (25°C) and become fully activated when the temperature reaches 104°F (40°C).

Under a fan failure condition, a fan failure alarm is raised.



**Warning:** Operating in a fan-failure mode is a short-term operational situation. If a fan failure alarm is raised, the Fan module must be replaced as soon as possible (the Fan module must be replaced within a period not exceeding 96 h; individual fans cannot be replaced). During a Fan module replacement, the system can operate safely for a period of up to 5 min. Service may be affected if the Fan module is not replaced within this period.

## Adapter Cards

The 7705 SAR-18 chassis provides 12 2.5-Gb slots (MDA slot positions 1 to 12) which support a maximum of 12 1-Gb adapter cards in Release 4.0. See [Figure 5](#) for adapter card slot locations.

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. The 7705 SAR-18 adapter cards are hot-swappable and field-replaceable by qualified trained personnel as described in the procedures in [Field-Replaceable Units](#).

[Table 4](#) describes the adapter cards that are supported on the 7705 SAR-18 in Release 4.0. The adapter cards are available in variants supporting -48/-60V power. The 16-port T1/E1 ASAP Adapter card (version 2), 32-port T1/E1 ASAP Adapter card, and Auxiliary Alarm card provide ultra-wide support of -48/-60V and +24V power ( +24V power is not supported on the 7705 SAR-18).

Refer to the appropriate adapter card installation guide for installation and LED information, and for applicable SFP support.

See [Distribution Panels and Cables](#) for a description of the distribution panels and associated cables that may be used with the 16-port T1/E1 ASAP Adapter card and 32-port T1/E1 ASAP Adapter card.

**Table 4: 7705 SAR-18 Adapter Cards**

| Adapter Card and Type                               | Description   |
|---|---|
| 2-port OC3/STM1 Channelized Adapter card (a2-choc3) | <ul style="list-style-type: none"> <li>• A maximum of four cards can be installed in MDA slots 1 to 12</li> <li>• Has two hot-pluggable SFP-based ports (optical or electrical)</li> <li>• The port type must be configured to be either SONET (OC3) or SDH (STM1) and the port mode must be configured to be either access or network; the ports can be configured for ATM/IMA or TDM in access mode, or for MLPPP in network mode.</li> <li>• Supports channelization down to channel group DS0</li> <li>• All channels on a channelized port must either be all access or all network (not a mix of the two). Once the first channel has been configured, all other channels on the same port must be set to the same mode.</li> </ul> |

**Table 4: 7705 SAR-18 Adapter Cards (Continued)**

| Adapter Card and Type                               | Description   |
|---|---|
| 4-port OC3/STM1 Clear Channel Adapter card (a4-oc3) | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Has four hot-pluggable SFP-based ports (optical or electrical)</li> <li>• Supports clear channel only</li> <li>• The port type must be configured to be either SONET (OC3) or SDH (STM1) and the port mode must be configured to be either access or network; the ports can be configured for ATM in access mode, or for or for Packet over SONET/SDH (POS) in network mode.</li> </ul>   |
| 4-port DS3/E3 Adapter card (a4-chds3)               | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Has four TDM DS3/E3 clear channel ports; the port type must be configured to be either DS3 or E3 and the port mode must be configured to be either access or network. In access mode, the DS3 ports can be configured for ATM (E3 ports do not support ATM in Release 4.0). In network mode, the DS3/E3 ports can be configured for PPP.</li> <li>• The clocking source on each DS3/E3 port can be configured to be looped-timed (the link recovers the clock from the received data stream) or node-timed (the link uses the internal clock of the active CSM when transmitting data)</li> <li>• Up to two loop-timed DS3/E3 ports can be configured to be a timing source for the node clock</li> </ul> |
| 8-port Ethernet Adapter card version 2 (a8-ethv2)   | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Has six 10/100 FE RJ-45 ports and two GigE SFP ports for 10/100/Gigabit Ethernet SFPs (optical or electrical) and T3 SFPs</li> <li>• Has six 10/100 FE RJ-45 ports and two GigE SFP ports that can be configured in either access or network mode. The six RJ-45 ports are 10/100 Mb/s-capable ports that support autosense and autonegotiation. The two SFP ports support 10/100/Gigabit Ethernet SFPs (optical or electrical) and T3 SFPs</li> <li>• Supports Synchronous Ethernet as a timing source (the electrical SFP does not support Synchronous Ethernet)</li> </ul>   |

**Table 4: 7705 SAR-18 Adapter Cards (Continued)**

| Adapter Card and Type  | Description   |
|--|---|
| 16-port T1/E1 ASAP Adapter card version 1 (a16-chds1)<br>16-port T1/E1 ASAP Adapter card version 2 (a16-chds1v2) | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Has one SCSI-2 connector that supports 16 ports that can be configured for T1 or E1 operation. The ports must be all T1 or all E1 (not a mix of the two). Once the first port has been configured, all other ports must be set to the same type.</li> <li>• Uses a single cable connection to a 32-port BNC, 32-port RJ-45, or 32-port Mini-Coaxial distribution panel. The cable can be a 1 m (3.25 ft) 68-pin AMP to 68-pin AMP T1/E1 cable, or a 15 m (39 ft)/30 m (98 ft) 68-pin AMP connector to open-ended T1/E1 cable.</li> <li>• A T1/E1 port must be set to either access or network mode before it can be used to transport traffic. All channel groups on a port must either be all access or all network (not a mix of the two). Once the first channel group has been configured, all other channel groups on the same port must be set to the same mode. To change between modes, all channel groups must first be deleted.</li> <li>• In access mode, each port can be configured for TDM (for 2G BTS), ATM/IMA (for 3G UMTS Node Bs), or IP over PPP/MLPPP (for CDMA BTS). All member links of an IMA or MLPPP group must reside on the same card.</li> <li>• In network mode, either MLPPP can be configured on a number of T1/E1 ports within a bundle, or a PPP channel group with a number of DS0/64k channels may be configured. All member links of a MLPPP group must reside on the same card.</li> <li>• The clocking source on each T1/E1 port can be configured to be looped-timed (the link recovers the clock from the received data stream), node-timed (the link uses the internal clock of the active CSM when transmitting data), or adaptive-timed (the clock is adaptively recovered from the rate at which data is received and not from the physical layer). On version 1 of the card, one single recovered clock, either from a loop-timed port or adaptive-timed port, can be configured to be the possible timing source for the node clock; on version 2 of the card, up to two reference clocks are available. These two references must be from different framers on the card.</li> <li>• Each T1/E1 CES circuit can be independently configured for adaptive timing; a maximum of 16 adaptive-timed circuits are supported in separate timing domains</li> </ul> |

**Table 4: 7705 SAR-18 Adapter Cards (Continued)**

| Adapter Card and Type                                      | Description   |
|--|---|
| 32-port T1/E1 ASAP Adapter card<br>version 2 (a32-chds1v2) | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Has two SCSI-2 connectors that support 32 ports that can be configured for T1 or E1 operation. The ports must be all T1 or all E1 (not a mix of the two). Once the first port has been configured, all other ports must be set to the same type.</li> <li>• Each connector uses a single cable connection to a 32-port BNC, 32-port RJ-45, or 32-port Mini-Coaxial distribution panel. The cable can be a 1 m (3.25 ft) 68-pin AMP to 68-pin AMP T1/E1 cable, or a 15 m (39 ft)/30 m (98 ft) 68-pin AMP connector to open-ended T1/E1 cable.</li> <li>• A T1/E1 port must be set to either access or network mode before it can be used to transport traffic. All channel groups on a port must either be all access or all network (not a mix of the two). Once the first channel group has been configured, all other channel groups on the same port must be set to the same mode. To change between modes, all channel groups must first be deleted.</li> <li>• In access mode, each port can be configured for TDM (for 2G BTS), ATM/IMA (for 3G UMTS Node Bs), or IP over PPP/MLPPP (for CDMA BTS). All member links of an IMA or MLPPP group must reside on the same card.</li> <li>• In network mode, either MLPPP can be configured on a number of T1/E1 ports within a bundle, or a PPP channel group with a number of DS0/64k channels may be configured. All member links of a MLPPP group must reside on the same card.</li> <li>• The clocking source on each T1/E1 port can be configured to be looped-timed (the link recovers the clock from the received data stream), node-timed (the link uses the internal clock of the active CSM when transmitting data), or adaptive-timed (the clock is adaptively recovered from the rate at which data is received and not from the physical layer). Two loop-timed ports or adaptive-timed ports can be configured to be the possible timing reference source for the node clock. These two references must be from different framers on the card.</li> <li>• Each T1/E1 CES circuit can be independently configured for adaptive timing; a maximum of 32 adaptive-timed circuits are supported in separate timing domains</li> </ul> |

**Table 4: 7705 SAR-18 Adapter Cards (Continued)**

| Adapter Card and Type            | Description   |
|----------------------------------|---|
| Auxiliary Alarm card (aux-alarm) | <ul style="list-style-type: none"> <li>• A maximum of 12 cards can be installed in MDA slots 1 to 12</li> <li>• Provides additional alarm monitoring support for the Alarm module</li> <li>• Has 24 dry contact digital inputs, 8 dry contact digital output relays, and 2 analog inputs</li> <li>• A single 68 pin-AMP (SCSI-2 form factor) connector provides access to all the input and output pins. The cable connection can be made using a 15 m (49 ft)/30 m (98 ft) 68-pin AMP to open-ended cable or 3 m (9.8 ft) SCSI-2 to 64-pin AMP cable.</li> </ul> |

## Filler Plates

Filler plates are required on all empty slots to prevent dust accumulation, help control airflow and cooling, help confine electromagnetic interference, and for safety reasons. Filler plates do not have board components or connector pins.

The following filler plates are supported on the 7705 SAR-18 in Release 4.0:

- 7705 SAR-18 CSM filler plate, which is used to cover an empty CSM slot
- 7705 SAR-8/7705 SAR-18 single-slot 1-Gb adapter card filler plate, which is used to cover an empty 1 Gb adapter card slot
- 7705 SAR-8/7705 SAR-18 triple-slot 1-Gb adapter card filler plate, which is used to cover three adjacent empty 1-Gb adapter card slots
- 7705 SAR-18 single-slot 10-Gb adapter card filler plate, which is used to cover an empty 10-Gb adapter card slot

The 7705 SAR-18 chassis is shipped with three installed single-slot 1-Gb adapter card filler plates, three installed triple-slot 1-Gb adapter card filler plates, and four installed single-slot 10-Gb adapter card filler plates. The CSM slots do not come with installed filler plates; 7705 SAR-18 CSM filler plates (3HE06022AA) may be ordered separately.



**Note:** In Release 4.0, the 10-Gb filler plates must remain permanently installed in the empty 10 Gb adapter card slots.

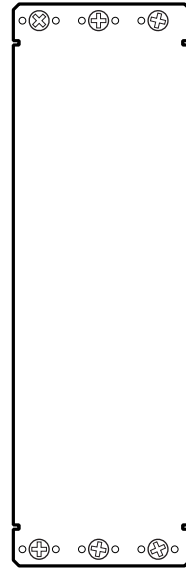
[Figure 8](#) shows a single-slot 1-Gb adapter card filler plate. [Figure 9](#) shows a triple-slot adapter card filler plate. The 7705 SAR-18 single-slot 10-Gb adapter card filler plate looks similar to the single-slot 1-Gb adapter card filler plate, except that it is slightly higher and wider.

See [Installing a Filler Plate](#) for instructions on how to install a filler plate.

**Figure 8: 7705 SAR-8/7705 SAR-18 Single Adapter Card Filler Plate**



21386

**Figure 9: 7705 SAR-8/7705 SAR-18 Triple Adapter Card Plate**

21387

## Power System

The 7705 SAR-18 has two input feeds (A and B) that provide power redundancy for the system. Native  $-48/-60$  VDC power is supported. The power terminals for the feeds are installed directly on the backplane with access from the front. Two circuit breakers, which are also accessible from the front of the chassis, provide a means of disconnecting both A and B feeds.

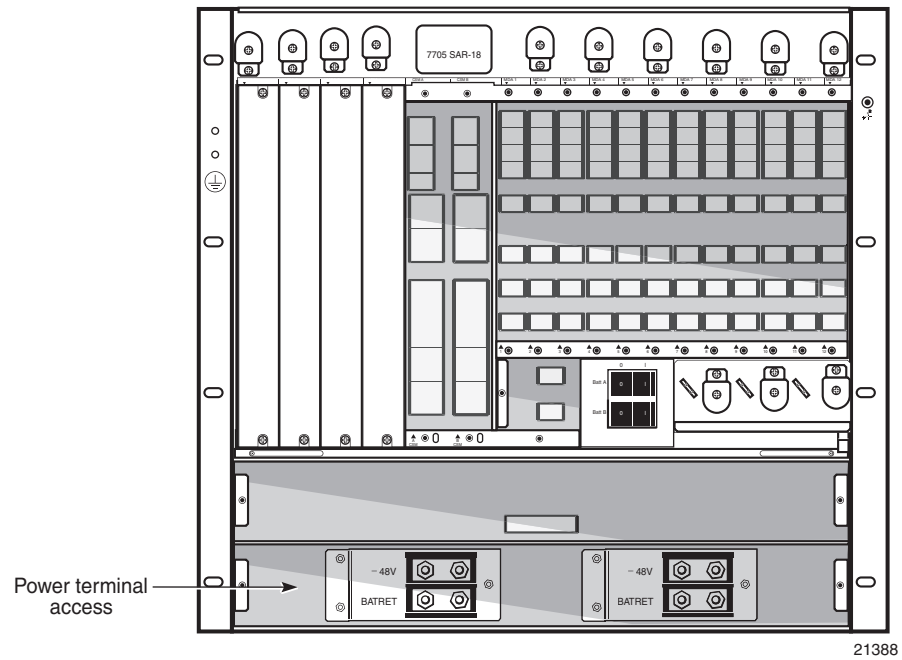
Two openings are provided on the left side of the chassis for routing the DC power cables from the power terminals on the shelf backplane to either the front or the back of the rack; see [Figure 10](#).

The 7705 SAR-18 uses a distributed power design, where each CSM and adapter card provides independent power for its own functionality; no power input modules are required. The power system has no field-replaceable parts.

The DC power LEDs are located on the Alarm module (labeled Batt A and Batt B; see [Figure 7](#)). See [Alarm Module LEDs](#) for a description of the LEDs.

See [DC Power Connections](#) for information on how to wire the DC power inputs.

**Figure 10: Power Terminal Access**



## Distribution Panels and Cables

The following distribution panels may be used to connect the 16-port T1/E1 ASAP Adapter card/32-port T1/E1 ASAP Adapter card to the customer equipment in cases where high-density connectors cannot be used:

- [T1/E1 ASAP Adapter Card BNC Distribution Panel](#)
- [T1/E1 ASAP Adapter Card 1.0/2.3 Mini-Coaxial Distribution Panel](#)
- [T1/E1 ASAP Adapter Card RJ-45 Distribution Panel](#)

### T1/E1 ASAP Adapter Card BNC Distribution Panel

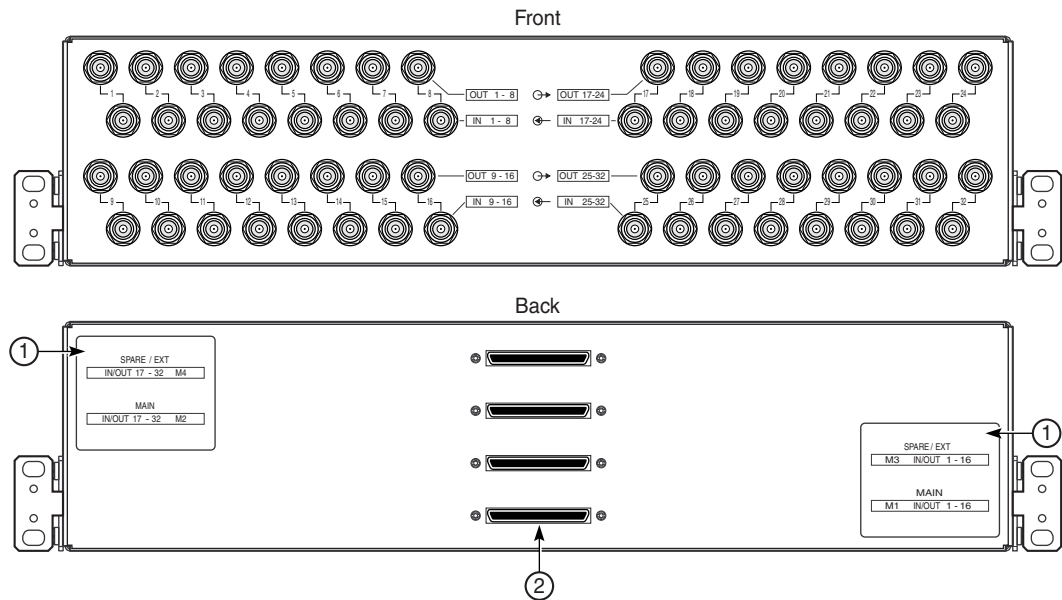
[Figure 11](#) shows the BNC distribution panel. [Table 5](#) lists the panel features.

The BNC distribution panel provides up to 32 ports of E1 access with 75  $\Omega$  impedance. On the customer (front) side of the panel, each access port has separate transmit and receive BNC female connectors. On the equipment (back) side, the panel has two sets of two 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP Adapter cards or one 32-port T1/E1 ASAP Adapter card. One set of 68-pin AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32. The panel ports 17 to 32 connect to either a second 16-port T1/E1 ASAP Adapter card or to ports 17 to 32 on the 32-port T1/E1 ASAP Adapter card. The cables described in [T1/E1 Cables](#) are used for the connections.



**Note:** A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to a 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card, always use the (bottom) connectors labeled MAIN. The SPARE (M3 and M4) connectors should not be used.

Figure 11: BNC Distribution Panel



19788

Table 5: 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

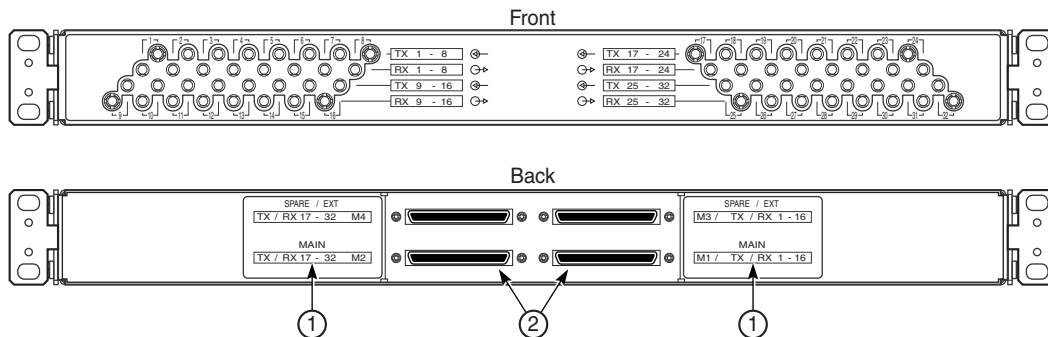
Figure 12 shows the 1.0/2.3 Mini-Coaxial distribution panel. Table 5 lists the panel features.

The 1.0/2.3 Mini-Coaxial distribution panel provides up to 32 ports of E1 access with 75  $\Omega$  impedance. On the customer (front) side of the panel, each access port has separate transmit and receive 1.0/2.3 mini-coaxial, female connectors. The connectors are labeled TX for the input and RX for the output. On the equipment (back) side, the panel has two sets of two 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP Adapter cards or one 32-port T1/E1 ASAP Adapter card. One set of 68-pin AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32. The panel ports 17 to 32 connect to either a second 16-port T1/E1 ASAP Adapter card or to ports 17 to 32 on the 32-port T1/E1 ASAP Adapter card. The cables described in T1/E1 Cables are used for the connections.



**Note:** A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to a 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card, always use the (bottom) connectors labeled MAIN. The SPARE (M3 and M4) connectors should not be used.

Figure 12: Mini-Coaxial Distribution Panel



19946

## T1/E1 ASAP Adapter Card RJ-45 Distribution Panel

Figure 13 shows the RJ-45 distribution panel. Table 5 lists the panel features.

The RJ-45 distribution panel provides up to 32 ports of T1 access with 100  $\Omega$  impedance or E1 access with 120  $\Omega$  impedance. On the customer (front) side of the panel, each port has an RJ-45 connector (see Table 44 in the [RJ-45 Distribution Panel Pinouts](#) section for pinout information).



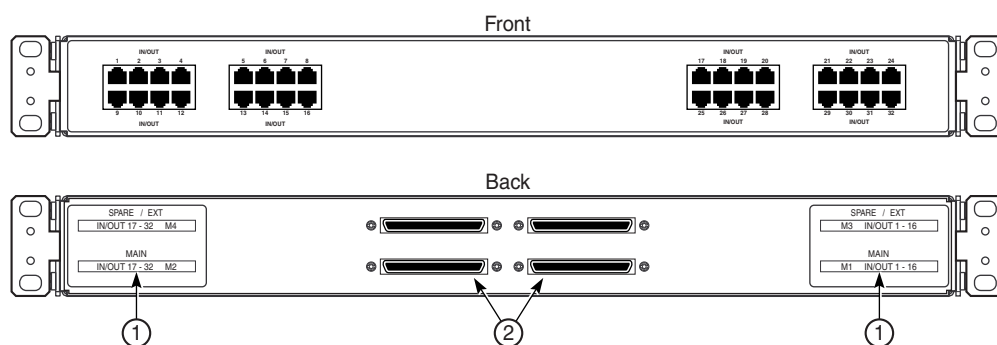
**Note:** In Table 44, RJ-45 pins 1 and 2 are receive input and RJ4-5 pins 4 and 5 are transmit output (the receive is defined as input and transmit is defined as output).

On the equipment (back) side, the panel has two sets of two 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP Adapter cards or one 32-port T1/E1 ASAP Adapter card. One set of 68-pin AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32. The panel ports 17 to 32 connect to either a second 16-port T1/E1 ASAP Adapter card or to ports 17 to 32 on the 32-port T1/E1 ASAP Adapter card. The RJ-45 panel has the input labeled IN and the output labeled OUT. The cables described in [T1/E1 Cables](#) are used for the connections.



**Note:** A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to a 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card, always use the (bottom) connectors labeled MAIN. The SPARE (M3 and M4) connectors should not be used.

Figure 13: RJ-45 Distribution Panel



21545

## T1/E1 Cables

[Table 6](#) describes the T1/E1 shielded cables that are used to make the connection between the 7705 SAR-18 equipment and the distribution panels.

**Table 6: T1/E1 Cables**

| Name Used in Installation Guide  | Name Used in Orderable Parts Catalog   |
|--|--|
| 68-pin AMP to 68-pin AMP T1/E1 cable <sup>(1)</sup>                          | T1/E1 Cable for Distribution Panel, 1m   |
| 68-pin AMP connector to open-ended T1/E1 cable <sup>(2)</sup> <sup>(3)</sup> | T1/E1 Cable 28 AWG Open-ended 30m<br>T1/E1 Cable 28 AWG Open-ended 15m<br>T1/E1 Cable 26 AWG Open-ended 30m<br>T1/E1 Cable 26 AWG Open-ended 15m |

**Notes:**

1. The T1/E1 cables with 68-pin AMP (SCSI-2) 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.
2. One end of the cable has a 68-pin AMP (SCSI-2) connector while the other end has open wires that can be connected to other telecom equipment.
3. The ground shield at the open end of the cable must be grounded to chassis ground in order to maintain EMC compliance.

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](#).

## 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). A 10 ft (3 m) coaxial 1.0/2.3 plug-to-female-BNC-jack shielded cable (3HE00106AA) is used to connect the port connectors to the attached equipment.

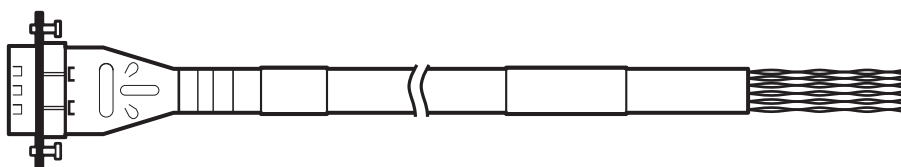
## Alarm Module External Alarm Cable

Customers can optionally order an alarm cable from Alcatel-Lucent (part number 3EM24105) that is used to connect the 15-pin D-sub External Alarm connector on the Alarm module to an alarm panel. This cable is an open-ended shielded cable that 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 14](#). See [External Alarms Connector Pinouts](#) for a description of the Alarm module External Alarm connector pinouts.



**Note:** The ground shield at the open end of the cable must be grounded to chassis ground in order to maintain EMC compliance.

**Figure 14: Alarm Module External Alarm Cable**



20933

## Auxiliary Alarm Card Cables

The following shielded cables can be used with the Auxiliary Alarm card:

- 15 m (49 ft) 68-pin AMP to open-ended wire cable (3HE03398AB)
- 30 m (98 ft) 68-pin AMP to open-ended wire cable (3HE03399AB)

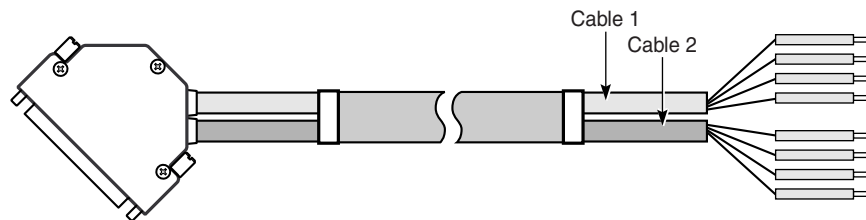
The open-ended cables are 26 AWG 68-pin AMP (SCSI-2) cables that connect to the Auxiliary Alarm card to provide an open-wire interface to which the customer can connect. See [Figure 15](#).

- 3 m (9.8 ft) SCSI-2 to 64-pin AMP cable (3HE02783AA). See [Figure 16](#).



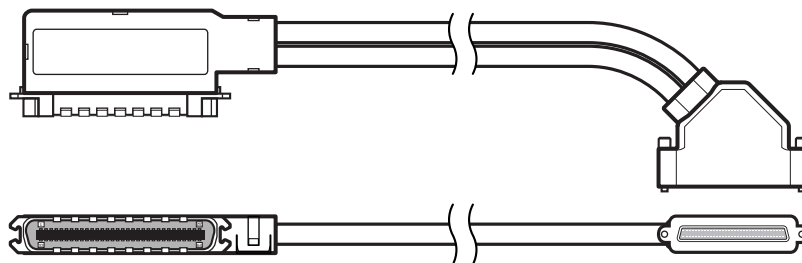
**Note:** The ground shield at the open end of the cable must be grounded to chassis ground in order to maintain EMC compliance.

**Figure 15: 68-pin AMP to Open-Ended Wire Cable**



21082

**Figure 16: SCSI-2 to 64-pin AMP Cable**



21017

## 7705 SAR-18 System Installation Process

Install a 7705 SAR-18 system 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.
-

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

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

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

The 7705 SAR-F chassis has a fixed hardware configuration. The 7705 SAR-F replaces the CSM, Fan module, and the 16-port T1/E1 ASAP Adapter card and 8-port Ethernet Adapter card with an all-in-one unit that provides comparable functional blocks, as detailed in [Table 7](#).

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



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

**Table 7: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison**

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

Table 7: 7705 SAR-8, 7705 SAR-18, and 7705 SAR-F Comparison (Continued)

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

# Site Preparation

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## In This Chapter

This chapter provides information about preparing your site to install a 7705 SAR-18:

- [Warnings and Notes on page 76](#)
- [System Specifications on page 78](#)
  - [Chassis Specifications on page 78](#)
  - [Environmental Specifications on page 79](#)
  - [CSM Specifications on page 80](#)
  - [Alarm Module Specifications on page 80](#)
  - [Fan Module Specifications on page 80](#)
  - [Adapter Card Specifications on page 81](#)
  - [Distribution Panel Specifications on page 81](#)
  - [Power Consumption on page 82](#)
  - [Operating Requirements on page 83](#)
- [Installation Locations on page 84](#)
  - [Chassis Location Requirements on page 84](#)
- [Safety Considerations on page 86](#)
  - [Placement on page 86](#)
  - [Grounding on page 86](#)
  - [Power on page 87](#)
  - [Cabling on page 88](#)
  - [Fan Module on page 88](#)
  - [Storage on page 89](#)
- [Compliance on page 90](#)

## Warnings and Notes



### Dangers:

- Installation and servicing must be done only by trained service personnel familiar with potential electrical, mechanical, and laser radiation hazards.
- Before installation and servicing, be sure to first disconnect power to the equipment rack and external cables from the DC branch circuit and then turn the circuit breakers OFF before disconnecting the contacts for both A and B feeds.
- Be aware of all operating equipment in the area of the 7705 SAR-18 installation. Make safe any exposed power equipment, such as breaker panel bus bars, or power connectors on any nearby equipment. Either shut off the power, if possible, or install safety guards or mats over exposed power points and cables. Tools used for power connections should be insulated in an appropriate manner for the task.
- The 7705 SAR-18 uses a fiber-optic communications method and is a Class 1 laser product. Only trained service personnel familiar with laser radiation hazards should install or remove fiber-optic cables and cards in this system.



### Warnings:

- Do not transport and relocate a 7705 SAR-18 chassis that has any cards or modules installed. To properly transport and relocate a 7705 SAR-18 chassis, do the following:
  - label cards and modules to facilitate reassembly (optional)
  - remove all CSMs, adapter cards, and the Alarm and Fan modules from the chassis
  - disconnect any connected power cables from the chassis
  - repackage the cards and modules in their original shipping containers for relocation
- Do not install equipment that appears to be damaged.
- The 7705 SAR-18 should be installed in a restricted access area, such as a dedicated equipment room or an equipment closet, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code ANSI/ NFPA 70.
- The 7705 SAR-18 complies with, and has been CE marked in accordance with, the European Directive 99/05/EC (R&TTE) and 2004/108/EC (EMC).
- Failure to comply with the equipment rack and chassis instructions as outlined in [Installation Locations](#) and [Chassis Location Requirements](#) may cause thermal failure and corrosion due to such factors as corrosive dust and water ingress.



**Caution:** When a T1/E1 ASAP Adapter card port that is configured for T1 is connected to external equipment or is in physical loopback, ensure that the external equipment's transmit signal is attenuated according to the distance to the T1/E1 ASAP Adapter card receiver. Adjust LBO settings appropriately so that the T1/E1 ASAP Adapter card receiver's nominal input voltage level is < 3Vp. Refer to "Configuring DS1 Line Buildout" in the 7705 SAR OS Interface Configuration Guide for detailed information on attenuating transmit signals.

**Notes:**

- Prepare the equipment rack and site before installing the chassis. Plan the chassis placement near the power sources and network interface connections.
  - An empty 7705 SAR-18 chassis weighs approximately 35 lbs (15.9 kg).
  - A fully loaded 7705 SAR-18 chassis with the heaviest components/cards weighs approximately 66 lbs (30 kg).
  - Always install the heaviest equipment on the bottom of the rack to keep the center of gravity of the equipment rack as low as possible.
  - To provide necessary stability, ensure that the equipment rack is bolted to the floor. Ceiling brackets are useful to provide additional stability.
  - The equipment rack must be properly grounded.
  - Install components after the chassis is installed in the rack.
  - Maintain a clearance of at least 2.5 in. (6.4 cm) at the front of the chassis for cable management and air intake.
  - Maintain a clearance of at least 2.5 in. (6.4 cm) at the rear of the chassis for exhaust.
  - When mounting the chassis in a rack, ensure that the rack complies with all requirements outlined in [Chassis Location Requirements](#).
  - The 7705 SAR-18 chassis includes factory-installed rack-mounting brackets to mount in a 19-inch equipment rack.
-

## System Specifications

### Chassis Specifications

**Table 8: 7705 SAR-18 Chassis Specifications**

| Parameter   | Description   |
|---|---|
| Dimensions (H x W x D, without mounting brackets)   | 17.5 in. (44.5 cm) (10 RU) x 19 in. (48.25 cm) x 10 in. (25.4 cm)   |
| Chassis weight (empty)  | 35 lbs (15.9 kg)  |
| Chassis weight (with two CSMs, an Alarm module, a Fan module, and heaviest 12 1-Gb adapter cards; see <a href="#">Adapter Card Specifications</a> for the weight of individual adapter cards) | 66 lbs (30 kg)  |
| Adapter card slots  | 12 (supporting 1 Gb adapter cards in Release 4.0)   |
| Alarm module slots  | 1   |
| Fan module slots  | 1   |
| CSM slots   | 2   |
| Mounting  | Mounts in a recommended 19-inch equipment rack; rack-mount brackets are factory-installed for NEBS mounting |

## Environmental Specifications

**Table 9: Environmental Specifications**

| Parameter                                       | Description   |
|---|---|
| Shipping and storage temperature                | -40° to 158°F (-40° to 70°C )   |
| Normal operating temperature                    | 23° to 113°F (-5° to 45°C)  |
| Short-term operating temperature <sup>(1)</sup> | 23° to 131°F (-5° to 55°C)  |
| Cold-start temperature                          | 23°F (-5°C)   |
| Normal relative humidity                        | 5 to 85% (non-condensing)   |
| Short-term relative humidity <sup>(1)</sup>     | 5 to 95%, not to exceed 0.024 lb of water per 1.0 lb of air (35 g of water per 1.0 cubic meter of air)  |
| Altitude range                                  | Between 197 ft (60 m) below sea level and 5906 ft (1800 m) above sea level (70kPa to 106kPa)  |
| Shock and vibration                             | Very low levels for continuous duration disturbance (similar to modern office building, for example)<br>Shock: 3 g half sine 11 ms<br>Vibration: 0.1 g from 5 to 100 Hz |
| Earthquake                                      | Suitable for high-risk areas (Zone 4/California, for short-duration disturbance)  |
| Pollution degree <sup>(2)</sup>                 | 2   |
| Rated voltage (DC)                              | -48/-60 VDC (-60 VDC is for various European countries)   |
| Operating voltage range (DC)                    | -40 to -75 VDC  |
| Acoustic noise level                            | < 72 dB (Declared Sound Power)  |

**Notes:**

1. Short-term is a period of less than 96 consecutive h and a total of no more than 15 days per year. This is equivalent to 360 h per year, with short-term periods occurring no more than 15 times per year.
2. Pollution degree is as defined in IEC 60950. Pollution Degree 2 applies where there is only non-conductive pollution that might temporarily become conductive due to occasional condensation.

## CSM Specifications

Table 10: CSM Specifications

| Parameter              | Description   |
|------------------------|---|
| Dimensions (H x W x D) | 10.2 in. (25.9 cm) x 1.3 in. (3.3 cm) x 9.5 in. (24.1 cm) |
| Weight                 | 2.2 lbs (1 kg)  |

## Alarm Module Specifications

Table 11: Alarm Module Specifications

| Parameter              | Description   |
|------------------------|---|
| Dimensions (H x W x D) | 2.6 in. (6.6 cm) x 2.2 in. (5.6 cm) x 9.5 in. (24.1 cm) |
| Weight                 | 0.45 lbs (0.20 kg)                                      |

## Fan Module Specifications

Table 12: Fan Module Specifications

| Parameter              | Description   |
|------------------------|---|
| Dimensions (H x W x D) | 2.1 in. (5.3 cm) x 17.1 in. (43.4 cm) x 9.5 in. (24.1 cm) |
| Weight                 | 7.83 lbs (3.55 kg)  |

## Adapter Card Specifications

**Table 13: Adapter Card Specifications**

| Parameter              | Description   |
|------------------------|---|
| Dimensions (H x W x D) | 6.7 in. (17.0 cm) x 0.9 in. (2.29 cm) x 8.7 in. (22.0 cm)       |
| Weight                 | 0.88 lbs (0.40 kg) (16-port T1/E1 ASAP Adapter card v1 and v2)  |
|                        | 0.95 lbs (0.43 kg) (32-port T1/E1 ASAP Adapter card v2)         |
|                        | 0.77 lbs (0.35 kg) (8-port Ethernet Adapter card v2)            |
|                        | 0.91 lbs (0.41 kg) (4-port OC3/STM1 Clear Channel Adapter card) |
|                        | 0.88 lbs (0.4 kg) (2-port OC3/STM1 Channelized Adapter card)    |
|                        | 0.94 lbs (0.43 kg) (4-port DS3/E3 Adapter card)                 |
|                        | 0.76 lbs (0.34 kg) (Auxiliary Alarm card)                       |

## Distribution Panel Specifications

**Table 14: Distribution Panel Specifications**

| Distribution Panel | Dimensions (H x W x D) <sup>(1)</sup>                        | Weight <sup>(2)</sup> |
|--------------------|--|-----------------------|
| T1/E1 BNC          | 4.44 in. (11.3 cm) x 17.24 in. (43.8 cm) x 1.42 in. (3.6 cm) | 5.5 lbs (2.5 kg)      |
| T1/E1 mini-coaxial | 1.75 in. (4.44 cm) x 17.24 in. (43.8 cm) x 1.42 in. (3.6 cm) | 1.9 lbs (0.86 kg)     |
| T1/E1 RJ-45        | 2.52 in. (6.4 cm) x 17.24 in. (43.8 cm) x 1.18 in. (3.0 cm)  | 2.5 lbs (1.13 kg)     |

**Notes:**

1. Dimensions do not include mounting brackets
2. Weight does not include packaging or mounting brackets

## Power Consumption

**Table 15: Power Consumption**

| Description                                   | Typical Power (W) | Maximum Power (W) |
|---|-------------------|-------------------|
| Chassis <sup>(1)</sup> (no modules, no cards) | 0 W               | 0 W               |
| Alarm module                                  | 1.6 W             | 2 W               |
| Fan module                                    | 68 W              | 242 W             |
| CSM <sup>(2)</sup>                            | 75 W              | 120 W             |
| Adapter cards                                 |                   |                   |
| 16-port T1/E1 ASAP Adapter card v1            | 14 W              | 17 W              |
| 16-port T1/E1 ASAP Adapter card v2            | 21 W              | 26 W              |
| 32-port T1/E1 ASAP Adapter card v2            | 24 W              | 30 W              |
| 8-port Ethernet Adapter card v2               | 16.8 W            | 20 W              |
| 4-port OC3/STM1 Clear Channel Adapter card    | 25.9 W            | 30 W              |
| 2-port OC3/STM1 Channelized Adapter card      | 22.1 W            | 25 W              |
| 4-port DS3/E3 Adapter Card                    | 22.1 W            | 25 W              |
| Auxiliary Alarm card                          | 2.7 W             | 3.9 W             |

**Notes:**

1. The chassis itself consumes no power because it has no power dissipating components once the modules and cards are removed.
2. The power numbers for the CSM are preliminary numbers that are subject to change.

## Operating Requirements

Table 16: 7705 SAR-18 Hardware for DC Operational Requirements

| Description   | Minimum | Maximum | Field-Replaceable |
|---------------|---------|---------|-------------------|
| CSM           | 1       | 2       | Y                 |
| Alarm module  | 1       | 1       | Y                 |
| Fan module    | 1       | 1       | Y                 |
| Adapter cards | 1       | 12      | Y                 |

## Installation Locations

The 7705 SAR-18 is intended to be installed in facilities that provide weather protection and an extended temperature-controlled environment. The 7705 SAR-18 is not intended for installation outdoors.

The 7705 SAR family of products is designed to work in an environment equivalent to a modern office building, where protection is provided from contaminants including mold growth, precipitation, volatile or corrosive chemicals, hygroscopic dust, insects, pests, or vermin entering the product.



**Warning:** Follow the equipment rack manufacturer's instructions for proper rack installation. Failure to comply with the requirements and the location requirements outlined in this section and in [Chassis Location Requirements](#) may impede proper airflow and may result in the system overheating.

The air on the 7705 SAR-18 is drawn in from the bottom front of the chassis and is exhausted from the top rear of the chassis, in compliance with the Class (S) F1-R3 airflow protocol as defined by Telcordia GR-3028-CORE. The ambient air temperature must be within the specifications defined in [Environmental Specifications](#). For proper thermal performance, the following conditions must be met.

- For seismic applications, the rack must be a Telect Global Seismic Frame (GS series).
- The rail mounting holes in the equipment rack must align with the mounting holes on the chassis mounting brackets. The 7705 SAR-18 mounting brackets are factory-installed for a NEBS mount in a 19-inch rack.

Required tools and hardware:

- #2 Phillips screwdriver
- flathead screwdriver
- anti-static bags, mats, and packaging
- ESD wrist strap

## Chassis Location Requirements

Allow at least 2.5 in. (6.4 cm) in front for cable management. See [Figure 17](#).

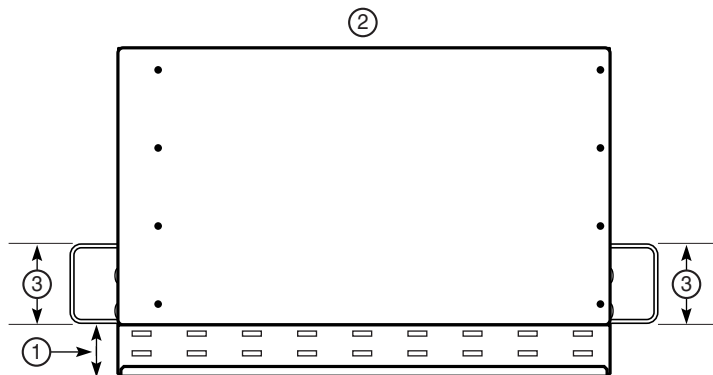


**Warning:** Failure to comply with the location requirements outlined in this section and in [Installation Locations](#) may impede proper airflow and may result in equipment failure due to overheating.

Observe the following requirements when installing the system.

- Ensure that the chassis is located in an area that can provide an average inlet air temperature (bulk air temperature averaged over 1 year) no greater than 113°F (45°C) under full system power loading combined with worst-case environmental deployment conditions per GR-63.
- Ensure that the 7705 SAR-18 system intake is not located immediately adjacent to the exhaust of another chassis such that preheated air above 113°F (45°C) is drawn into the system.
- Ensure that the 7705 SAR-18 system intake is not located immediately adjacent to the intake of another chassis such that 7705 SAR-18 airflow is restricted in any way.
- Ensure that the inlet and exhaust of the chassis is free of obstructions from cabling, mounting hardware, or other electronic equipment in the areas shown in [Figure 17](#). [Table 17](#) lists the chassis clearance specifications.

**Figure 17: 7705 SAR-18 Chassis Clearance**



21389

**Table 17: Chassis Clearance Specifications**

| Key | Description   |
|-----|---|
| 1   | <b>Front:</b> 2.5 in. (6.4 cm) required for cable management and air intake |
| 2   | <b>Rear:</b> 2.5 in. (6.4 cm) required for exhaust                          |
| 3   | <b>Rack upright:</b> 5 in. (12.7 cm) maximum required for airflow           |

## Safety Considerations

### Placement



**Warnings:**

- Install this product according to the guidelines described in [Installation Locations](#).
- Install the 7705 SAR-18 chassis in recommended equipment racks.
- Verify that the equipment rack is properly bolted and braced.
- Install the chassis in the equipment rack before installing components.

### Grounding



**Warnings:**

- The 7705 SAR-18 chassis and equipment rack must be properly grounded. Chassis ground cables are not included. Lack of proper grounding (earthing) of the equipment may result in a safety hazard and excessive electromagnetic emissions.
- The 7705 SAR-18 has two ground studs, which are suitable for a double-lug ground connector, on the mounting bracket attached to the left-hand side of the chassis (when viewed from the front). The chassis ground must be connected to the building ground, using either a direct connection or a ground bus.
- ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-18 (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Before making the chassis ground connection, ensure that all power is OFF from the DC circuit. To switch the power OFF, locate the circuit breaker on the panel board that services the DC circuit and switch the circuit breaker to the OFF position.  
Tip: For extra safety, you can tape the handle of the circuit breaker in the OFF position.
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.

## CBN and IBN Support

The 7705 SAR-18 supports both Common Bonding Networks (CBN) and Isolated Bonding Networks (IBN). The battery terminals, labeled Batt A (+ and -) and Batt B (+ and -) on the chassis, are floating inputs relative to digital or chassis ground within the chassis.



### Warnings:

- In an IBN installation, the chassis ground terminal must be connected to ground at the building ground point in the IBN zone.
- In a CBN installation, if you use the 7705 SAR-18 chassis ground studs to connect the chassis ground terminal(s) to the frame ground on the rack, then you must use a second nut on the studs to secure the attachment. The first nut is used to secure the building ground point wire to the chassis ground stud.

For information on grounding the chassis and connecting the DC supply, refer to [Chassis Ground Wiring](#) and [Wiring and Connecting DC Power](#).

## Power



### Dangers:

- Only electrical service personnel should perform wiring and cabling to the system.
- If the 7705 SAR-18 is the only piece of equipment that is being installed in the rack, all power to the equipment rack should be disconnected before the installation.
- Power cable(s) must meet your local electrical code requirements.
- When removing the DC power from the system, first disconnect the power from the source and then disconnect the power from the terminal block on the 7705 SAR-18.

## DC Power Requirements

The recommended minimum ground cable size on the 7705 SAR-18 is 6 AWG.

## Cabling



### Warnings:

- To meet surge protection requirements, the shield on any open-ended cable must be grounded by attaching the shield to a convenient chassis ground point, using hardware suitable to provide a solid electrical and mechanical connection. In addition, ensure that there is sufficient strain relief to remove any mechanical strain on the ground connection due to cable movement.
- 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 metalically 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 metalically to OSP wiring. Connection to external OSP wiring must be made through an external Channel Service Unit (CSU) prior to exiting the building.
- Bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before they are connected.
- The 7705 SAR-18 is suitable for both DC-I and DC-C power configurations. However, when used in a DC-I configuration, the battery returns must remain isolated until they reach the main power bus.

## Fan Module

The 7705 SAR-18 supports a field-replaceable Fan module housing eight fans. The Fan module is replaceable as a single unit; individual fans are not replaceable.



**Danger:** When removing the Fan module for servicing or any other reason, wait until all fans have stopped rotating before continuing work.



**Warning:** Failure to comply with the location requirements outlined in [Installation Locations](#) and in this section may impede proper airflow and may result in equipment failure due to overheating.

## Storage

Table 18 shows the storage specifications. To store an uninstalled 7705 SAR-18 or extra field-replaceable parts, repackage the components in the original packaging or an appropriately sized container and keep them in a dry, dust-free, weather-protected environment.

**Table 18: Storage Specifications**

| Parameter                        | Description                       |
|----------------------------------|-----------------------------------|
| Storage and shipping temperature | From -40° to 158°F (-40° to 70°C) |
| Non-condensing relative humidity | Within 5 to 85%                   |

## Compliance

See [Standards and Protocol Support](#) for compliance information.

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# Installing the Chassis

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## In This Chapter

This chapter provides information on installing a 7705 SAR-18 chassis:

- [Unpacking the Chassis on page 92](#)
  - [Unpacking Precautions on page 92](#)
  - [Installation Warnings on page 92](#)
  - [Unpacking Instructions on page 93](#)
- [Installing the Chassis in a Rack on page 95](#)
- [Chassis Ground Wiring on page 98](#)
  - [Making the Ground Connection on page 99](#)

## Unpacking the Chassis

### Unpacking Precautions

Observe the following cautions to avoid injury and to prevent damage to the 7705 SAR-18.



#### Cautions:

- The shipping weight of the chassis is approximately 35 lbs (15.9 kg) without any components installed.
- The chassis is shipped in a heavy corrugated cardboard container protected by foam end caps. Do not discard the packaging container and materials used in shipping. The packing materials should be reused if it is necessary to reship the chassis.
- Keep the chassis wrapped in the anti-static packaging until you are ready to install the chassis.

### Installation Warnings

Observe the following warnings when installing the 7705 SAR-18 chassis.



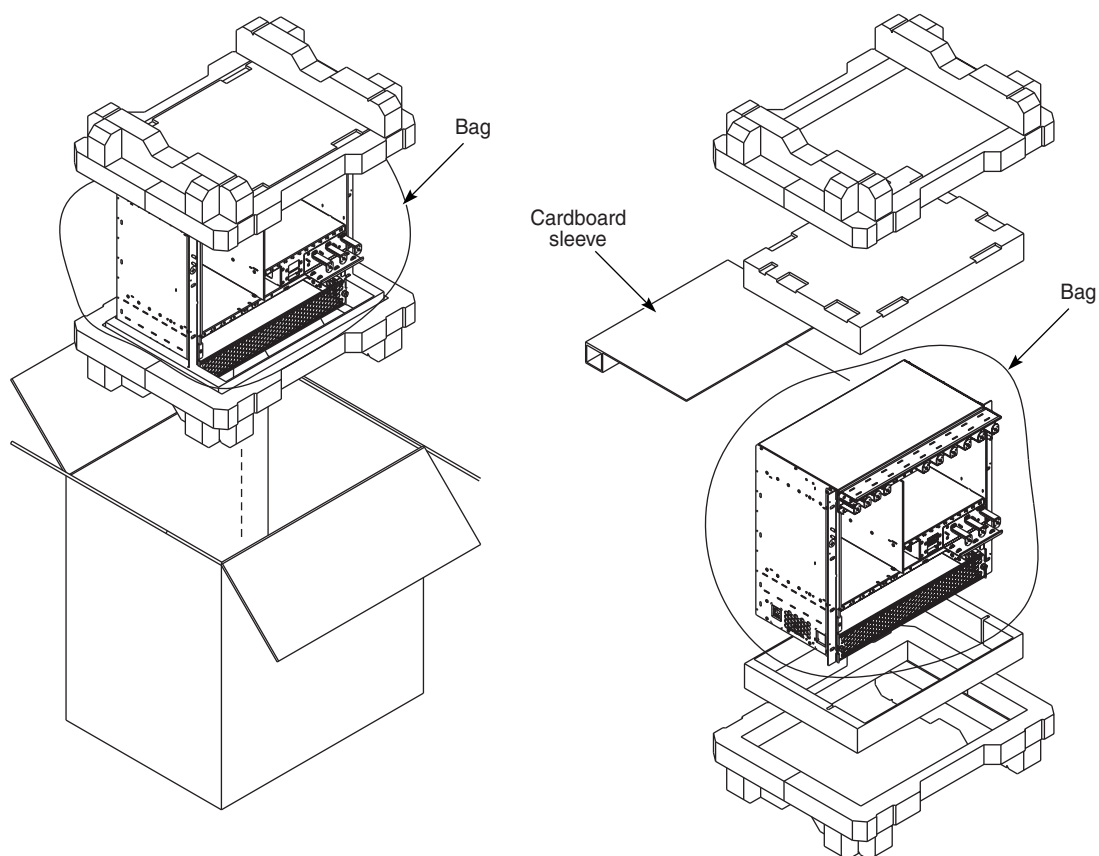
#### Warnings:

- 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 (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-18 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.
- 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 metalically 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 metalically to OSP wiring.

## Unpacking Instructions

Figure 18 shows unpacking a 7705 SAR-18 chassis.

**Figure 18: Unpacking the 7705 SAR-18 Chassis**



21459

To unpack the chassis, open the carton and follow these steps:



**Dangers:**

- Do not put your hands inside a card slot to lift the unit.
- The shipping weight of the chassis is approximately 35 lbs (15.9 kg); it is recommended that two people unpack the chassis in order to avoid possible injury.



**Warning:** Make sure that you remove the cardboard sleeve from the top of the chassis prior to installation. Failure to do so may result in over-heating and damage to the system.

**Step 1.** Place the carton in the upright position and open the top flaps.

**Step 2.** Remove the top foam/cardboard cap.

**Step 3.** Carefully tilt the chassis in one direction inside the carton to free the chassis base from the bottom-end cap.

**Step 4.** Carefully lift the chassis, from the bottom, out of the carton and place it on a flat surface.

**Step 5.** Remove the polyethylene anti-static bag and the cardboard sleeve when you are ready to install the chassis.

---

## Installing the Chassis in a Rack



**Danger:** Only trained and qualified personnel should install or replace this equipment.



**Warnings:**

- Failure to comply with the location requirements outlined in [Installation Locations](#) and [Chassis Location Requirements](#) may impede proper airflow and may result in equipment failure due to overheating.
- Non-conductive coatings (such as lacquer and enamel) must be removed from threads and other contact surfaces to ensure electrical conductivity. Thread-forming screws with paint piercing washers may be used for this purpose during installation.



**Cautions:**

- 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 on the 7705 SAR-18 (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Lift the chassis by the bottom. Do not put your hands inside a card slot to lift the unit.
- When rack-mounting the chassis in an equipment rack, do not stack one 7705 SAR-18 chassis or any other equipment directly on top of another 7705 SAR-18 chassis, such that the bottom chassis is supporting other devices. Each unit must be secured in the rack with the appropriate mounting apparatus.

Required tools:

- a torque driver for Phillips screws

Before you begin:

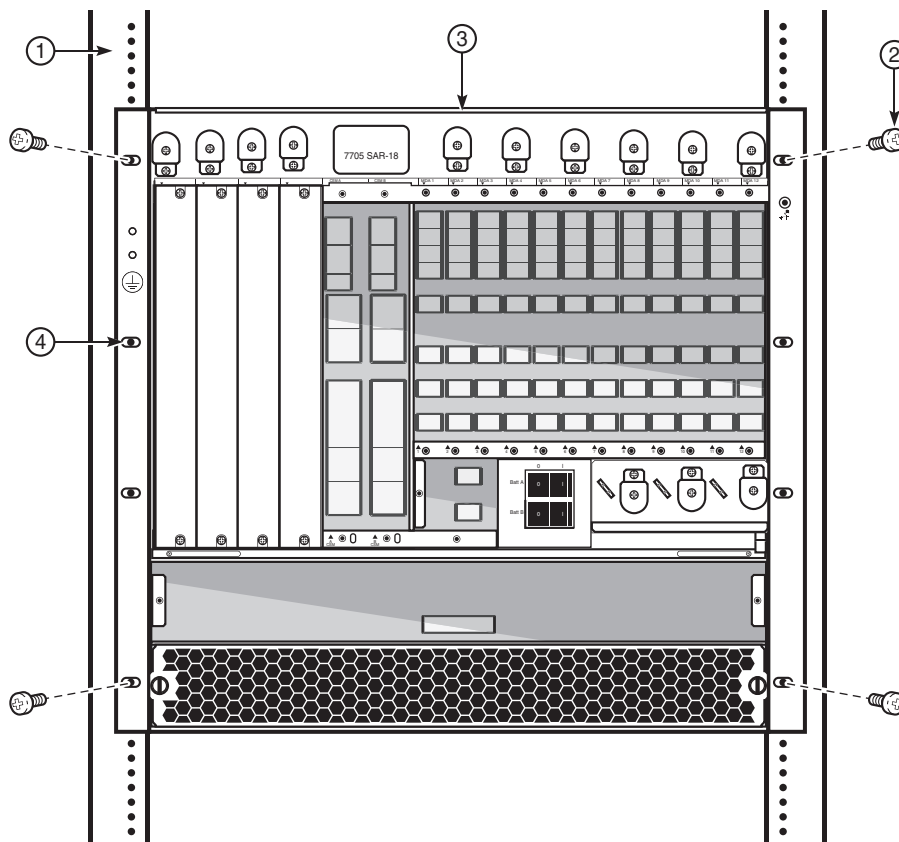
- verify that the equipment rack is securely installed, anchored, and grounded. Refer to the rack manufacturer's documentation for instructions.
- verify that nearby equipment, including breaker panel bus bars and power connectors, is made safe. Either shut off the power, if possible, or install safety guards or mats over exposed power points and cables.
- ensure that the bottom of the chassis is not deformed or bent

You are now ready to install the chassis in the rack. The 7705 SAR-18 chassis is designed for installation in a 19-inch rack. The rack-mount brackets are factory-installed. [Figure 19](#) illustrates the installation of the chassis in a rack; [Table 19](#) describes the parts.



**Warning:** In order to avoid personal injury, it is recommended that two people install the 7705 SAR-18 chassis in the rack, one person to hold the chassis and one person to secure it to the rack.

**Figure 19: Installing the 7705 SAR-18 Chassis in a Rack**



21390

**Table 19: Rack-Mounting Parts**

| Key | Description           |
|-----|-----------------------|
| 1   | Equipment rack        |
| 2   | Rack-mounting screws  |
| 3   | 7705 SAR-18 chassis   |
| 4   | Rack-mounting bracket |

To install the chassis in the rack:

**Step 1.** Lift the chassis from the bottom and position it in the rack. If two people are installing the chassis, position one person in front of the rack and one behind it.

**Step 2.** Align the mounting holes on each bracket with the mounting holes on the rack rail.  
Insert a screw into each mounting hole and tighten.

**Step 3.** Ground the chassis to the building ground. See [Chassis Ground Wiring](#).

---

## Chassis Ground Wiring

To make sure that the equipment is connected to earth ground, use the following instructions to prepare the ground wire and make the connection. Ground wire is not provided. The length of the ground wire depends on the location of the chassis and proximity to the proper grounding facilities.



**Caution:** The 7705 SAR-18 chassis ground studs located on the left-hand side mounting bracket must be a permanent connection to the earth (building) ground point. Therefore, the connection requires its own washers and nuts.



**Notes:**

- When wiring the unit, the chassis ground connection must always be made first and disconnected last.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before connecting them.
- All surfaces that are used for intentionally grounding the chassis must be brought to a bright finish, and an antioxidant solution must be applied to the surfaces being joined.

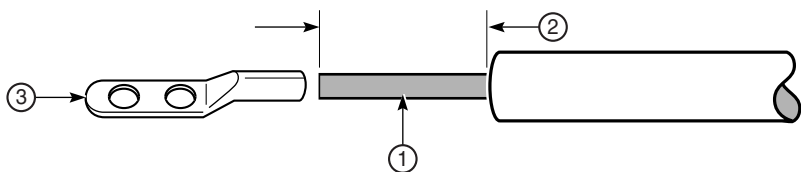
## Making the Ground Connection

Required tools and hardware:

- wire stripper
- wire cutter
- crimping tool, as recommended by the lug manufacturer
- torque driver for hex nut
- two-hole ring lug, Panduit LCD6-14B-L (1AB051530013) or equivalent
- copper ground wire with green or green/yellow colored insulation jacket (minimum #6 AWG)

Figure 20 shows preparing the ground wire for installation. Table 20 describes the ground wiring features. Figure 21 shows attaching the ground wire connection. Table 21 describes the ground wire connection features.

Figure 20: Preparing the Ground Wire

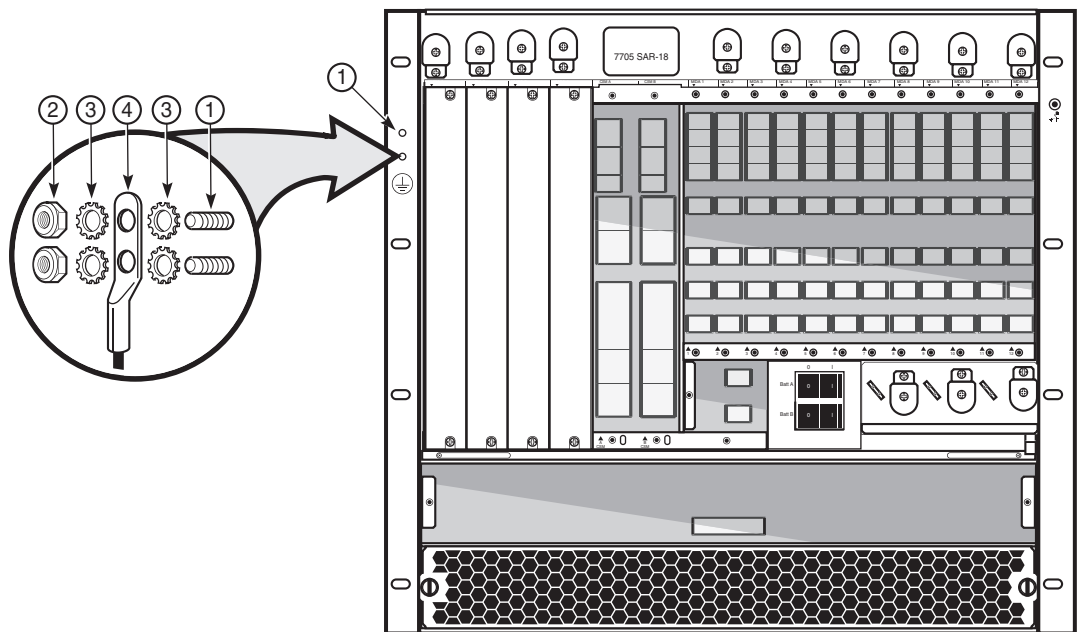


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Table 20: Ground Wiring Features

| Key | Description   |
|-----|---|
| 1   | Copper ground wire with green or green/yellow colored insulation jacket (minimum 6 AWG) |
| 2   | Insulation stripped according to local safety code                                      |
| 3   | Two-hole ring lug   |

Figure 21: Attaching the Chassis Ground Connector



21392

Table 21: Ground Wire Connection Features

| Key | Description          |
|-----|----------------------|
| 1   | Chassis ground studs |
| 2   | Ground stud nuts     |
| 3   | Ground stud washers  |
| 4   | Two-hole ring lug    |

To make the chassis ground connection:

- Step 1.** Run a single length of minimum #6 AWG wire from the ground point (building ground or equipment ground bus) to the chassis ground studs. When routing the cable, ensure that there is enough extra wire to form a service loop at the chassis end in order to facilitate maintenance.
- Step 2.** Using a wire-stripping tool, strip the insulation from the wire according to local safety codes and crimp the ring lug to the wire.

- Step 3.** Remove the nuts and star washers from the ground studs on the mounting bracket.
- Step 4.** Place a star washer (optional) and the two-hole ring lug on the ground studs such that the wire runs down the rack upright. Secure the lug with the second star washer (optional) and nuts. Tighten the nuts to a torque of 8 to 10 lbf-in (0.9 to 1.13 N·m) maximum. Do not over-tighten.
- Step 5.** Use a cable tie to secure the ground wire to the lance on the mounting bracket.
- Step 6.** Form a service loop with the extra wire and secure it to a convenient place (for example, a rack upright).



**Warning:** For radio site equipment, avoid using loops or 90° bends on ground connections, as these will impede the path to ground during lightning strikes or other power impulse events.

- Step 7.** Connect the opposite end of the ground wire to the appropriate ground point at the installation site. Ensure that the chassis ground connection is made according to local safety codes.
  - Step 8.** Connect the chassis to the DC power source. See [DC Power Connections](#).
-



# DC Power Connections

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## In This Chapter

This chapter provides information about wiring and connecting the DC power source to the 7705 SAR-18 chassis:

- [Wiring and Connecting DC Power on page 104](#)
  - [Warnings and Notes on page 104](#)
  - [DC-Input Power Connections on page 105](#)
    - [Removing the Protective Overlays from the DC Power Cables Side-Wall Access Locations on page 109](#)
    - [Wiring the DC Inputs on page 110](#)

## Wiring and Connecting DC Power

### Warnings and Notes



#### Dangers:

- Only qualified personnel should install or replace this equipment.
- Ensure that all power is OFF from the DC circuit. Locate the circuit breakers that service the DC circuit and switch the circuit breakers to the OFF position. For extra safety, you can tape the handle of the circuit breakers to the OFF position.
- Hazardous electrical voltages and currents can cause serious physical harm or death. Always use insulated tools and follow proper safety precautions when connecting or disconnecting power circuits.
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.
- Before working on equipment that is connected to power, remove jewelry, such as rings, necklaces, and watches. When metal objects are in contact with power and ground, serious burns can occur or the objects can be welded to the terminals.
- You must use cables that meet local electrical code requirements.



#### Warnings:

- Do not install equipment that appears to be damaged.
- Equipment damage will occur if any units or the alarm cable are installed in the shelf while connecting the DC power cables.
- The 7705 SAR-18 chassis and equipment rack must be properly grounded. ESD damage can occur if components are mishandled. A typical grounding point is one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench.
- For IBN installations, the battery return terminal(s) on the 7705 SAR-18 must always be connected to the building ground at the power source. For redundant supply configurations, separate battery return wires must be used.
- For CBN installations, the battery return terminal should be connected to chassis ground at the chassis or frame.

**Notes:**

- The 7705 SAR-18 requires a minimum of one DC power source to operate, but using two DC power sources is recommended for redundancy.
- The 7705 SAR-18 is suitable for both DC-I and DC-C power configurations.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before connecting them.
- The recommended minimum power cable size is 6 AWG wire (per feed).
- The recommended power terminal is a 2-hole lug, Panduit LCD6-14B-L (1AB051530013) or equivalent.

## DC-Input Power Connections

The 7705 SAR-18 uses a standard terminal block that provides dual power feeds for a redundant power configuration. These connectors are the DC power feed points for the source voltage from the DC circuit. The power terminals, labeled -48V and BATRET, are installed directly on the backplane with access from the front. See [Figure 22](#). Two circuit breakers, labeled Batt A and Batt B, which are also accessible from the front of the chassis (see [Figure 23](#)), provide a means of disconnecting both A and B feeds.

Power cable routing is done through the two locations on the left side of the chassis. See [Figure 24](#). These openings are covered with protective overlays that must be removed before the power cables can be run through the openings. See [Removing the Protective Overlays from the DC Power Cables Side-Wall Access Locations](#).

**Figure 22: DC Power Terminal Connectors**

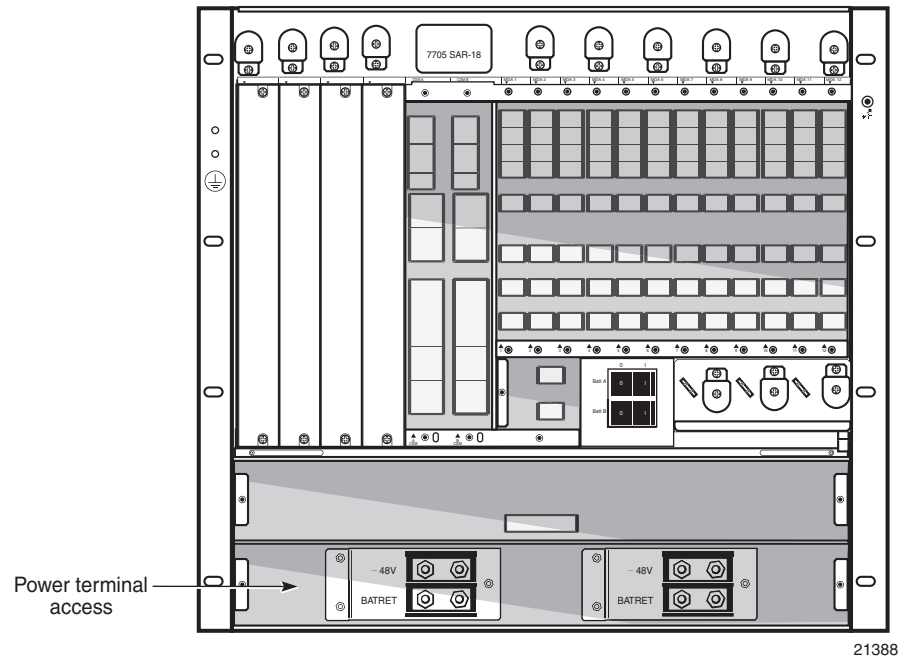
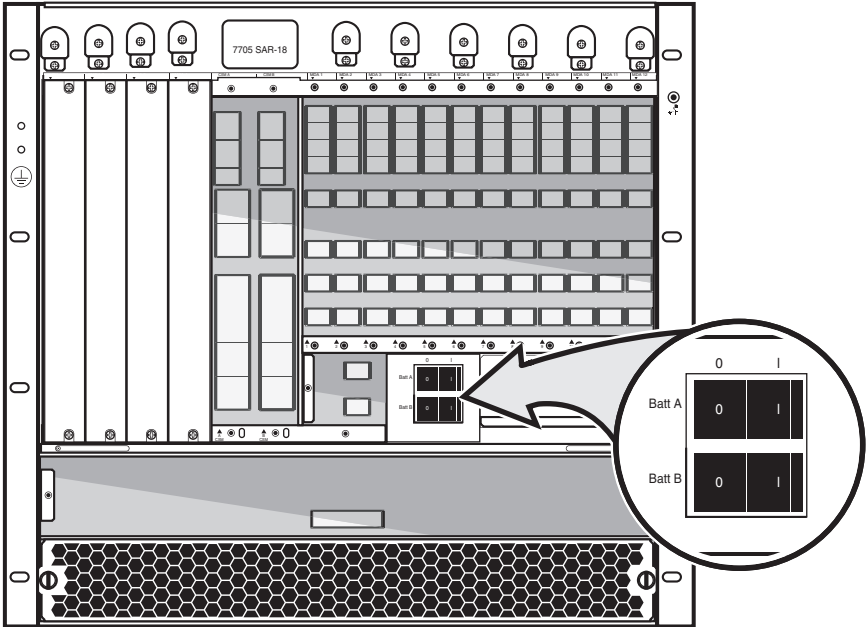
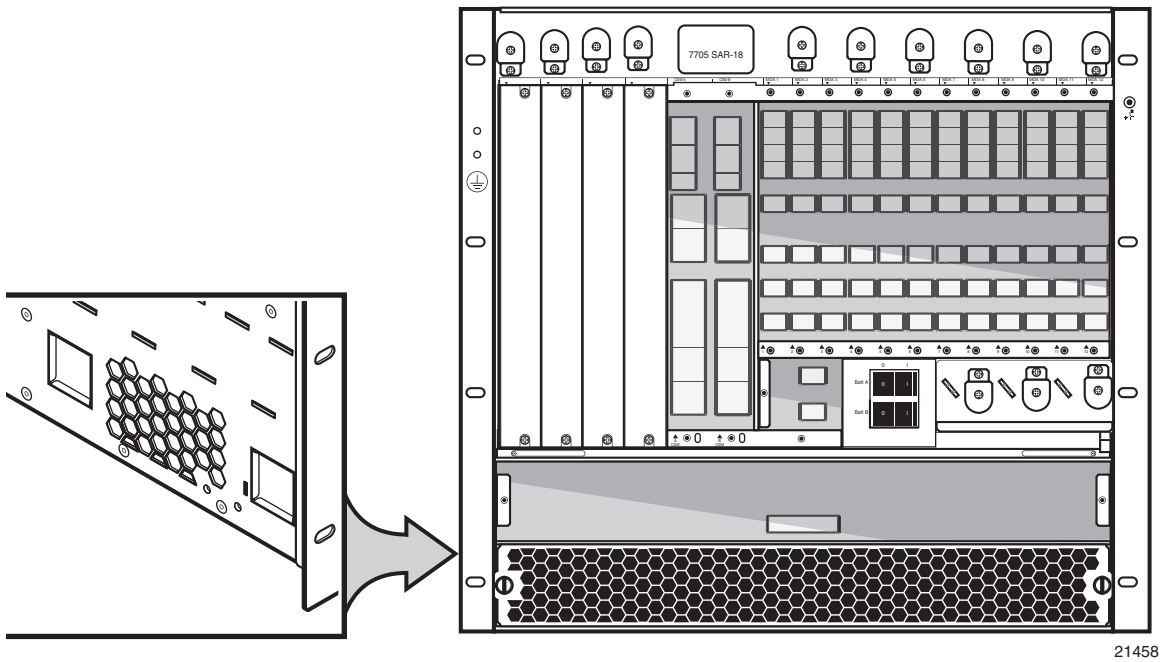


Figure 23: DC Power Terminal Circuit Breakers



21393

**Figure 24: DC Power Cable Access Openings**



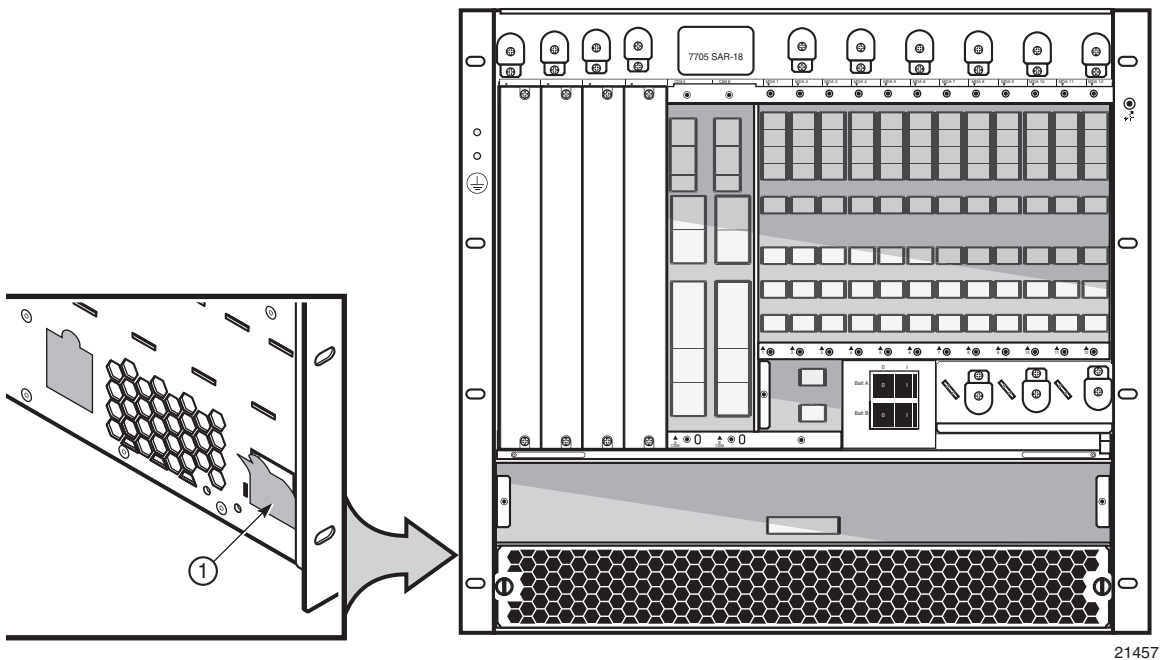
## Removing the Protective Overlays from the DC Power Cables Side-Wall Access Locations

The 7705 SAR-18 chassis is shipped with two side-wall access locations, the openings of which are covered with a protective overlay. These overlays must be removed before the power cables can be run through the openings.

To remove the coverings:

**Step 1.** Carefully grab the top non-adhesive portion of the overlay and peel the overlay from the opening. See [Figure 25](#).

**Figure 25: Removing the Protective Strip from the DC Power Cable Access Location**



21457

## Wiring the DC Inputs

Required tools and hardware:

- power cables (up to four for redundant feeds), minimum 6 AWG wire
- torque driver for slot screws
- #1 Phillips screwdriver
- cable ties

Follow these steps to connect the DC power feeds on the 7705 SAR-18 chassis:

- Step 1.** Using a recommended crimp tool, prepare the battery feed cables; up to four are required for redundant feeds.
- Step 2.** Ensure that the breakers of the power supply feeds are off.
- Step 3.** Remove the Fan module to gain better access to the power terminals. See [Removing the Fan Module](#) for the procedure.
- Step 4.** Loosen the two captive screws on the air intake bezel and remove the bezel.
- Step 5.** Remove the two screws on the power terminal cover and remove the cover. Retain the screws for reuse.
- Step 6.** Using a recommended crimp tool, prepare the battery feed cables; up to four are required for redundant feeds.
- Step 7.** Determine which power cable access opening you need to use to route the power cables to the power terminals.
- Use the opening at the back of the chassis if the power connections are routed from the back of the rack and the opening is accessible.
- Use the opening at the front of the chassis if the power cables are routed from the front of the rack, or if the power cables are routed from the back of the rack and the opening at the back of the chassis is not accessible.
- Step 8.** Loosely bundle together the power cables using a cable tie and run the cables through the opening and to the power terminals.

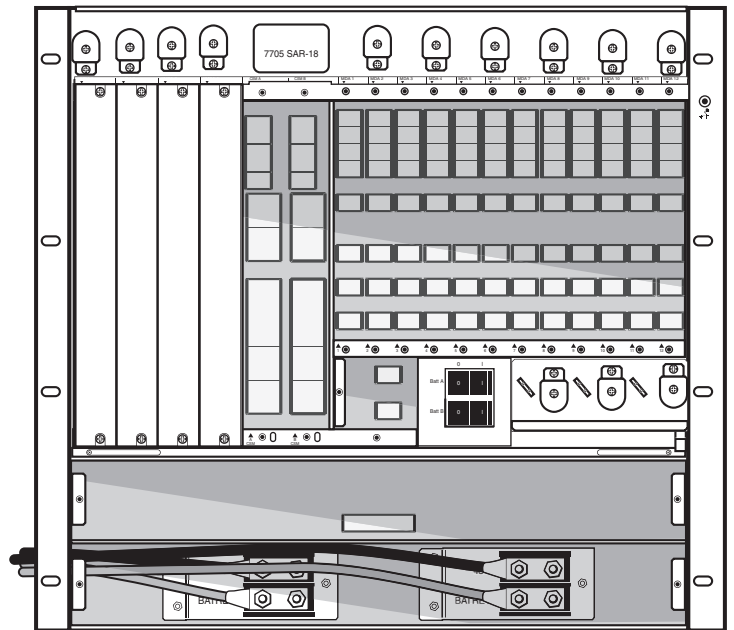
**Step 9.** Connect the power cables to the power terminal block. See [Figure 26](#).

Remove the nuts and washers from the appropriate power terminals.

Connect the 2-hole lug on the power cables using the nuts and washers removed earlier. Make the battery return connection by attaching the positive feed cable to the positive terminal on the terminal block. Make the battery feed connection by attaching the negative feed cable to the negative terminal on the terminal block.

Secure the connection by tightening the nuts. Do not over-tighten. The recommended torque is 28 to 30 lbf-in (3.16 to 3.39 N·m).

**Figure 26: Connecting the Power Cables to the Terminal Block**



**Step 10.** For a redundant power supply configuration, repeat step 8 and step 9 to connect the other two power cables.

**Step 11.** Turn on the supply feed breakers and verify with a voltmeter that all connections are made correctly.

**Step 12.** Replace the air intake bezel and tighten the two captive screws.

**Step 13.** Replace the Fan module. See [Replacing the Fan Module](#) for the procedure.

**Step 14.** Replace the power connector cover using the screws removed in step 5.

**Step 15.** Check that the DC supply wiring is correct.

For CBN installations only, ensure that the positive terminal on the DC power source is connected to ground.

**Step 16.** Route and connect the other end of the power cables to the supply feeds.

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# Installing the Components

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## In This Chapter

This chapter provides information on installing the components in the 7705 SAR-18:

- [Installing Components on page 115](#)
  - [Warnings and Notes on page 115](#)
  - [Installing a CSM on page 116](#)
  - [Installing the Fan Module on page 119](#)
  - [Installing the Fan Filter on page 122](#)
  - [Installing the Alarm Module on page 124](#)
  - [Installing Adapter Cards on page 125](#)
  - [Installing SFPs on page 128](#)
  - [Installing a Filler Plate on page 129](#)
- [Installing a Distribution Panel in a Rack on page 131](#)
  - [Rack-Mounting a Distribution Panel on page 131](#)
  - [Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel on page 133](#)
- [Managing Cable Connections to Adapter Cards and Modules on page 135](#)
  - [Warnings and Notes on page 135](#)
  - [Ethernet and Copper Cables on page 138](#)
  - [Fiber Cables on page 139](#)
  - [Modifying the Cable Management Area for a Dense Cable Deployment on page 140](#)
  - [Making a Shield Ground Connection on page 141](#)
  - [T3/E3 SFP Connections on page 142](#)
  - [DS3/E3 Connections on page 142](#)
  - [Alarm Module Alarm Port Connections on page 143](#)
  - [Auxiliary Alarm Card Connections on page 143](#)
  - [Wire Identification by Color on page 144](#)

- [Making External Synchronization Connections Using the RJ-45 BITS Ports on page 145](#)



**Note:** See [Field-Replaceable Units](#) for information on removing and replacing field-replaceable components.

## Installing Components

The Control and Switching Module (CSM), compact flash 3 (which is shipped with the CSM and preloaded with the software image required for system startup and operation), Alarm module, Fan module, adapter cards, distribution panels, and cables are field-installable and field-replaceable components.

## Warnings and Notes



### Dangers:

- Only trained and qualified personnel should install or replace this equipment.
- Invisible laser radiation can be emitted from an adapter card aperture port when no cable is connected. Avoid exposure and do not stare into open apertures.



### Warnings:

- ESD damage can occur if the CSM, compact flash, or adapter cards are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to a site grounding point (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-18 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.
- When installing the CSM, Alarm module, Fan module, and adapter cards, make sure to tighten the captive screws to the chassis as each component is being installed.



### Notes:

- Ports cannot be configured until the adapter card is provisioned.
- Services cannot be configured until the ports are configured.

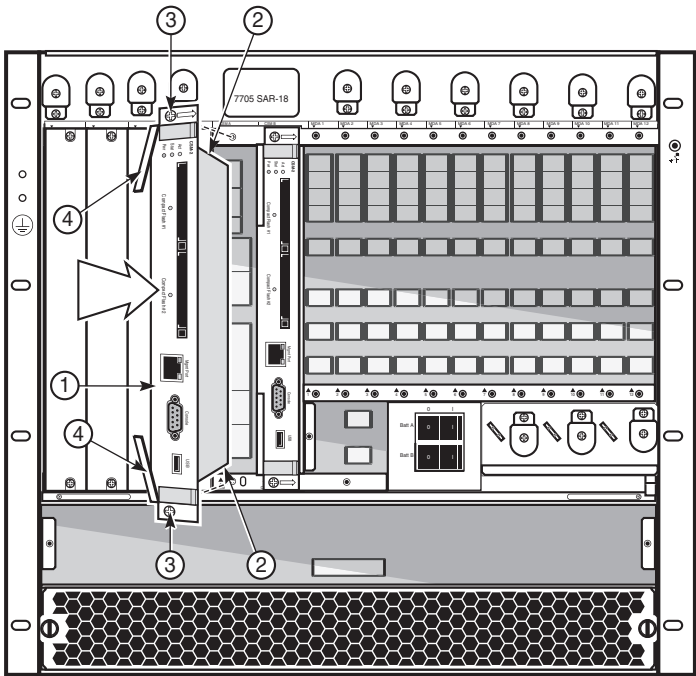
## Installing a CSM

CSMs are installed in slots A and B. For a simplex control configuration, a CSM can be installed in either slot A or slot B and a filler plate is installed on the empty slot. For redundant configurations, CSMs are installed in both slots A and B. [Figure 27](#) illustrates the installation of a CSM in slot A. [Table 22](#) describes the CSM installation features.

See [CSM LEDs](#) for a description of the CSM LEDs.

See [Removing and Replacing a CSM](#) for instructions on replacing a CSM.

Figure 27: Installing the CSM



21404

Table 22: CSM Installation Features

| Key | Description   |
|-----|---------------|
| 1   | CSM card      |
| 2   | Slot guide    |
| 3   | Captive screw |
| 4   | Ejector latch |

Required tools:

- torque driver for Phillips screw



**Warnings:**

- When installing the CSM in the 7705 SAR-18 chassis, make sure to tighten the captive screws to the chassis before installing other components.
- The CSM ejector latches have a spring-loaded locking button that must be unlocked before the latches can be extended. Failure to unlock the locking button may damage the latches.

To install a CSM:

**Step 1.** Remove the new CSM from the packaging. Do not touch the printed circuit board or connector pins.

**Step 2.** Install the CSM. For simplex configurations, the CSM can be installed in slot A or slot B. For redundant configurations, install a CSM in slot A and in slot B.

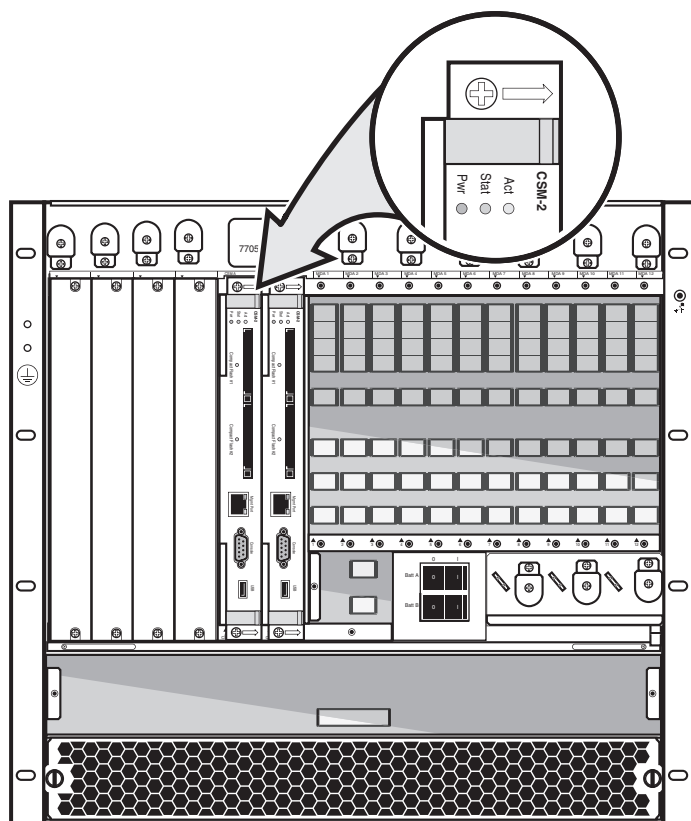
Unlock the locking button on each latch (see [Figure 28](#)) and extend the latch levers.

Hold the CSM by the latches. Align the card with the slot guides and slide the card inward until the connectors are seated in the backplane. Depress the levers until the spring-loaded locks are activated.

**Step 3.** Secure the card in place by tightening the captive screws. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N·m).

**Step 4.** Verify the status of the LEDs. See [CSM LEDs](#).

**Figure 28: Unlocking the Locking Button on the CSM Ejector Latch**



21462

### Compact Flash 3 Card

The CSM is shipped with the compact flash memory device (CF3) installed; therefore, the compact flash does not require installation. To replace the compact flash, see [Replacing a Compact Flash 3 Card](#).

## Installing the Fan Module

### Warnings and Notes



**Danger:** Always keep your fingers away from rotating fan blades.



**Warnings:**

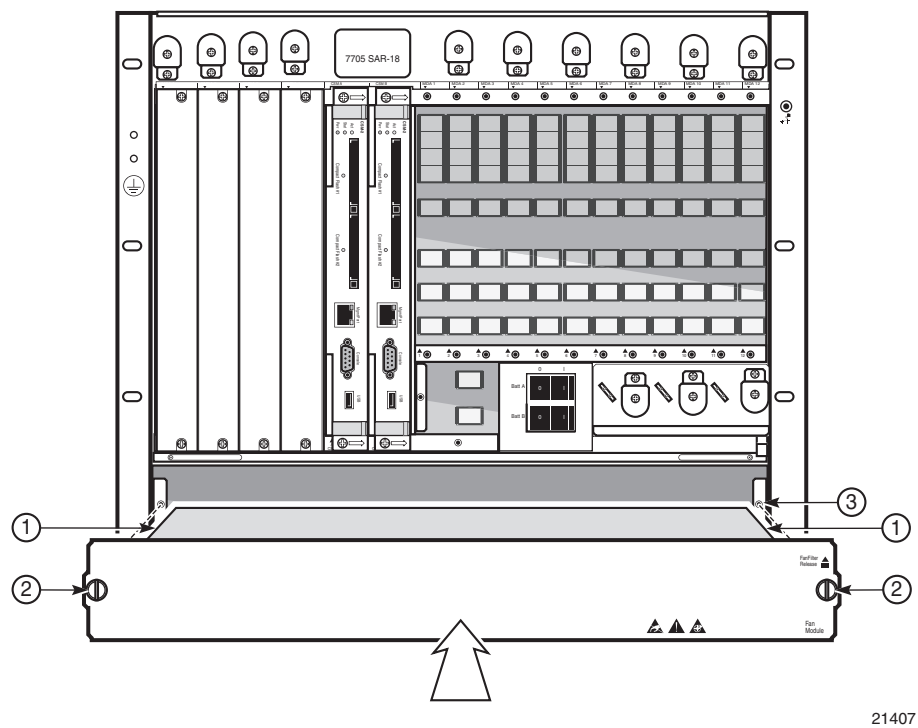
- The Fan module must always be installed and fully operational while the 7705 SAR-18 is powered up.
- Operating in a fan-failure mode is a short-term operational situation. The Fan module must be replaced within 96 h if a fan failure alarm is raised, and immediately if a second fan failure alarm is raised.
- The Fan module is hot-swappable. The 7705 SAR-18 operates safely for up to 5 min while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent over-heating conditions.
- When installing the Fan module, tighten the captive screws to the chassis before installing other components.

[Figure 29](#) illustrates the installation of the Fan module. [Table 23](#) describes the Fan module installation features.

The Fan module LEDs are found on the Alarm module; see [Alarm Module LEDs](#) for a description of the LEDs.

See [Replacing the Fan Module](#) for information on replacing the Fan module.

Figure 29: Installing the Fan Module



21407

Table 23: Fan Module Installation Features

| Key | Description         |
|-----|---------------------|
| 1   | Slot guide          |
| 2   | Captive screw       |
| 3   | Threaded receptacle |

Required tools:

- torque flathead screwdriver

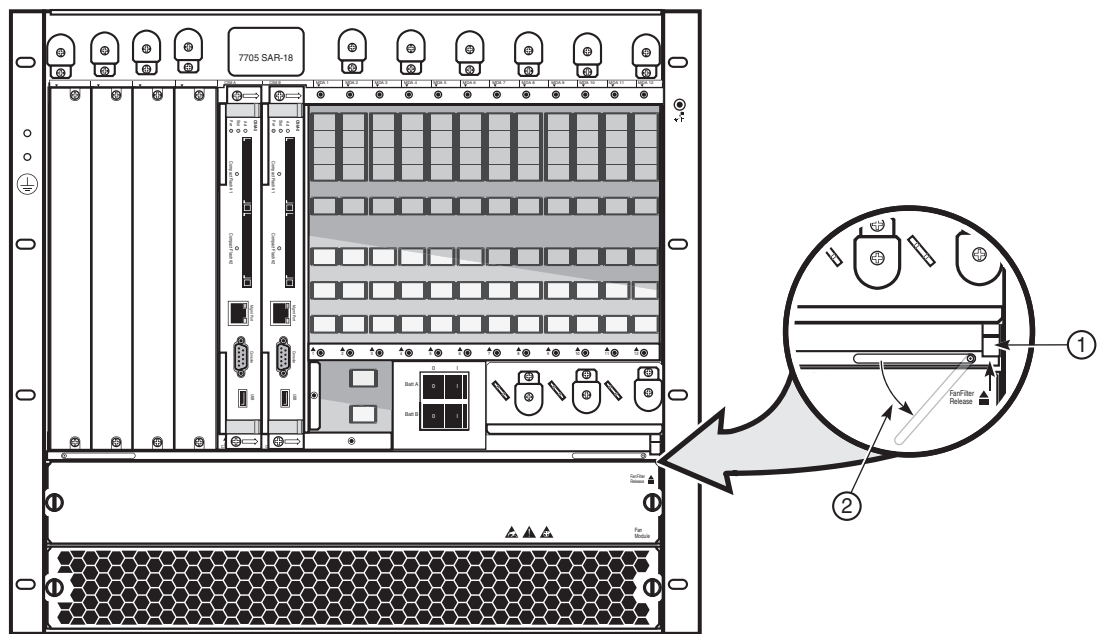
To install the Fan module:

- Step 1.** Remove the Fan module from the packaging and place it on an anti-static work surface. Avoid touching the board components and connector pins.
- Step 2.** Insert the Fan module into the Fan slot. Align the Fan module with the slot guides and the captive screw with the threaded receptacle.
- Step 3.** Press the Fan module firmly into the slot. Make sure that the connectors are fully seated in the backplane connectors.
- Step 4.** Secure the Fan module to the chassis, using a calibrated torque screwdriver set at 3 to 4 lbf-in (0.34 to 0.45 N·m). Do not over-tighten.
- Step 5.** Verify the status of the LEDs. See [Alarm Module LEDs](#).

# Installing the Fan Filter

Figure 30 and Figure 31 show how to install the fan filter. Table 24 describes the fan filter installation features.

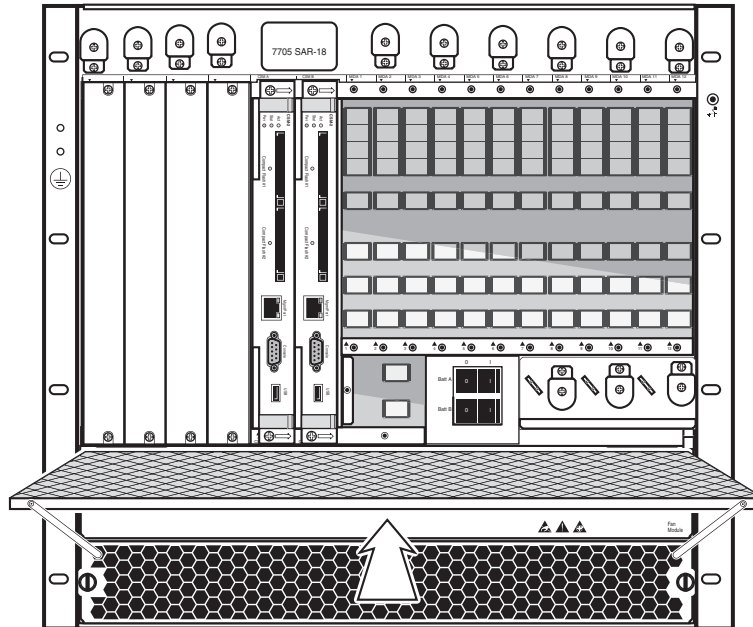
Figure 30: Releasing the Fan Filter Latches



21455

Table 24: Fan Filter Installation Features

| Key | Description              |
|-----|--------------------------|
| 1   | Fan filter release latch |
| 2   | Fan filter strips        |

**Figure 31: Installing the Fan Filter**

21484

To install the fan filter:

- Step 1.** Remove the fan filter from the packaging.
- Step 2.** Rotate the thin strips (item 2 in [Figure 30](#)) downward and position the fan filter in the fan filter slot located above the Fan module.
- Step 3.** Hold the top of the small metal latch located right above the Fan Filter Release label (item 1 in [Figure 30](#)) upward, slide in the fan filter until it is fully inserted in the slot, and release the metal latch. Make sure you install the filter with the grid portion facing upward, as shown in [Figure 31](#).
- Step 4.** Rotate the thin strips on either end of the fan filter so that they are inline with the fan filter frame.

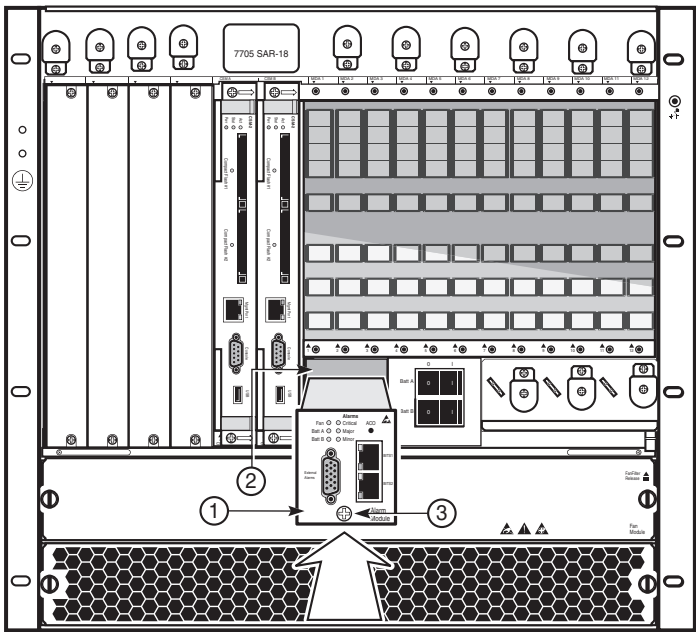
# Installing the Alarm Module

The Alarm module is installed in the Alarm module slot; see [Figure 32](#). [Table 25](#) describes the Alarm module installation features.

See [Alarm Module LEDs](#) for a description of the Alarm module LEDs.

See [Removing and Replacing the Alarm Module](#) for instructions on replacing the Alarm module.

Figure 32: Installing the Alarm Module



21395

Table 25: Alarm Module Installation Features

| Key | Description   |
|-----|---------------|
| 1   | Alarm module  |
| 2   | Slot guide    |
| 3   | Captive screw |

Required tools:

- torque driver for Phillips screws



**Warning:** When installing the Alarm module in the 7705 SAR-18 chassis, make sure to tighten the captive screws to the chassis before installing other components.

To install the Alarm module:

- Step 1.** Remove the new Alarm module from the packaging. Do not touch the printed circuit board or connector pins.
- Step 2.** Install the Alarm module in the Alarm module slot. Align the module with the slot guides and slide the module inward until the connectors are seated in the backplane and the faceplate is flush with the front of the chassis.
- Step 3.** Secure the module in place by tightening the captive screw. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N·m).
- Step 4.** Connect all required cables. See [Managing Cable Connections to Adapter Cards and Modules](#).
- Step 5.** Verify the status of the LEDs. See [Alarm Module LEDs](#).

## Installing Adapter Cards

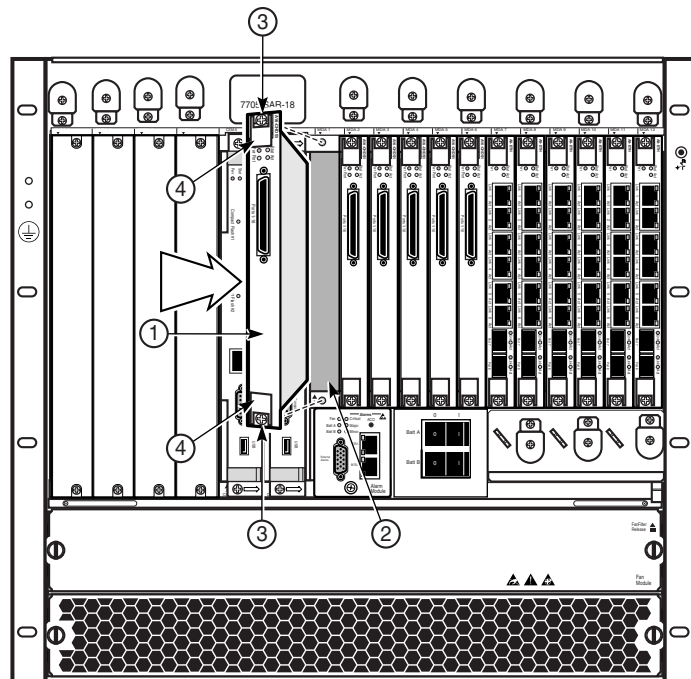
In Release 4.0, a maximum of 12 1-Gb adapter cards can be installed in the 7705 SAR-18 chassis. The following adapter cards are supported:

- 2-port OC3/STM1 Channelized Adapter card (maximum of 4)
- 4-port OC3/STM1 Clear Channel Adapter card (maximum of 12)
- 4-port DS3/E3 Adapter card (maximum of 12)
- 8-port Ethernet Adapter card, version 2 (maximum of 12)
- 16-port T1/E1 ASAP Adapter card, version 1 and version 2 (maximum of 12)
- 32-port T1/E1 ASAP Adapter card, version 2 (maximum of 12)
- Auxiliary Alarm card (maximum of 12)

The adapter cards are installed in 1 Gb adapter card slots MDA 1 through MDA 12, from left to right. The 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. See [Figure 5](#) for slot identification. See [Adapter Cards](#) for a description of the adapter cards.

[Figure 33](#) illustrates the installation of an adapter card. In the example, a 16-port T1/E1 ASAP Adapter card version 1 is shown being installed. [Table 26](#) describes the adapter card installation features. See [Replacing an Adapter Card](#) for general information on replacing an adapter card. For information on replacing a specific adapter card, as well as information on its connectors and LEDs, refer to the appropriate adapter card installation guide.

**Figure 33: Installing an Adapter Card**



21396

**Table 26: Adapter Card Installation Features**

| Key | Description   |
|-----|---------------|
| 1   | Adapter card  |
| 2   | Slot guide    |
| 3   | Captive screw |
| 4   | Ejector lever |

Required tools:

- torque driver for Phillips screws



**Warning:** If installing multiple adapter cards in the 7705 SAR-18 chassis, make sure to tighten the captive screws to the chassis as each card is being installed.

To install an adapter card:

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

With the ejector levers rotated inward, hold the adapter card by the levers, align the card with the slot guides, and slide the adapter card into the slot (see [Figure 33](#)).



**Note:** If the adapter card does not seat properly in the backplane, an ejector lever may not be completely rotated inward. Pull the card out halfway, adjust the levers, and reinsert the card.

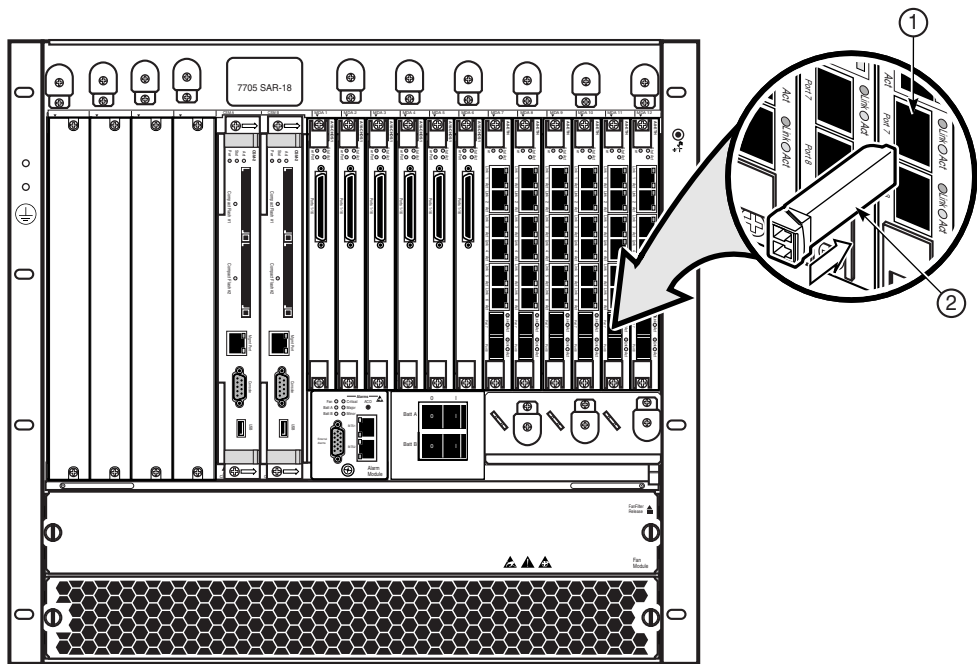
**Step 2.** Press the adapter card firmly into the slot. Make sure that the card connectors are seated in the backplane connectors and the faceplate is flush with the front of the chassis.

**Step 3.** 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).

Installing SFPs

A small form-factor pluggable (SFP) module can be installed on the 8-port Ethernet Adapter card, the 4-port OC3/STM1 Clear Channel Adapter card, and the 2-port OC3/STM1 Channelized Adapter card. Figure 34 illustrates the installation of an SFP on an 8-port Ethernet Adapter card. Table 27 describes the SFP installation features. Refer to the appropriate adapter card installation guide for more information on SFPs and a list of available types supported by the adapter card.

Figure 34: Installing an SFP



21397

Table 27: SFP Installation Features

| Key | Description    |
|-----|----------------|
| 1   | SFP receptacle |
| 2   | SFP            |

To install an SFP:

**Step 1.** Remove the SFP from the packaging and place it on an anti-static work surface.

**Step 2.** Insert the SFP into the appropriate receptacle on the adapter card until it clicks into place.

## Installing a Filler Plate

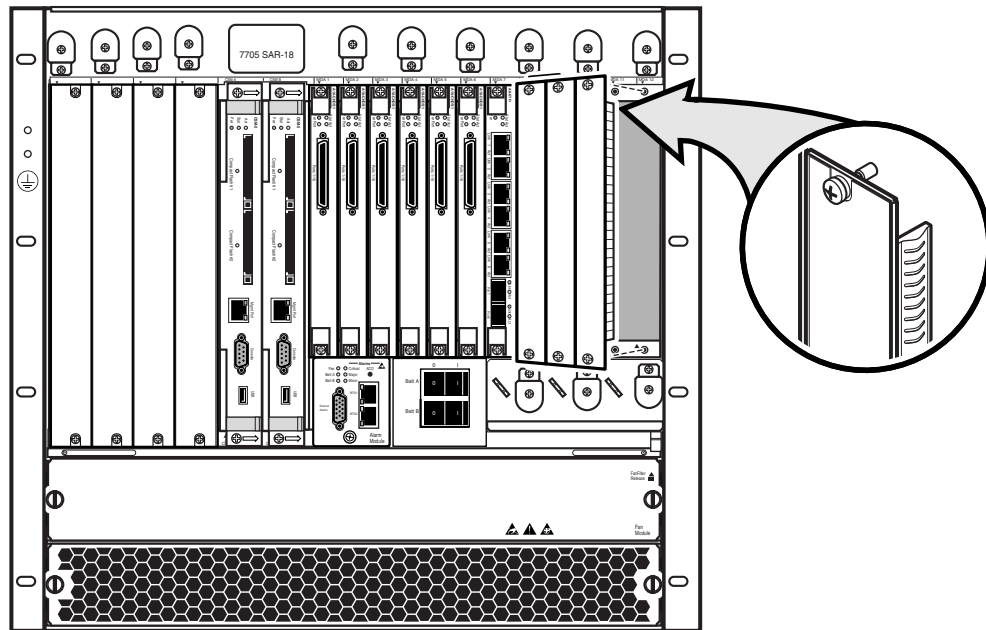
A filler plate must be installed on all empty chassis slots. You can install the following filler plates:

- 7705 SAR-18 CSM filler plate, which is used to cover an empty CSM slot
- 7705 SAR-8/7705 SAR-18 single-slot adapter card filler plate, which is used to cover an empty 1 Gb adapter card slot
- 7705 SAR-8/7705 SAR-18 triple-slot adapter card filler plate, which is used to cover three adjacent empty 1 Gb adapter card slots



**Note:** The 7705 SAR-18 chassis is shipped with 10 Gb filler plates installed in the empty 10 Gb adapter card slots. These filler plates must stay installed in the chassis as 10 Gb adapter cards are not supported on the 7705 SAR-18 in Release 4.0.

**Figure 35: Installing a 7705 SAR-18 Filler Plate**



21487

Required tools:

- Phillips screwdriver

To install a filler plate on the 7705 SAR-18:

- Step 1.** Align the filler plate with the empty card slot(s); make sure to orient the filler plate so that the EMI gasket is right-facing, as shown in [Figure 35](#).
- Step 2.** Insert the filler plate into the empty chassis slot(s) (filler plates do not have card connectors), and tighten the two captive screws that fasten the filler plate to the chassis. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N·m).

## Installing a Distribution Panel in a Rack



**Danger:** Only trained and qualified personnel should install or replace this equipment.



**Caution:** When rack-mounting the distribution panel in an equipment rack, do not stack another panel or any other equipment directly on top of the panel. Each panel must be secured in the rack with the appropriate mounting apparatus.

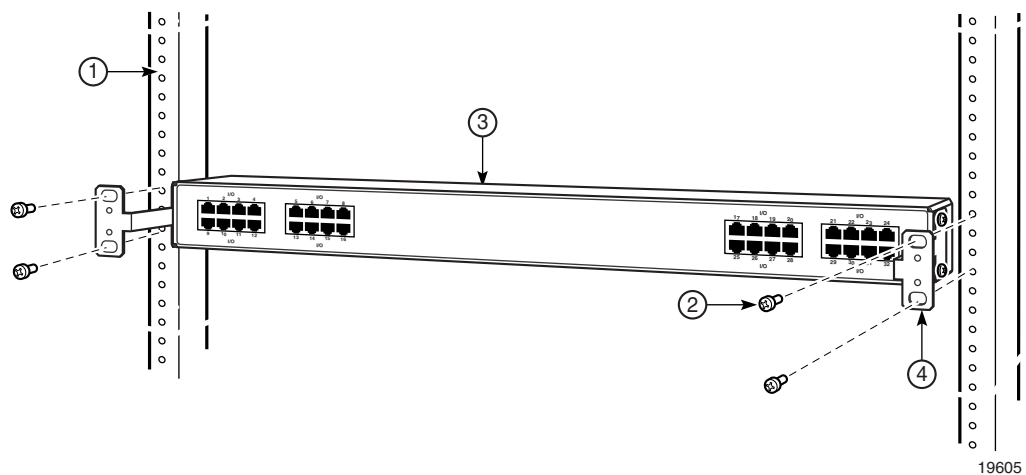
## Rack-Mounting a Distribution Panel

The distribution panels are designed for installation in a 19-inch rack. [Figure 36](#) shows the installation of a distribution panel; [Table 28](#) describes the installation features.



**Note:** There should be at least 1.75 in (4.45 cm) (1 RU) of space above and/or below the 7705 SAR-18 chassis to run cables from the faceplate connectors. It is not necessary for the space to be immediately above or below the chassis.

### Figure 36: Installing a Distribution Panel in a Rack



**Table 28: Rack-Mounting the Distribution Panel**

| Key | Description        |
|-----|--------------------|
| 1   | Equipment rack     |
| 2   | Rack-mount screws  |
| 3   | Distribution panel |
| 4   | Rack-mount bracket |

Before you begin, verify that:

- the equipment rack is securely installed, anchored, and grounded. Refer to the rack manufacturer's documentation for instructions.
- nearby equipment, including breaker panel bus bars and power connectors, is made safe. Either shut off the power, if possible, or install safety guards or mats over exposed power points and cables.

Required tools:

- torque driver for Phillips screws

To install a distribution panel in the rack:

**Step 1.** Attach the rack-mount brackets to the panel as shown in [Figure 36](#).

**Step 2.** Lift the panel and position it in the rack. Ensure that there is at least 1 RU of empty space above or below the 7705 SAR-18 chassis to run cables. See [Managing Cable Connections to Adapter Cards and Modules](#).

**Step 3.** Align the mounting holes on each bracket to the mounting holes on the rack upright. Insert a screw into each mounting hole and tighten.

**Step 4.** Ground the panel to the building ground using one of the methods described below.  
a) If a ground stud is present on the panel, see [Chassis Ground Wiring](#).



**Warning:** Some panels have a grounding tab riveted to the side of the chassis. Do not use the ground tab to make the building ground connection because it does not conform to GR-1089-CORE specifications. Using the grounding tab may result in equipment damage or loss of data.

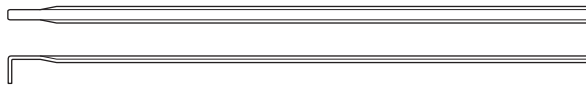
b) Alternatively, the panel may be grounded to the rack through its mounting screws while adhering to the following requirements.

- All surfaces that are used for intentionally grounding the panel must be brought to a bright finish, and an antioxidant solution must be applied to the surfaces being joined.
- Non-conductive coatings (such as lacquer and enamel) must be removed from threads and other contact surfaces to ensure electrical conductivity. Thread-forming screws with paint piercing washers may be used for this purpose during installation.

## Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel

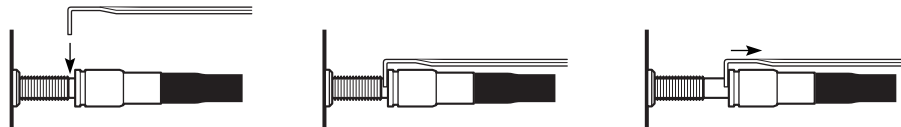
Some installations have the 1.0/2.3 Mini-Coaxial Distribution panel installed with no rack space between the equipment above and below the panel. This type of installation may require the use of an extraction tool to facilitate the removal of a mini-coaxial cable. [Figure 37](#) shows the tool (top and side views). [Figure 38](#) illustrates the use of the tool, which is shipped with the distribution panel.

**Figure 37: Mini-Coaxial Connector Extraction Tool**



20008

**Figure 38: Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel**



19447

Required tools:

- extraction tool for 1.0/2.3 mini-coaxial connectors (supplied with panel)

To disconnect a connector from the 1.0/2.3 mini-coaxial panel using the extraction tool:

**Step 1.** Hook the tool over the end of the mini-coaxial connector, as shown in [Figure 38](#). Take care to avoid scratching or damaging nearby cable.

**Step 2.** Keep the tool hooked over the connector and firmly pull the tool straight out (towards you) in order to release the clamping mechanism in the connector and disconnect the cable. Avoid pulling the tool up and out because the hook may slip off the connector.



**Warning:** Do not pull on the coaxial cable to help disconnect the cable. This may damage the cable.

---

# Managing Cable Connections to Adapter Cards and Modules

## Warnings and Notes

**Dangers:**

- Only trained and qualified personnel should install or replace this equipment.
- Invisible laser radiation can be emitted from the adapter card aperture ports when no cable is connected. Avoid exposure and do not stare into open apertures.

**Warnings:**

- ESD damage can occur if CSMs or adapter cards are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to a site grounding point (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Do not power up a 7705 SAR-18 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.



**Caution:** When a 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card port that is configured for T1 is connected to external equipment or is in physical loopback, ensure that the external equipment's transmit signal is attenuated according to the distance to the card's receiver. Adjust LBO settings appropriately so that the receiver's nominal input voltage level is < 3Vp. Refer to "Configuring DS1 Line Buildout" in the 7705 SAR OS Interface Configuration Guide for detailed information on attenuating transmit signals.

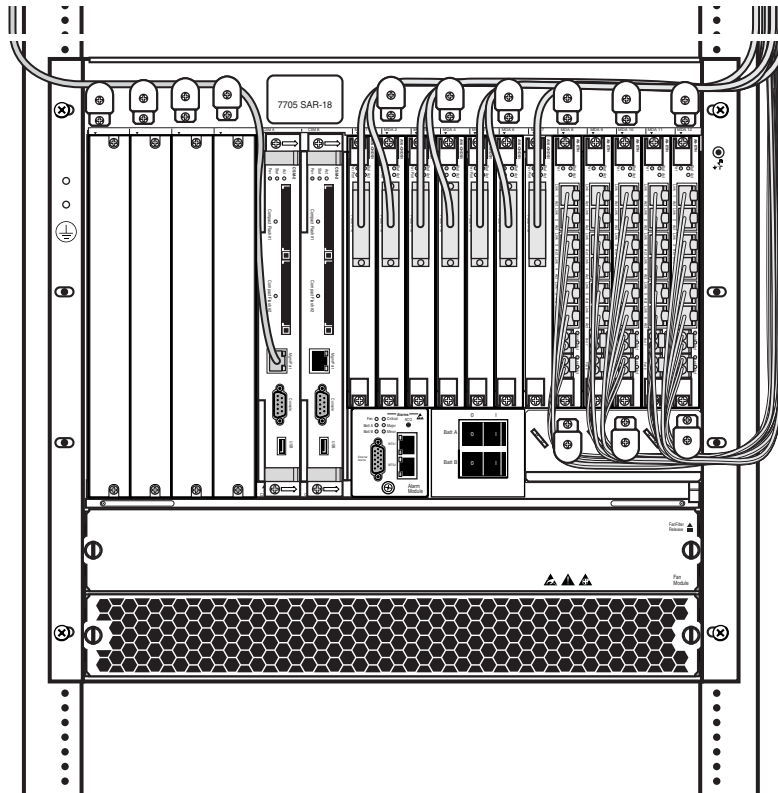
**Notes:**

- Ensure cables are dressed such that they do not impede the insertion or removal of field-replaceable units (FRUs), such as CSMs, adapter cards, Alarm module, and Fan module, or obscure the LEDs on the Alarm module.
- Typically, cables are routed between the rack uprights.
- If you require more space for the cabling process, you can remove the 7705 SAR-18 cable management guides as described in [Modifying the Cable Management Area for a Dense Cable Deployment](#).
- To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the adapter card interfaces.
- To meet surge protection requirements, the cable shield must be grounded by attaching the shield to a convenient chassis ground point. The hardware used must provide a solid electrical and mechanical connection. In addition, ensure that there is sufficient strain relief to remove any mechanical strain on the ground connection due to cable movement.

All cable connections to adapter cards are made from the front of the 7705 SAR-18 chassis. The adapter cards can be connected using Ethernet, copper, or fiber-optic cables.

The cables for the adapter cards in slots 1 to 7 are dressed upward and are routed along the upper cable management area using the cable management guides (see [Figure 39](#)). The adapter cards in slots 8 to 12 can be dressed upward or downward. If they are dressed upward, they are routed along the upper cable management area using the cable management guides. If they are dressed downward, they are routed along the lower cable management area using the lower cable management guides. For dense cable deployment, you can remove the upper cable guides to better facilitate the cabling; see [Modifying the Cable Management Area for a Dense Cable Deployment](#).

A distribution panel is needed to make coaxial cable connections when using the 16-port T1/E1 ASAP Adapter card or 32-port T1/E1 ASAP Adapter card. Refer to the 7705 SAR T1/E1 ASAP Adapter Card Installation Guide for details on connecting to a specific adapter card.

**Figure 39: Cable Management**

21398

## Ethernet and Copper Cables



**Warning:** To prevent damage to the components during installation, such as damage to the connectors, avoid bending, twisting and general over-exertion of the ethernet and copper cables. Also, when bundling the cables, leave enough slack to allow room to move the cables aside during servicing and to prevent unwanted stress at the termination to the module.

Required hardware:

- cable ties (optional)

To attach Ethernet and copper wire cables:

**Step 1.** Attach the cable to the port connector or SFP connector on the adapter card.

**Step 2.** Route the cables along the upper and/or lower cable management area; route the cables for adapter cards installed in slots 1 to 7 along the upper cable management area; route the cables for adapter cards installed in slots 8 to 12 along the upper or lower cable management area. If desired, loosely bundle together the cables from each slot using a cable tie. Do not over-tighten the cable tie.

**Step 3.** Attach the cable to a distribution panel or appropriate connector.

## Fiber Cables

**Warnings:**

- Fiber cables are sensitive to bending, twisting and general over-exertion. Extreme caution is recommended when handling fiber cable.
- In order to ensure that the minimum fiber bend radius of 1.2 in. (3 cm) is maintained within the allowable space, an open-angled 90° boot such as TYCO 1374737-x or equivalent is recommended. The boots must be installed and oriented during fiber termination.
- Observe proper fiber connector handling in the use of dust covers and cleaning.

Fiber-optic cables are routed along the upper and/or lower cable management area in a similar fashion to Ethernet and copper wire cables.

Required hardware:

- fiber cable boot (optional)
- cable ties (optional)

To attach fiber cables:

- Step 1.** Attach the cable to the port connector or SFP connector on the adapter card. If necessary, attach the fiber cable boot according to the manufacturer's instructions.
- Step 2.** Route the cables along the upper and/or lower cable management area, similar to [Ethernet and Copper Cables](#). If desired, loosely bundle the cables from each slot together using a cable tie. Do not over-tighten the cable tie.
- Step 3.** Attach the fiber cable to a distribution panel or appropriate connector.

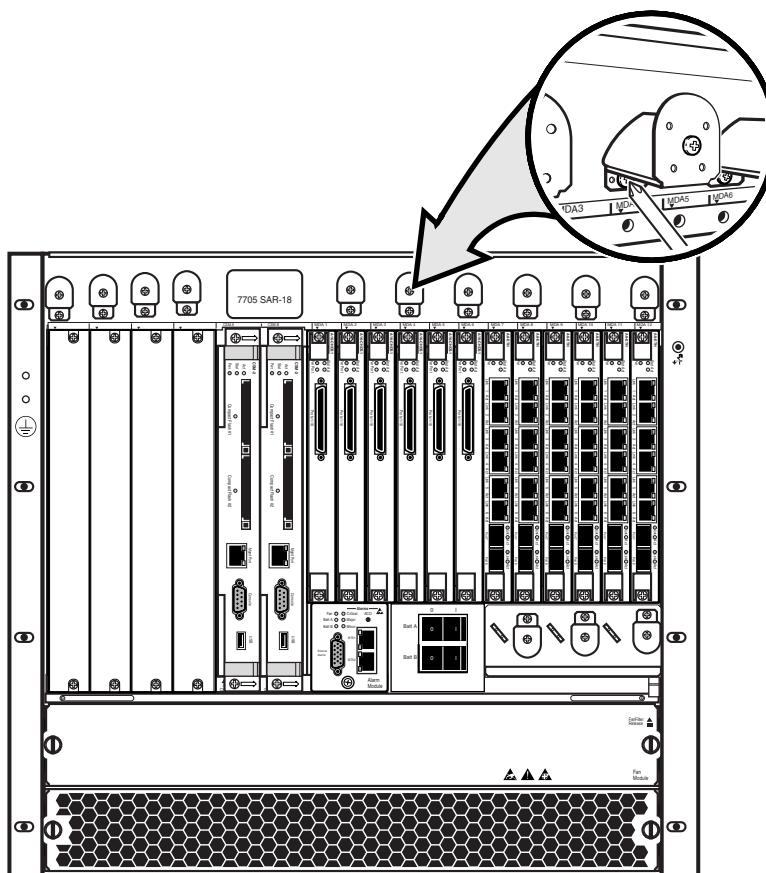
## Modifying the Cable Management Area for a Dense Cable Deployment

For a deployment where there is a dense concentration of cables, such as when several 16-port T1/E1 ASAP Adapter cards and /or 32-port T1/E1 ASAP Adapter cards are being installed, you can remove the cable management guides in order to have more room for the cabling process; see [Figure 40](#).

Required tools:

- Phillips screwdriver

**Figure 40: Unscrewing a Cable Management Guide**



21464

## Making a Shield Ground Connection

To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the CSM, Alarm module, Fan module, and adapter card electrical interfaces.

To meet surge protection requirements, the cable shield on any open-ended cable must be grounded to a convenient chassis ground point, such as the equipment rack.

Required tools and hardware:

- wire stripper
- hardware for making the connection (such as a screw, star washer, and cable ties)

To make a shield ground connection:

**Step 1.** Locate a convenient chassis ground point, such as the equipment rack.

**Step 2.** Carefully strip enough insulation (outer jacket) from the cable such that the exposed grounding wire can reach the chassis ground point. Ensure that there is enough stripped insulation to provide strain relief for the ground connection.



**Caution:** When stripping the cable insulation, avoid nicking the ground conductors or the insulation on the signal conductor. Nicks can weaken or break a conductor or expose a wire to a potential short circuit.

**Step 3.** Separate the ground shield (braid, foil, and drain wire) from the signal conductors.

**Step 4.** Securely attach the shield to the chassis ground point. Use a screw and star washer large enough to make a proper ground connection. Use proper cable dressing and strain relief techniques.

## T3/E3 SFP Connections

The T3/E3 SFP has two DIN 1.0/2.3 screw-on connectors. The SFP is supplied with two 1 m adapter cables with a 1.0/2.3 screw-type connector on one end and a female BNC connector on the other end.

**Step 1.** Connect the 1.0/2.3 end of the cables to the connectors on the T3/E3 SFP.

**Step 2.** Route the cables along the upper or lower cable management area, depending on where the adapter card is installed (cables for adapter cards installed in slots 1 to 7 are routed along the upper cable management area; cables for adapter cards installed in slots 8 to 12 are routed along the upper or lower cable management area). If desired, loosely bundle the cables together using a cable tie. Do not over-tighten the cable tie.



**Note:** Arrange the cables such that they do not impede the insertion or removal of other equipment mounted in the rack.

**Step 3.** Connect the BNC end of the cables to the attached equipment.

## DS3/E3 Connections

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). A 10 ft (3 m) coaxial 1.0/2.3 plug-to-female-BNC-jack cable (3HE00106AA) is used for BNC connectivity. The cable uses a spring-loaded mechanism that makes it easy to install and remove the cable from the 4-port DS3/E3 Adapter card.

**Step 1.** Connect the 1.0/2.3 end of the cables to the port connectors on the 4-port DS3/E3 Adapter card.

**Step 2.** Route the cables along the upper or lower cable management area, depending on where the 4-port DS3/E3 Adapter card is installed (cables for adapter cards installed in slots 1 to 7 are routed along the upper cable management area; cables for adapter cards installed in slots 8 to 12 are routed along the upper or lower cable management area). If desired, loosely bundle the cables together using a cable tie. Do not over-tighten the cable tie.



**Note:** Arrange the cables such that they do not impede the insertion or removal of other equipment mounted in the rack.

**Step 3.** Connect the BNC jack end of the cables to the attached equipment.

## Alarm Module Alarm Port Connections

The 3EM24105 shielded cable is used to connect the 15-pin D-sub External Alarm connector on the Alarm module to a suitable alarm panel, such as a punch-down or wire-wrap panel.

**Step 1.** Connect the cable assembly pins to the External Alarm port connector. See [External Alarms Connector Pinouts](#) for the required pinout information.

**Step 2.** Route the cable along the lower cable management area. If desired, loosely bundle the cable together with other cables using a cable tie. Do not over-tighten the cable tie.



**Note:** Arrange the cables such that they do not impede the insertion or removal of other equipment mounted in the rack.

**Step 3.** Connect the open-ended side of the cable to the alarm panel.

## Auxiliary Alarm Card Connections

The Auxiliary Alarm card uses the 26 AWG 15 m (49 ft) and 30 m (98 ft) 68-pin AMP to open-ended wire cables (3HE03398AB/3HE03399AB), or the 3 m (9.8 ft) SCSI-2 to 64-pin AMP cable (3HE02783AA) to connect to an alarm panel. See [Auxiliary Alarm Card Cables](#) for more information on these cables.

To make a connection using the SCSI-2 to 64-pin AMP cable, see [Ethernet and Copper Cables](#).

To make a connection using the 68-pin AMP to open-ended wire cables:

**Step 1.** Connect the cable assembly pins to the 68-pin AMP (SCSI-2 form factor) connector on the Auxiliary Alarm card. Refer to the 7705 SAR Auxiliary Alarm Card Installation Guide, “Auxiliary Alarm Card Faceplate Connections” and “Auxiliary Alarm Card Cable Pinouts”, for the connector and pinout information.

**Step 2.** Route the cable along the upper or lower cable management area, depending on where the Auxiliary Alarm card is installed (cables for adapter cards installed in slots 1 to 7 are routed along the upper cable management area; cables for adapter cards installed in slots 8 to 12 are routed along the upper or lower cable management area). If desired, loosely bundle the cable together with other cables using a cable tie. Do not over-tighten the cable tie.



**Note:** Arrange the cables such that they do not impede the insertion or removal of other equipment mounted in the rack.

**Step 3.** Connect the open-ended side of the cable to the alarm panel.

## Wire Identification by Color

Within the T1/E1 cable, there are two cables: Transmit (Tx) and Receive (Rx). For 28 AWG, each Tx and Rx cable consists of 16 twisted pairs. For 26 AWG, each Tx and Rx cable consists of unique “quads”, which are groupings of four wires.

To identify quads for the 26 AWG open-ended wire T1/E1 cable by color:

**Step 1.** Identify the Transmit (Tx) and Receive (Rx) cables. The Transmit cable is labeled “TX”, and the Receive cable is labeled “RX”.

**Step 2.** For each Tx and Rx cable, strip the end of the outer jacket of the cable. Note that the wires are twisted in groups of four (quads), each quad containing one white wire, one turquoise wire, one violet wire, and one uniquely colored wire. The uniquely colored wire identifies the quad number, and the same color is used for both the Tx and the Rx cables. See [Table 29](#) for quad identification wire colors.

**Step 3.** For each Tx and Rx cable, after identifying the quads by color, label the quads as Transmit 1 to 8 and Receive 1 to 8. Perform this step before untwisting the wires.



**Note:** To maintain signal integrity, wires should not be untwisted more than 0.5 in. (13 mm).

**Table 29: Quad Identification Wire Color**

| Quad Number | Unique Wire Color | Identified               |
|-------------|-------------------|--------------------------|
| 1           | Blue              | <input type="checkbox"/> |
| 2           | Orange            | <input type="checkbox"/> |
| 3           | Green             | <input type="checkbox"/> |
| 4           | Brown             | <input type="checkbox"/> |
| 5           | Gray              | <input type="checkbox"/> |
| 6           | Red               | <input type="checkbox"/> |
| 7           | Black             | <input type="checkbox"/> |
| 8           | Yellow            | <input type="checkbox"/> |

## Making External Synchronization Connections Using the RJ-45 BITS Ports

Two RJ-45 BITS ports (A and B) located on the Alarm module are available as an input and output source for external synchronization for the 7705 SAR-18 node (SSU). Both BITS inputs are available to both CSMs. This provides redundant SSU clocking across the two CSMs. A Category 5E shielded cable (one for each BITS port) is used to connect to an external synchronization source. See [BITS Ports and Pinouts](#) for pinout information.

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# Initializing and Provisioning

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## In This Chapter

This chapter provides information about initializing and provisioning the 7705 SAR-18:

- [Powering Up the 7705 SAR-18 on page 148](#)
  - [Powering Up and Initializing the 7705 SAR-18 on page 148](#)
  - [Troubleshooting the Initial Startup on page 150](#)
- [Automatic Discovery Protocol on page 152](#)
- [Establishing 7705 SAR-18 Management Connections on page 154](#)
  - [Console Connection on page 154](#)
  - [Telnet Connection on page 155](#)
  - [Running Telnet on page 156](#)
- [Provisioning CSM and Adapter Card Parameters on page 157](#)
  - [Provisioning Requirements on page 157](#)
  - [Card and Card-Type Commands on page 157](#)
  - [MDA and MDA-Type Commands on page 158](#)
- [Removing an Adapter Card Configuration on page 160](#)

## Powering Up the 7705 SAR-18

Complete the steps in [Wiring the DC Inputs](#) and [Installing the Components](#) before proceeding with the power-up and initialization instructions.

The primary copy of the 7705 SAR-18 TiMOS software is located on the compact flash memory device that is factory-installed on the CSM.



**Warning:** For proper thermal operation, ensure that filler plates are installed on all empty slots before powering up the 7705 SAR-18.



**Notes:**

- The 7705 SAR-18 is powered on by applying power from the DC power source. This is done using the two circuit breakers that are used to turn the power ON or OFF for both A and B power feeds.
- Configurations and executable software can be stored on the compact flash memory device or at an FTP file location.
- You must have a console or Telnet connection to communicate with and provision the 7705 SAR-18. See [Establishing 7705 SAR-18 Management Connections](#).

## Powering Up and Initializing the 7705 SAR-18

To power up the 7705 SAR-18, follow these steps:

**Step 1.** Turn on the power to the 7705 SAR-18 to initiate the boot process. To switch the power ON, locate the circuit breaker on the panel board that services the DC circuit and switch the circuit breaker to the ON position.

**Step 2.** Turn ON the circuit breakers on the front of the 7705 SAR-18 chassis.

The Power LEDs on the CSM and adapter cards should be blue, and the Batt A, Batt B, and Fan LEDs on the Alarm module should be green. If only one DC power source is used, only one Batt LED should be lit.

**Step 3.** Verify that the system is initializing.

The system searches the compact flash device on the CSM (cf3) for the `boot_loader` file (also known as the bootstrap or boot loader file). The Status and Activity LEDs on the CSM blink green during initialization. After initialization (approximately 30 s), the Status LED and the Activity LED on the active CSM turn solid green; the Activity LED on the inactive CSM continues to blink green.

If the LEDs do not operate as described above, or if they blink and turn off, see [Troubleshooting the Initial Startup](#).

**Step 4.** Verify the operational status of the 7705 SAR-18 components by checking all the LEDs on the following components:

- Alarm module and Fan module (see [Alarm Module LEDs](#))
- CSM (see [CSM LEDs](#))
- Adapter cards (refer to the appropriate adapter card installation guide)

**Step 5.** (Optional, if ADP is installed) After verifying the LEDs, establish communication with the 7705 SAR-18 using the Console port. See [Console Connection](#).

**Step 6.** (Conditional) Run ADP.

ADP is triggered by a factory-installed boot option in the BOF file. ADP automates the initial commissioning of 7705 SAR nodes. By default, and if the boot-option is installed, ADP runs automatically the first time the system is powered up. The Status LED blinks green and amber on the CSM while ADP is running. You can terminate ADP while it is running by pressing the ACO button or using the console. See [Automatic Discovery Protocol](#) for more information.

**Step 7.** (Optional) Assign an IP address to the CSM via the console. See [Telnet Connection](#) for quick reference information and the 7705 SAR OS Basic System Configuration Guide, “CLI Usage”, for detailed information on the Telnet command.

**Step 8.** (Optional) Configure or modify the settings in the BOF file via the console. The primary-image, primary-config, address, and static-route parameters can be entered. Other parameters, including the setting for auto-discovery, can be changed at the same time. The `tools auto-discovery terminate` command may be used to disable the auto-discovery function. See [Telnet Connection](#) for reference information and the 7705 SAR OS Basic System Configuration Guide, “CLI Usage”, for detailed information on the Telnet command.

# Troubleshooting the Initial Startup

If the system cannot load or cannot find the `boot.ldr` file on the compact flash memory device (cf3), the system will continuously reboot in an attempt to successfully find and load the `boot.ldr` file. If this happens, the CSM should be replaced and the faulty CSM returned to Alcatel-Lucent. The example below displays the output when the `boot.ldr` file cannot be found.

### Example: Rebooting display

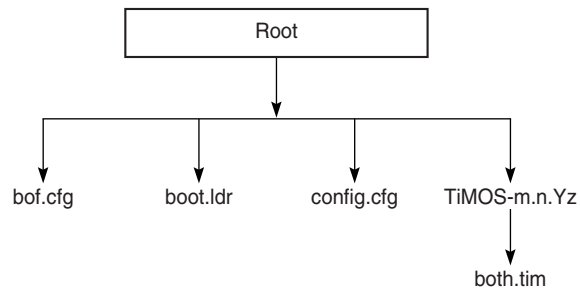
```
Rebooting...
Alcatel 7705 Boot ROM. Copyright 2010 Alcatel-Lucent.
All rights reserved. All use is subject to applicable license agreements.
Build: X-0.0.I166 on Wed Aug 19 23:22:35 EDT 2010 by csabuild
Version: 0x1C
Processor core is xxxXX
COLD boot on processor #1
?Preparing for jump to RAM...
Starting bootrom RAM code...
Boot rom version is v28
>>>Octeon BIST check passed.
>>>Testing SDRAM from 0x02200000 to 0x40000000
>>>Testing Compact Flash ... Slot Empty
Board Serial Number is 'NS073640003'
Platforms in BP EEPROM is 0x8
Chassis type 9 (csa8) found in BP EEPROM
Chassis Serial Number is 'A60511000005'
Searching for boot.ldr on local drives:
No disk in cf3
No disk in cf3
No disk in cf3
Error - file boot.ldr not found on any drive
Please insert CF containing boot.ldr. Rebooting in 5 seconds.
```

If the system finds the `boot.ldr` file, the system processes the initialization parameters from the BOF (boot option file). The BOF should be on the same drive as the `boot.ldr` file. If the BOF cannot be found or loaded, then the system prompts the user for alternate software and configuration file locations.

When the system software is successfully loaded, control is passed from the boot loader file to the system software. The system software attempts to locate the configuration file as configured in the BOF. The configuration file includes chassis, CSM, adapter card, and port configurations, as well as system, routing, and service configurations.

Figure 41 displays the compact flash directory structure and file names.

**Figure 41: Files on the Compact Flash**



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Files on the compact flash are:

- bof.cfg — boot option file
- boot.ldr — bootstrap software
- config.cfg — default configuration file
- TiMOS-m.n.Yz:
  - m — major release number
  - n — minor release number
  - Y: A — Alpha release
  - B — Beta release
  - M — maintenance release
  - R — released software
  - z — version number
- both.tim — application software file

## Automatic Discovery Protocol

Automatic Discovery Protocol (ADP) automates the initial commissioning of 7705 SAR nodes. It is triggered when a 7705 SAR is started for the first time by a factory-installed boot option; an ADP keyword in the BOF causes automatic discovery to run as part of the TiMOS application image.

In the console session, during the boot-up sequence, you can change the boot options before the application image is loaded. On systems that support ADP, you will be presented with the following additional options:

- enable/disable ADP
- specify an optional identifier and optional VLAN
- modify the location where the newly discovered configuration will be stored

For more information about ADP and the BOF file, refer to the 7705 SAR OS Basic System Configuration Guide, “Automatic Discovery Protocol”.

ADP can be controlled using the CLI while it is running or by the Audible Alarm Cutoff/Lamp Test button (labeled ACO) on the Alarm module. You can use the ACO button to terminate or retry ADP, or reboot the chassis. For ADP CLI commands, refer to the 7705 SAR OS OAM and Diagnostics Guide, “Tools Commands”.



**Note:** On the 7705 SAR-18, ADP is supported only on 1 Gb adapter cards installed in MDA slot positions 1 to 6. See [Figure 5](#) for adapter card slot locations.

[Table 30](#) lists the ADP commands you can perform with the ACO button.

**Table 30: ADP Front Panel Interface Commands**

| Command                          | Instructions   | Notes  |
|----------------------------------|--|--|
| Enter front panel interface mode | Hold down the ACO button for at least 3 s                                    | Once the user interface mode is activated, you have 5 s to enter the commands. The user interface mode is also activated when ADP is halted, or whenever it enters a new stage of discovery. |
| Terminate ADP                    | Enter the front panel interface, then press the ACO button quickly two times | Wait 5 s for the command to take effect  |
| Retry ADP                        | Press the ACO button quickly once  | Wait 5 s for the command to take effect  |

**Table 30: ADP Front Panel Interface Commands (Continued)**

| Command            | Instructions  | Notes                                   |
|--------------------|---|---|
| Reboot the chassis | Enter the front panel interface, then hold down the ACO button for at least 3 s | Wait 5 s for the command to take effect |

When run on the system, ADP goes through four basic stages:

- Self-discovery
- Network discovery
- Configuration discovery
- Test and commit

If ADP encounters errors during one of the discovery stages, it enters a halted state until the errors are cleared. ADP can detect some cleared errors and will continue processing. For other cleared errors, you must give ADP a command to retry through the CLI or with the ACO button. This causes ADP to clear the rejected DHCP server list for all ports and retry any processing that failed. If still in a halted state after 15 min, ADP times out and reboots the system. During the reboot, ADP will attempt to run again.

If ADP is halted, the major and minor alarm LEDs on the Alarm module indicate the ADP stage. [Table 31](#) describes the LED combinations and corresponding ADP stage.

**Table 31: ADP Stage LED Indicators**

| ADP Stage               | Major Alarm LED | Minor Alarm LED |
|-------------------------|-----------------|-----------------|
| Self-discovery          | Off             | Off             |
| Network discovery       | Off             | On              |
| Configuration discovery | On              | Off             |
| Test and commit         | On              | On              |

ADP runs in the background to allow continued CLI access for status queries and troubleshooting. Periodic progress updates are sent to the console and can be viewed through a connected PC. Additionally, dump commands are available to display information and detailed logs about ADP during and after running on the system. The logs are not retained over a chassis reboot. After ADP successfully completes, or if it is manually terminated, the system sends a command to the BOF to remove the ADP keyword. Any temporary configuration done by ADP is removed; however, network configuration and remote access remain enabled to allow the 7705 SAR-18 to be manually provisioned remotely. ADP does not run again on future system reboots unless it is re-enabled using the CLI.

## Establishing 7705 SAR-18 Management Connections

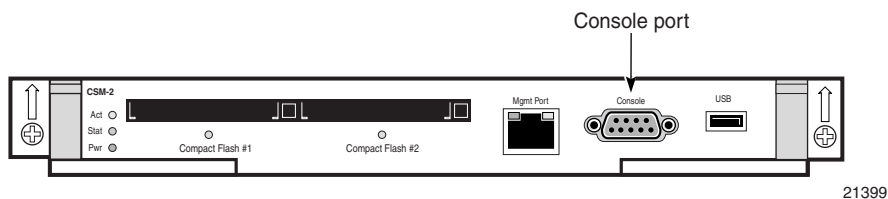
There are two ways to access management of the 7705 SAR-18:

- console connection
- Telnet connection

### Console Connection

The Console port on the CSM is a 9-pin D-sub (DB9) serial interface connector. See [Figure 42](#). See [Console Port Pinouts](#) for pinout information.

**Figure 42: 7705 SAR-18 Console Port Connection**



To establish a console connection, you need the following:

- an ASCII terminal or a PC running terminal emulation software set to the parameters shown in [Table 32](#)
- an EIA/TIA-232 serial cable with a female DB9 connector

**Table 32: Console Port Settings**

| Parameter    | Value   |
|--------------|---------|
| Gender       | DTE     |
| Baud Rate    | 115 200 |
| Data Bits    | 8       |
| Parity       | None    |
| Stop Bits    | 1       |
| Flow Control | None    |

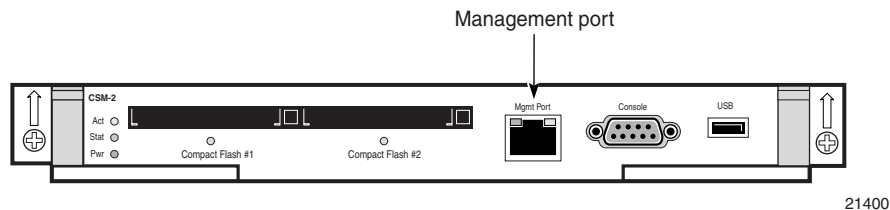
To establish a console connection:

- Step 1.** Connect the terminal to the Console port on the front panel (see [Figure 42](#)) using the serial cable.
- Step 2.** Power on the terminal.
- Step 3.** Establish the connection by pressing the <Enter> key a few times on your terminal keyboard.
- Step 4.** At the router prompt, enter the login and password.  
 The default login is `admin`.  
 The default password is `admin`.

## Telnet Connection

The management port on the CSM is an RJ-45 connector that provides a 10/100 Mb/s Ethernet management interface. See [Figure 43](#). This interface is accessed using Telnet and provides the same user and administrator options as those available through the console port. You need a CAT5 Ethernet cable to connect to the management port. See [Management Port Pinouts](#) for the RJ-45 connector pinout information. See [Running Telnet](#) for information on how to run Telnet.

**Figure 43: 7705 SAR-18 Management Port Connection**



You can access the 7705 SAR-18 management port from a PC or workstation connected to the network once the following conditions are met:

- the 7705 SAR-18 has successfully initialized
- the Management port has been configured using the `bof>address` command (see **CLI Syntax**)

**CLI Syntax:** `bof`

```
address ip-prefix/ip-prefix-length [primary |  
secondary]  
where:  
ip-prefix is in the a.b.c.d format  
ip-prefix-length is a value in the range [0..32]
```

For more information about configuring router parameters, refer to the 7705 SAR OS Router Configuration Guide.

## Running Telnet

After the IP parameters are configured, the CLI can be accessed with a Telnet connection. To establish a Telnet connection, run a Telnet program and issue the Telnet command, followed by the IP address.

The following displays an example of a Telnet login:

```
C:\>telnet 192.168.1.xx1  
Login: admin  
Password: #####  
  
ALU-1#
```

The default login is `admin`.  
The default password is `admin`.

---

# Provisioning CSM and Adapter Card Parameters

## Provisioning Requirements

The CSM does not require provisioning. However, the IOM 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 (the slot number is always 1 and the card type is always `iom-sar`). Adapter cards must be provisioned before their ports can be configured.

Provision the CSM and adapter card parameters in the following order:

- 1. Card slot number (use the `card slot-number` command)
- 2. Card type (use the `card-type card-type` command)
- 3. Adapter card slot number (use the `mda mda-number` command)
- 4. Adapter card type (use the `mda mda-type` command; see [Adapter Cards](#) for the adapter card types supported in Release 4.0)
- 5. Ports

## Card and Card-Type Commands

In the `config` context, activate the IOM on the CSM using the `card` and `card-type` CLI commands to specify the IOM.



**Note:** For the 7705 SAR-18, when specifying the IOM, the `slot-number` value is always 1 and the `card-type` is always `iom-sar`.

| Command                                  | Example                        |
|--|--------------------------------|
| Step 1. <code>card slot-number</code>    | <code>card 1</code>            |
| Step 2. <code>card-type card-type</code> | <code>card-type iom-sar</code> |

## MDA and MDA-Type Commands

In the CLI `config` context, 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 adapter card slot in the 7705 SAR-18 chassis (numbered sequentially 1 to 12 from left to right; for example, 1/1).

In the `show` context, adapter cards are identified as “1/*n*”, where “1” is the slot number and “*n*” is the *mda-number*. For example, the command `show mda 1 / 1` displays information on the adapter card in slot MDA 1.

After the IOM is activated, continue in the `config` context with the following CLI commands to provision the adapter card(s). In the example below, an 8-port Ethernet Adapter card version 2 is provisioned in slot MDA 1 and a 16-port T1/E1 ASAP Adapter card version 2 is provisioned in slot MDA 3

| Command                                | Example                        |
|--|--------------------------------|
| Step 1. <code>mda mda-number</code>    | <code>mda 1</code>             |
| Step 1. <code>mda-type mda-type</code> | <code>mda-type a8-ethv2</code> |
| Step 2. <code>exit</code>              | <code>exit</code>              |

To provision additional adapter cards, continue the configuration process with Step 4:

|  |                                   |
|--|-----------------------------------|
| Step 3. <code>mda mda-number</code>    | <code>mda 3</code>                |
| Step 4. <code>mda-type mda-type</code> | <code>mda-type a16-chdslv2</code> |
| Step 5. <code>exit</code>              | <code>exit</code>                 |

## Example

The following example displays the commands required to configure an 8-port Ethernet Adapter card version 2 in slot MDA 1 and a 16-port T1/E1 ASAP Adapter card version 2 in slot MDA 3:

```
ALU-1>config# card 1
ALU-1>config>card# card-type iom-sar
ALU-1>config>card# mda 1
ALU-1>config>card>mda# mda-type a8-ethv2
ALU-1>config>card>mda# exit
ALU-1>config>card# mda 3
ALU-1>config>card>mda# mda-type a16-chdslv2
ALU-1>config>card>mda# exit
```

The following CLI display reflects the configuration example shown above:

```
ALU-1>config# info
. . .
-----
echo "Card Configuration"
#-----
    card 1
      card-type iom-sar
      mda 1
        mda-type a8-ethv2
      exit
      mda 3
        mda-type a16-chdslv2
      exit
    exit
-----
ALU-1>config#
```

For more information on card, adapter card, and port configuration, refer to the 7705 SAR OS Interface Configuration Guide, “Card, Adapter Card, and Port Command Reference”.

---

# 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.

In the example below, an 8-port Ethernet Adapter card version 2 in slot 1 is being removed. In this example, only the port configuration must be removed.

| Command Syntax                    | Example                 |
|-----------------------------------|-------------------------|
| Step 1. <code>port port-id</code> | <code>port 1/1/5</code> |
| Step 2. <code>shutdown</code>     | <code>shutdown</code>   |



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

|                                       |                       |
|---------------------------------------|-----------------------|
| Step 3. <code>exit</code>             | <code>exit</code>     |
| Step 4. <code>card slot-number</code> | <code>card 1</code>   |
| Step 5. <code>mda mda-slot</code>     | <code>mda 1</code>    |
| Step 6. <code>shutdown</code>         | <code>shutdown</code> |
| Step 7. <code>exit</code>             | <code>exit</code>     |
| Step 8. <code>no mda mda-slot</code>  | <code>no mda 1</code> |

You can now remove the installed card, and replace it if required; see [Removing an Adapter Card](#) or [Replacing an Adapter Card](#). If you are simply removing the card, insert a filler plate in the empty slot; see [Installing a Filler Plate](#) for instructions. If you are replacing the card with a different type, provision the new card before installing it.

---

---

## In This Chapter

This chapter provides information on the LEDs that are on the 7705 SAR-18. The LEDs are found on the front of the Alarm module, CSMs, and the individual adapter cards:

- [Alarm Module LEDs on page 162](#)
- [CSM LEDs on page 165](#)
- [Adapter Card LEDs on page 167](#)

## Alarm Module LEDs

The Alarm module has LEDs that show the fan status, power status, and critical, major, and minor alarm indications.

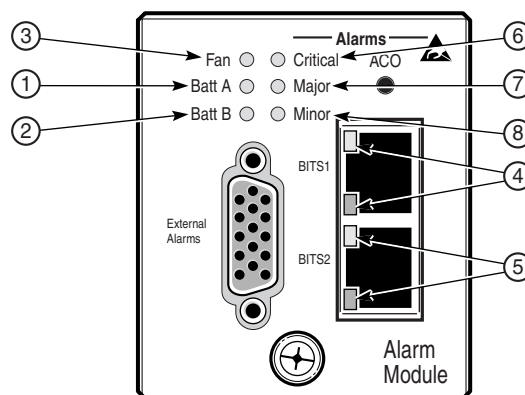
The Alarm module also has an Audible Alarm Cutoff/Lamp Test button (labeled ACO) that verifies the operability of the LED lamps on the CSM, Alarm module, Fan module, and adapter cards equipped with LEDs. The ACO button also controls the Automatic Discovery Protocol (ADP) interface during startup. As well, the ACO button turns off all external alarm relay control bits until the next new alarm condition.

If ADP is not running on the system, and the ACO button is pressed and held for 3 s, the LED lamp test is enabled—the Alarm module LEDs (with the exception of the fan and power feed LEDs) temporarily illuminate as shown in [Table 33](#), and the CSM LEDs (with the exception of the management port and power LEDs) temporarily illuminate as shown in [Table 34](#). When the ACO button is released, the LEDs return to their pre-lamp test state. The Alarm LEDs turn off and stay unlit until the next new alarm condition.

If ADP is running on the system, and the ACO button is pressed and held for 3 s, the ADP interface is enabled. You can also use the ACO/LT button to terminate ADP at any time. See [Automatic Discovery Protocol](#) for more information on ADP.

[Figure 44](#) shows the LEDs on the Alarm module faceplate. [Table 33](#) describes the LED activity.

**Figure 44: Alarm Module LEDs**



21401

Table 33: Alarm Module LEDs

| Key | Label    | Description               | LED Activity When ACO Button Pressed | Status Condition  |
|-----|----------|---------------------------|--------------------------------------|---|
| 1   | Batt A   | Power feed A status       | None                                 | <b>Green (solid):</b> Valid power on feed A<br><b>Unlit:</b> No power or faulty power on feed A   |
| 2   | Batt B   | Power feed B status       | None                                 | <b>Green (solid):</b> Valid power on feed B<br><b>Unlit:</b> No power or faulty power on feed B   |
| 3   | Fan      | Fan status                | None                                 | <b>Red (solid):</b> Fan module not present, or Fan module present, faulty power to Fan module<br><b>Green (solid):</b> Fan module present, all fans functioning normally<br><b>Amber (solid):</b> Fan module present, one or more fans not functioning  |
| 4   | BITS1    | BITS1 clock source status | Turns green or amber                 | <b>Green (solid):</b> Valid clock source received<br><b>Amber (solid):</b> BITS input port configured with no valid clock source received<br><b>Unlit:</b> Operationally down/disabled/shutdown   |
| 5   | BITS2    | BITS2 clock source status | Turns green or amber                 | <b>Green (solid):</b> Valid clock source received<br><b>Amber (solid):</b> BITS input port configured with no valid clock source received<br><b>Unlit:</b> Operationally down/disabled/shutdown   |
| 6   | Critical | Critical alarm status LED | Turns red                            | <b>Red (solid):</b> One of the following critical alarm conditions exists: <ul style="list-style-type: none"> <li>• a power feed failure</li> <li>• a critical fan failure</li> <li>• a critical external alarm input condition</li> </ul> <b>Unlit:</b> There is no critical alarm condition present |
| 7   | Major    | Major alarm status LED    | Turns red                            | <b>Red (solid):</b> One of the following major alarm conditions exists: <ul style="list-style-type: none"> <li>• an overheating condition</li> <li>• a major external alarm input condition</li> </ul> <b>Unlit:</b> There is no major condition present  |

Table 33: Alarm Module LEDs (Continued)

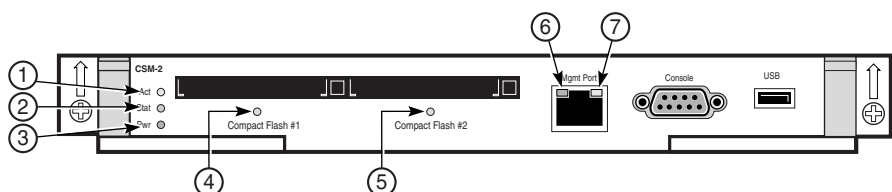
| Key | Label | Description            | LED Activity When ACO Button Pressed | Status Condition   |
|-----|-------|------------------------|--------------------------------------|--|
| 8   | Minor | Minor alarm status LED | Turns amber                          | <b>Amber (solid):</b> The following minor alarm condition exists: <ul style="list-style-type: none"><li>• a minor external alarm input condition</li></ul> <b>Unlit:</b> There is no minor condition present |

---

## CSM LEDs

Figure 45 shows the LEDs on the CSM faceplate. Table 34 describes the LED activity.

Figure 45: CSM LEDs



21402

Table 34: CSM LEDs

| Key | Label            | Description            | LED Activity When ACO Button Pressed | Status Condition  |
|-----|------------------|------------------------|--------------------------------------|---|
| 1   | Act              | CSM activity           | Green                                | <b>Green (solid):</b> The CSM is active<br><b>Green (blinking):</b> The CSM is in standby mode  |
| 2   | Stat             | CSM status             | Green                                | <b>Green (solid):</b> The CSM is operationally up<br><b>Green (blinking):</b> The CSM is initializing<br><b>Amber (solid):</b> The CSM is operationally down, administratively up<br><b>Unlit:</b> The CSM is operationally down  |
| 3   | Pwr              | CSM power              | None                                 | <b>Blue:</b> The CSM has valid power<br><b>Unlit:</b> There is no power to the CSM, or the CSM has faulty power   |
| 4   | Compact Flash #1 | Compact Flash 1 status | Green                                | <b>Green (solid):</b> The compact flash card is operational (a read or write process is in progress); do not remove<br><b>Amber (blinking):</b> The compact flash card is faulty<br><b>Amber (solid):</b> The compact flash card is user-disabled; it can be safely removed<br><b>Unlit:</b> There is no compact flash card installed, or the card is not operational |

Table 34: CSM LEDs (Continued)

| Key | Label            | Description                          | LED Activity When ACO Button Pressed | Status Condition   |
|-----|------------------|--------------------------------------|--------------------------------------|--|
| 5   | Compact Flash #2 | Compact Flash 2 status               | Green                                | <p><b>Green (solid):</b> The compact flash card is operational (a read or write process is in progress); do not remove</p> <p><b>Amber (blinking):</b> The compact flash card is faulty</p> <p><b>Amber (solid):</b> The compact flash card is user-disabled; it can be safely removed</p> <p><b>Unlit:</b> There is no compact flash card installed, or the card is not operational</p> |
| 6   | Mgmt Port        | Management Ethernet port link status | None                                 | <p><b>Green (solid):</b> There is a valid communication link</p> <p><b>Unlit:</b> There is no link, or the link is operationally down/disabled/shutdown</p>  |
| 7   | Mgmt Port        | Management Ethernet port activity    | None                                 | <p><b>Amber (blinking):</b> There is receive or transmit activity on the link</p> <p><b>Unlit:</b> The link is down, disabled, or there is no activity on the link</p>   |

## Adapter Card LEDs

Adapter card LEDs are described in the specific adapter card installation guides.

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LEDs

# Field-Replaceable Units

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## In This Chapter

This chapter provides information on replacing field-replaceable units (FRUs) in the 7705 SAR-18 chassis. All 7705 SAR-18 components, with the exception of the shelf itself, are field-replaceable:

- [Warnings and Notes on page 170](#)
- [Removing and Replacing a CSM on page 171](#)
  - [Warnings and Notes on page 171](#)
  - [Removing a CSM on page 172](#)
  - [Replacing a CSM on page 174](#)
- [Removing and Replacing the Alarm Module on page 178](#)
  - [Warnings and Notes on page 178](#)
  - [Removing the Alarm Module on page 178](#)
  - [Replacing the Alarm Module on page 180](#)
- [Removing and Replacing the Fan Module on page 181](#)
  - [Warnings and Notes on page 181](#)
  - [Removing the Fan Module on page 182](#)
  - [Replacing the Fan Module on page 184](#)
- [Removing and Replacing the Fan Filter on page 185](#)
- [Removing and Replacing an Adapter Card on page 187](#)
  - [Warnings and Notes on page 187](#)
  - [Removing an Adapter Card on page 188](#)
  - [Replacing an Adapter Card on page 190](#)

## Warnings and Notes



**Danger:** Only trained and qualified personnel should install or replace this equipment.



**Warnings:**

- ESD damage can occur if 7705 SAR-18 components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-18 (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- If power cables are connected to a circuit panel, always use caution when removing and replacing field-replaceable components.
- Always place the 7705 SAR-18 components on an anti-static surface.
- Filler plates are required on all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



**Note:** Unless stated otherwise in this installation guide, replacing an FRU requires modifying the configuration of the FRU before the FRU can be removed. Typically, this means using the `shutdown` command to put the element(s) in an administratively “down” state.

---

# Removing and Replacing a CSM

## Warnings and Notes

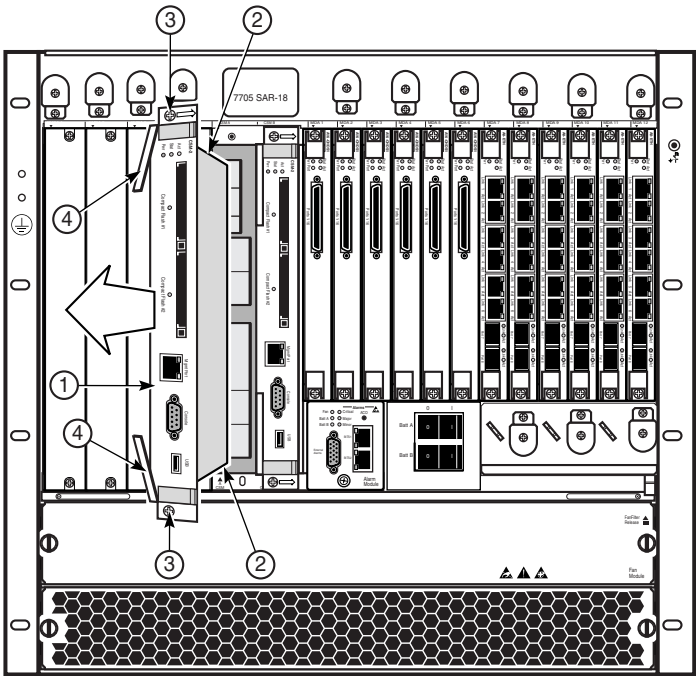
**Notes:**

- When replacing CSMs, modifying the configuration is not required.
- The 7705 SAR-18 requires at least one CSM, which can be installed in slot CSM A or CSM B. For redundancy, install a CSM in slots A and B.
- Do not force an adapter card into a CSM slot.
- Do not force a CSM into an adapter card slot.
- When removing a CSM, always use the ejector levers to make sure that the connector pins disconnect from the backplane.
- In a single CSM system, removing the active CSM causes the system to shut down. If you are not immediately installing a replacement CSM, cover the empty slot with a filler plate and power off the system until the CSM is replaced.

# Removing a CSM

Figure 46 illustrates removing a CSM. Table 35 describes the CSM removal features.

Figure 46: Removing a CSM



21403

Table 35: CSM Removal and Replacement Features

| Key | Description   |
|-----|---------------|
| 1   | CSM card      |
| 2   | Slot guide    |
| 3   | Captive screw |
| 4   | Ejector lever |

Required tools:

- Phillips screwdriver

To remove a CSM:

**Step 1.** Disconnect all cable connections to the CSM.

**Step 2.** Loosen the captive screws that fasten the CSM to the chassis.

**Step 3.** Unlock the locking button on each latch and extend the latch levers to unseat the backplane connectors.

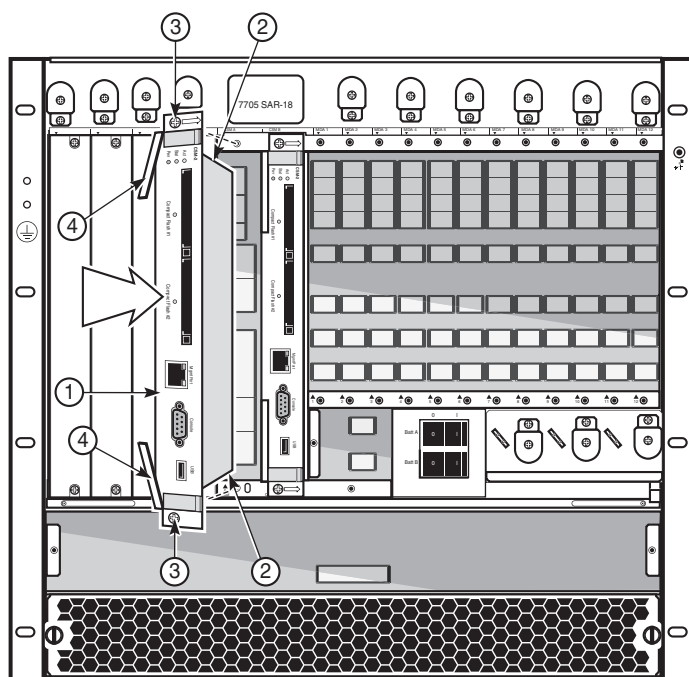
**Step 4.** Pull the CSM out of the slot using the ejector levers. Place the CSM on an anti-static surface.

**Step 5.** If you are not replacing the CSM immediately, install a CSM filler plate to cover the empty slot. See [Installing a Filler Plate](#) for instructions. If you are replacing the CSM, see [Replacing a CSM](#).

## Replacing a CSM

Figure 47 illustrates replacing a CSM. Table 35 describes the CSM replacement features.

**Figure 47: Replacing a CSM**



21404

Required tools:

- torque driver for Phillips screws

To replace a CSM:

**Step 1.** Remove the old CSM from the chassis. See [Removing a CSM](#) for instructions.

**Step 2.** Remove the new CSM from the packaging. Do not touch the printed circuit board or connector pins.

**Step 3.** Install the replacement CSM. See [Installing a CSM](#).

**Step 4.** Verify the status of the LEDs. See [CSM LEDs](#).

## Replacing a Compact Flash 3 Card

To facilitate commissioning, the compact flash 3 card (CF3) is user-replaceable; however, it must be replaced by a supported compact flash card that has the correct files. The files are:

- bof.cfg – boot option file
- boot.ldr – bootstrap software
- config.cfg – default configuration file
- TiMOS-m.n.Yz
  - m – major release number
  - n – minor release number
  - Y – A (alpha release), B (beta release), M (maintenance release), or R (released software)
  - z – version number

These files can be transferred to the new compact flash and from one compact flash to another on the same CSM by:

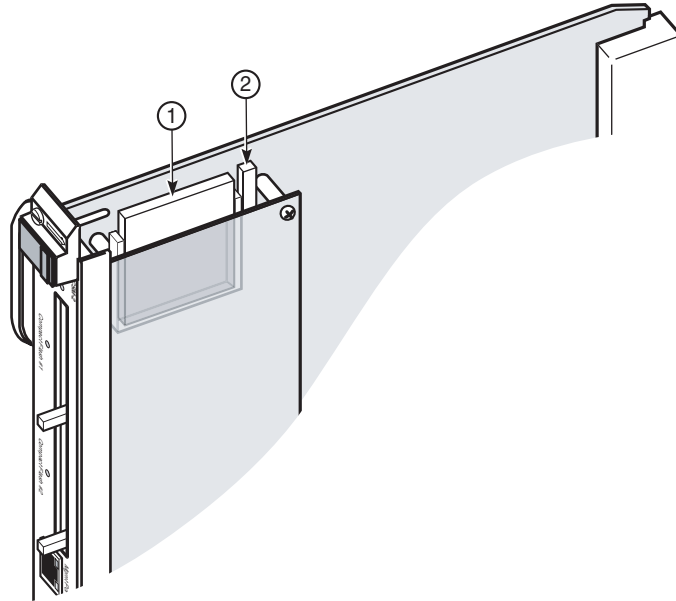
- copying the files from another compact flash to a PC and then transferring the files to the new compact flash
- accessing a 7705 SAR node via FTP and transferring the files from the node to the new compact flash



### Notes:

- CF3 is hidden behind the CSM faceplate and is accessible only on the base board; see [Figure 48](#). To replace CF3, you must first remove the CSM from the chassis.
- The installed compact flash is 2 Gbytes. Larger-capacity compact flashes may be ordered from Alcatel-Lucent; see [Table 3](#).

**Figure 48: Location of the CF3**



21489

To replace a CF3 card:

- Step 1.** Remove the CSM from the chassis; see [Removing a CSM](#) for instructions.
- Step 2.** Remove the new flash card from the packaging.
- Step 3.** Remove the CF3 card that is being replaced; see [Figure 48](#) for its location on the CSM base board.



**Danger:** The CSM base board may be hot; take care when handling it.

Press the ejector button (item 2 on [Figure 48](#)) to release the compact flash card and extract the flash card (item 1 on [Figure 48](#)) from its seating. Place the extracted flash card on an anti-static surface.

- Step 4.** Insert the new flash card into the slot until it is fully seated.
- Step 5.** Replace the CSM; see [Replacing a CSM](#) for instructions.

## Replacing a Compact Flash 1 and Compact Flash 2 Card

You can replace the compact flash 1 card or the compact flash 2 card. The cards are installed in the Compact Flash 1 (CF1) and/or Compact Flash 2 (CF2) slots and are accessible from the front of the CSM faceplate (see [Figure 6](#)). See [Table 3](#) for a list of Alcatel-Lucent orderable compact flash cards.



**Note:** In the case of a faulty compact flash card, its corresponding LED on the active CSM blinks amber.

To replace a compact flash 1 card or compact flash 2 card:

- Step 1.** Disable the compact flash card by performing a shutdown operation on the card.
  - Step 2.** Check the compact flash status LEDs on the CSM. Make sure the compact flash status LED for the card you are replacing is solid amber before you eject the card.
  - Step 3.** Press the ejector button next to the flash card. This ejects the compact flash card from its slot.
  - Step 4.** Carefully pull the card out of the slot and place it on an anti-static surface.
  - Step 5.** Remove the new flash card from the packaging.
  - Step 6.** Insert the flash card into the slot until it is fully seated.
-

## Removing and Replacing the Alarm Module

### Warnings and Notes



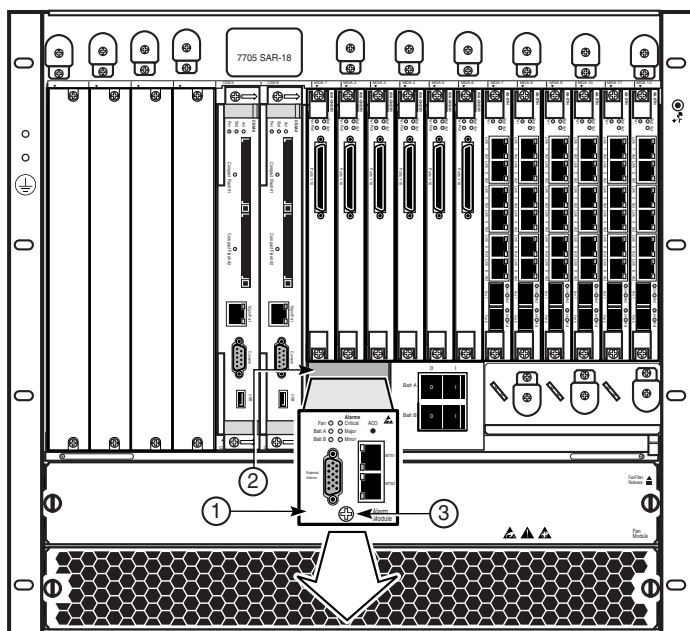
#### Warnings:

- Removal of the Alarm module may result in thermal and EMC requirements not being met.
- Removal of the Alarm module will prevent the BITS input port signals from being used for synchronization. Fall-back mechanisms, such as implementing line timing, IEEE1588v2, ACR, or SyncE, or entering a hold-over state, will take effect. Additionally, the external alarm inputs will be prevented from being used.

### Removing the Alarm Module

Figure 49 illustrates removing the Alarm module. Table 36 describes the Alarm module removal features.

Figure 49: Removing the Alarm Module



21405

**Table 36: Alarm Module Removal and Replacement Features**

| Key | Description   |
|-----|---------------|
| 1   | Alarm module  |
| 2   | Slot guide    |
| 3   | Captive screw |

Required tools:

- Phillips screwdriver

To remove an Alarm module:

**Step 1.** Disconnect all cable connections to the Alarm module.

**Step 2.** Use a Phillips screwdriver to loosen the captive screw that fastens the Alarm module to the chassis.

**Step 3.** Carefully pull the Alarm module outward to unseat the backplane connectors.

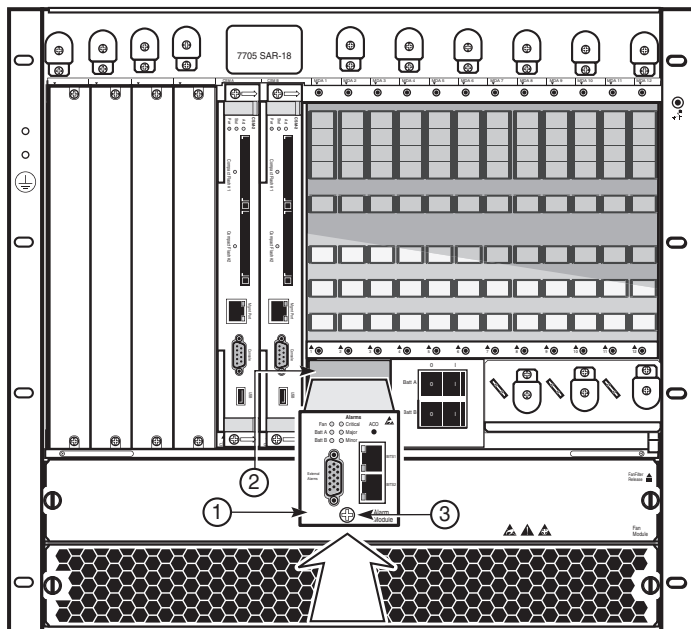
**Step 4.** Pull the Alarm module completely out of the slot. Place the Alarm module on an anti-static surface.

**Step 5.** If you are replacing the Alarm module, see [Replacing the Alarm Module](#).

## Replacing the Alarm Module

Figure 50 illustrates replacing the Alarm module. Table 36 describes the Alarm module replacement features.

**Figure 50: Replacing the Alarm Module**



21395

Required tools:

- Phillips screwdriver

To replace an Alarm module:

- Step 1.** Remove the old Alarm module from the chassis. See [Removing the Alarm Module](#) for instructions.
- Step 2.** Remove the new Alarm module from the packaging. Do not touch the printed circuit board or connector pins.
- Step 3.** Install the replacement Alarm module. See [Installing the Alarm Module](#).
- Step 4.** Reconnect all required cables.
- Step 5.** Verify the status of the LEDs. See [Alarm Module LEDs](#).

## Removing and Replacing the Fan Module

### Warnings and Notes



**Danger:** Always keep your fingers away from rotating fan blades.

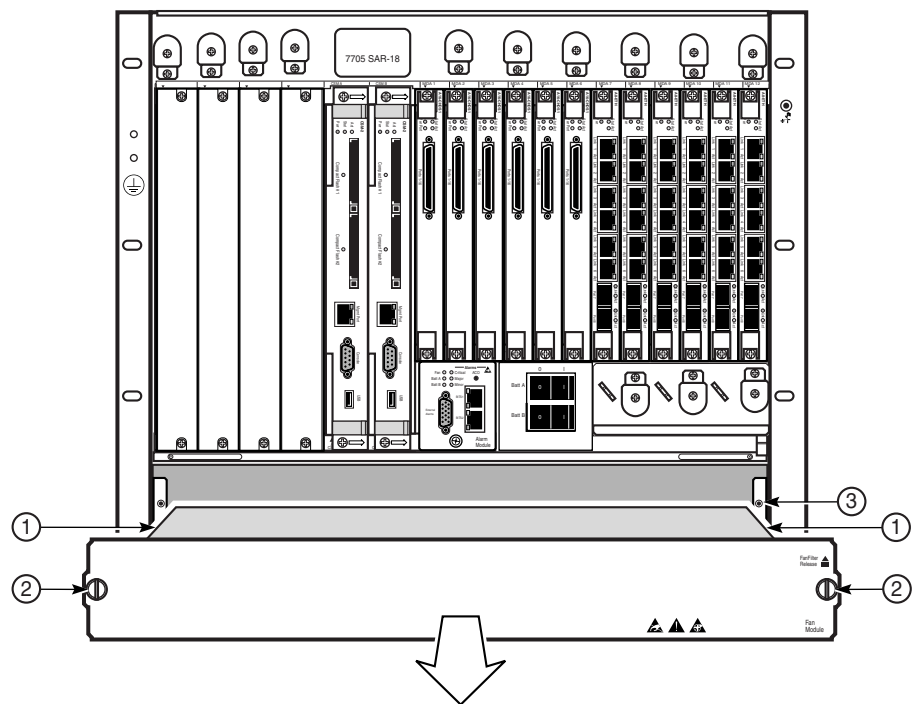


**Warning:** The 7705 SAR-18 chassis operates safely for up to 5 min while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent the system over-heating.

# Removing the Fan Module

Figure 51 illustrates removing the Fan module. Table 37 describes the Fan module removal features.

Figure 51: Removing the Fan Module



21406

Table 37: Fan Module Removal and Replacement Features

| Key | Description         |
|-----|---------------------|
| 1   | Slot guide          |
| 2   | Captive screw       |
| 3   | Threaded receptacle |

Required tools:

- flathead screwdriver

To remove the Fan module:

**Step 1.** Loosen the captive screws on the Fan module faceplate.

**Step 2.** Grab the captive screws. Carefully pull the Fan module part-way out of the chassis to disengage the backplane connectors (approximately 1 in.) and to allow the fans to stop spinning.



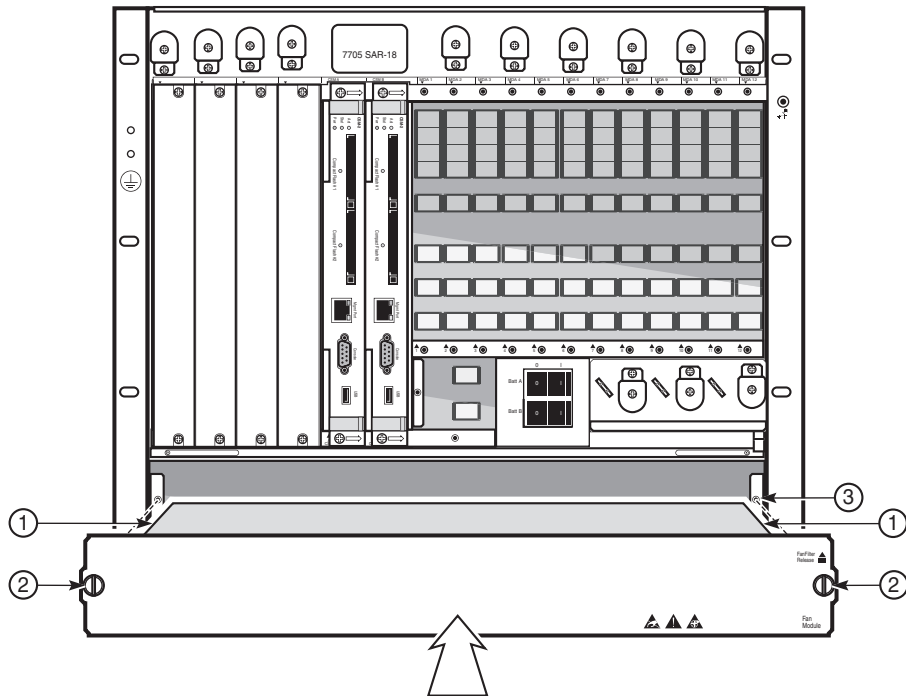
**Danger:** The fans are exposed on the top and bottom of the fan tray. DO NOT put your fingers or any tool in the Fan module if the fans are still spinning. Wait until the fans stop spinning (about 20 s) before completely removing the Fan module from its slot.

**Step 3.** When the fans stop spinning, pull the Fan module completely out of the slot.

## Replacing the Fan Module

Figure 52 illustrates replacing the Fan module. Table 37 describes the Fan module replacement features.

Figure 52: Replacing the Fan Module



21407

Required tools:

- flathead screwdriver

To replace the Fan module:

**Step 1.** Remove the old Fan module from the chassis. See [Removing the Fan Module](#).

**Step 2.** Unpack the replacement Fan module from the protective packaging. Place the Fan module on an anti-static surface.

**Step 3.** Install the replacement Fan module. See [Installing the Fan Module](#).

**Step 4.** Verify the status of the LEDs (found on the Alarm module). See [Alarm Module LEDs](#).

## Removing and Replacing the Fan Filter

You should replace the fan filter (3HE04995AA) at regular intervals, typically every 90 days. [Figure 53](#) and [Figure 54](#) illustrate replacing the fan filter, and [Table 38](#) describes the replacement features.

To replace the fan filter:

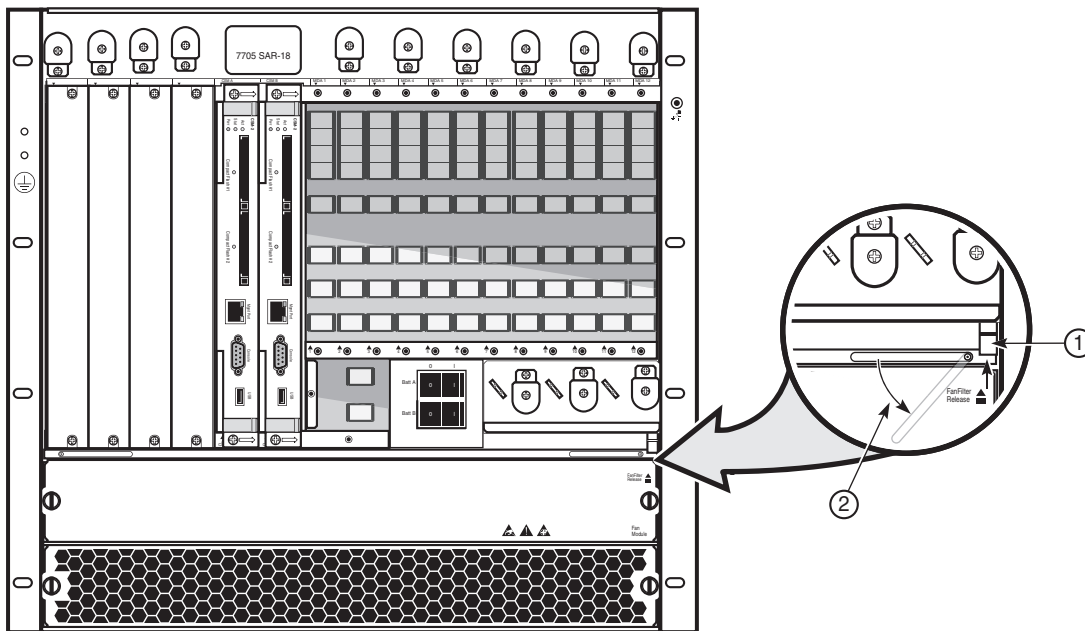
**Step 1.** Remove the new filter from the packaging and place it on an anti-static work surface.

**Step 2.** Remove the old fan filter.

Slide the two thin plastic strips on the front of the old fan filter downward (item 2 in [Figure 53](#)) and hold up the top of the small metal latch located right above the Fan Filter Release label (item 1 in [Figure 53](#)). Grasp the fan filter by the front edge or by the two plastic strips and carefully slide it out of its slot. See [Figure 54](#).

**Step 3.** Install the new fan filter. See [Installing the Fan Filter](#).

**Figure 53: Releasing the Fan Filter Latches**

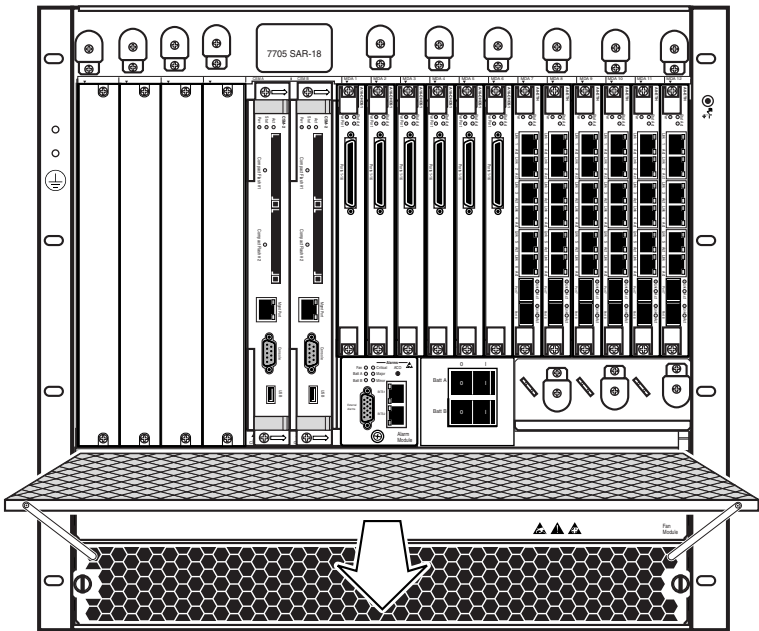


21455

Table 38: Fan Filter Removal Features

| Key | Description              |
|-----|--------------------------|
| 1   | Fan filter release latch |
| 2   | Fan filter strips        |

Figure 54: Removing the Fan Filter



21456

# Removing and Replacing an Adapter Card

## Warnings and Notes



**Danger:** Invisible laser radiation can be emitted from the aperture ports of an adapter card when no cable is connected. Avoid exposure and do not stare into open apertures.



### Warnings:

- Always place components on an anti-static surface.
- ESD damage can occur if 7705 SAR-18 components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to a site grounding point (typically, one of the ground studs on the 7705 SAR-18 chassis or a properly grounded rack or work bench).
- Do not power up a 7705 SAR-18 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card SFP ports.
- Filler plates are required on all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



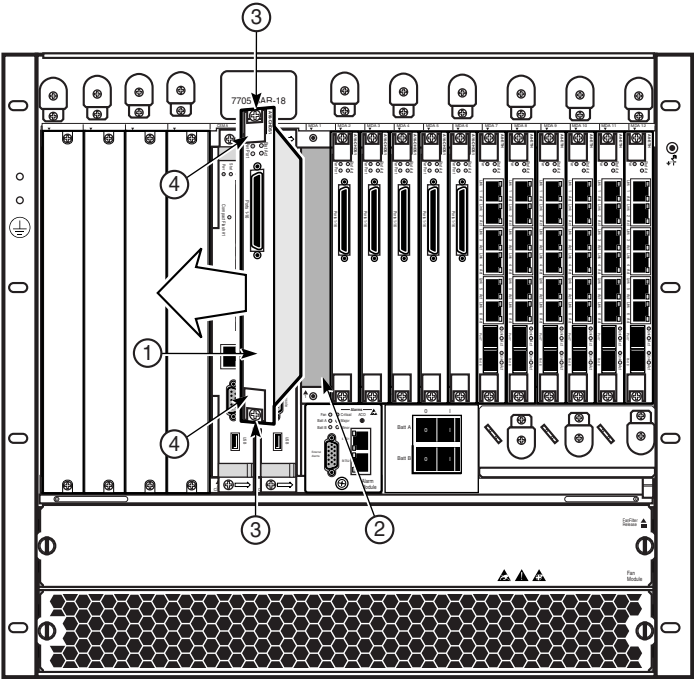
### Notes:

- This section contains general information on replacing an adapter card. For information on replacing a specific adapter card, as well as information on its connectors and LEDs, refer to the appropriate adapter card installation guide.
- Before you replace an adapter card, see [Removing an Adapter Card Configuration](#).
- Ports cannot be configured if the adapter card is not provisioned.
- Adapter card slots are numbered MDA 1 through 12.
- Adapter cards and their slots are identified on the CLI as `mda` slots.
- When you remove an adapter card, always use the ejector levers to ensure that the connector pins disconnect from the backplane.

# Removing an Adapter Card

Figure 55 illustrates removing an adapter card. In the example, a 16-port T1/E1 ASAP Adapter card is shown being removed. Table 39 describes the adapter card removal features.

Figure 55: Removing an Adapter Card



21408

Table 39: Adapter Card Removal and Replacement Features

| Key | Description   |
|-----|---------------|
| 1   | Adapter card  |
| 2   | Slot guide    |
| 3   | Captive screw |
| 4   | Ejector lever |

Required tools:

- Phillips screwdriver

To remove an adapter card:

**Step 1.** Disconnect all cables from the adapter card ports.

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



**Note:** The adapter card cannot be removed if the captive screws are tightened.

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

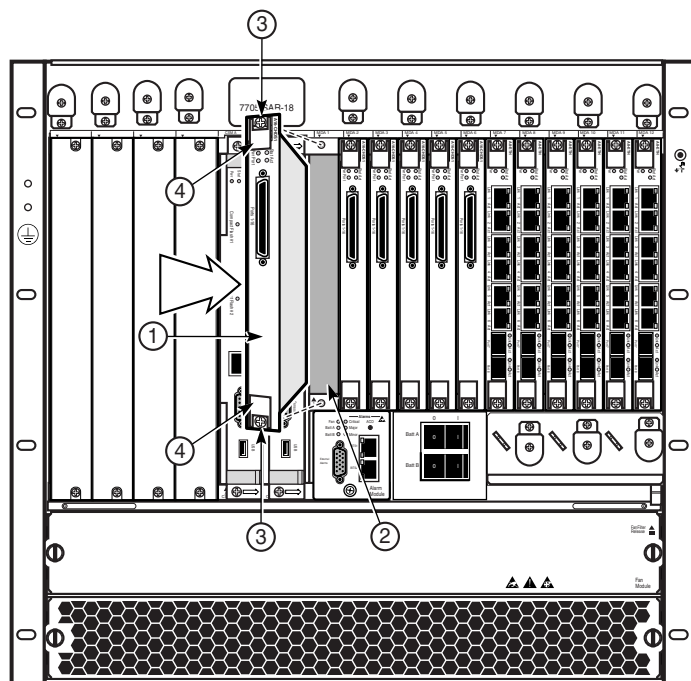
**Step 4.** Grip the adapter card by the ejector levers and slide the card out of the slot. Place the adapter card on an anti-static surface.

**Step 5.** If you are not replacing the adapter card immediately, cover the empty adapter card slot with a filler plate. See [Installing a Filler Plate](#) for instructions on installing a filler plate. If you are replacing the adapter card, see [Replacing an Adapter Card](#).

## Replacing an Adapter Card

Figure 56 illustrates replacing an adapter card. In the example, a 16-port T1/E1 ASAP Adapter card is shown being replaced. Table 39 describes the adapter card replacement features.

Figure 56: Replacing an Adapter Card



21396

Required tools:

- torque driver for Phillips screws

To replace an adapter card:

- Step 1.** Remove the old adapter card. See [Removing an Adapter Card](#).
- Step 2.** Unpack the replacement adapter card from the protective packaging and place the card on an anti-static work surface. Avoid touching board components and connector pins.
- Step 3.** With the ejector levers rotated inwards, hold the adapter card by the levers, align the card with the slot guides, and slide the adapter card into the slot.

- Step 4.** Press the adapter card firmly into the slot. Make sure that the card connectors are seated in the backplane connectors.
- Step 5.** Secure the card in place by tightening the captive screws. Do not over-tighten. The recommended torque is 3 to 4 lbf-in (0.34 to 0.45 N·m).
- Step 6.** Check the Power LED on the adapter card faceplate. If the chassis is powered ON, the Power LED on the adapter card is lit (blue). Refer to the adapter card installation guide for information on LEDs for the specific adapter card.
- Step 7.** Reconnect all previously removed network cables to the adapter card ports.
-



# Pinout Assignments

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## In This Chapter

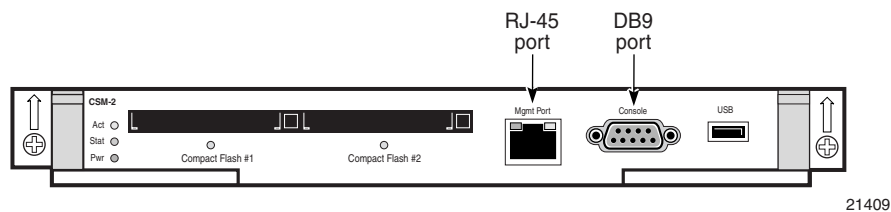
This chapter provides information on the pinout assignments for the port connectors on the 7705 SAR-18:

- [CSM Ports and Pinouts on page 194](#)
  - [Management Port Pinouts on page 194](#)
  - [Console Port Pinouts on page 195](#)
- [Alarm Module Ports and Pinouts on page 197](#)
  - [BITS Ports and Pinouts on page 197](#)
  - [External Alarms Connector Pinouts on page 199](#)
- [RJ-45 Distribution Panel Pinouts on page 200](#)
- [Adapter Card Pinouts on page 201](#)

## CSM Ports and Pinouts

The CSM faceplate has an RJ-45 connector that provides a 10/100 Mb/s Ethernet management interface that supports full/half duplex and is capable of autonegotiation. You must provide a shielded CAT5 Ethernet cable to connect to the port. The CSM faceplate also has a 9-pin D-sub (DB9) serial interface console port that can be used as a local craft interface and can be configured for a baud rate of 9600, 19200, 38400, 57600, or 115200 b/s. You must provide a shielded EIA/TIA-232 serial cable to connect to the console port. [Figure 57](#) identifies these ports.

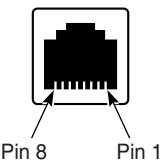
Figure 57: 7705 SAR-18 CSM Ports



## Management Port Pinouts

[Figure 58](#) shows the management port pin numbers.

Figure 58: Management Port Pin Numbers



19593

Table 40 describes the Management port pin assignments.

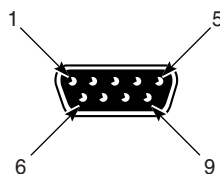
**Table 40: Ethernet Management Port Pinouts – RJ-45 Female**

| Pin | Signal | Direction | Description                           |
|-----|--------|-----------|---------------------------------------|
| 1   | TX+    | Output    | Differential transmit data – positive |
| 2   | TX-    | Output    | Differential transmit data – negative |
| 3   | RX+    | Input     | Differential receive data – positive  |
| 4   | NC     | —         | Not connected                         |
| 5   | NC     | —         | Not connected                         |
| 6   | RX-    | Input     | Differential receive data – negative  |
| 7   | NC     | —         | Not connected                         |
| 8   | NC     | —         | Not connected                         |

## Console Port Pinouts

Figure 59 shows the Console port pin numbers.

**Figure 59: Console Port Pin Numbers**



19862

Table 41 describes the Console port pin assignments. The Console port is configured for DTE mode.

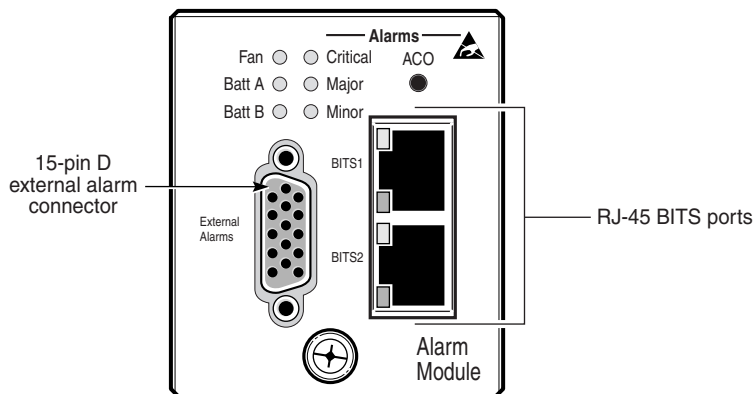
**Table 41: Console Port Pinouts – DB9 Male**

| <b>Pin</b> | <b>Signal</b> | <b>Direction</b> | <b>Description</b> |
|------------|---------------|------------------|--------------------|
| 1          | DCD           | —                | Not connected      |
| 2          | RXD           | Input            | Receive data       |
| 3          | TXD           | Output           | Transmit data      |
| 4          | DCD           | —                | Not connected      |
| 5          | GND           | Signal ground    | Signal ground      |
| 6          | DCD           | —                | Not connected      |
| 7          | RTS           | Output           | Request to send    |
| 8          | CTS           | Input            | Clear to send      |
| 9          | DCD           | —                | Not connected      |

## Alarm Module Ports and Pinouts

The Alarm module faceplate has two RJ-45 BITS ports that provide redundant clocking sources for the 7705 SAR-18 node, and a 15-pin D-sub external alarm connector that provides three sets of alarm output contacts and four alarm inputs. [Figure 60](#) identifies these ports.

**Figure 60: 7705 SAR-18 Alarm Module Ports**

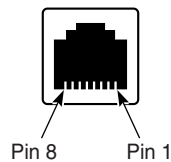


21411

## BITS Ports and Pinouts

[Figure 61](#) shows the RJ-45 BITS port pin numbers. [Table 42](#) describes the RJ-45 BITS port pin assignments.

**Figure 61: RJ-45 BITS Port Pin Numbers**



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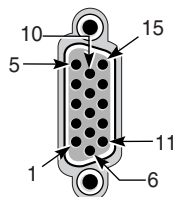
**Table 42: BITS Port Pinouts – RJ-45 Female**

| Pin    | Signal | Direction | Description       |
|--------|--------|-----------|-------------------|
| 1      | RX1    | Input     | Ring – negative   |
| 2      | RX2    | Input     | TIP - positive    |
| 3      | NC     | —         | Not connected     |
| 4      | TX1    | Output    | Ring – negative   |
| 5      | TX2    | Output    | TIP - positive    |
| 6      | NC     | —         | Not connected     |
| 7      | NC     | —         | Not connected     |
| 8      | NC     | —         | Not connected     |
| Shield | GND    | —         | Chassis connected |

## External Alarms Connector Pinouts

Figure 62 shows the External Alarms port pin numbers. Table 43 describes the External Alarms port connector pinouts.

**Figure 62: External Alarms Port Pin Numbers**



21410

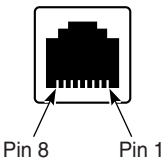
**Table 43: External Alarms Port Pinouts**

| Pin | Signal                | Direction | Wire Color   | Description                       |
|-----|-----------------------|-----------|--------------|-----------------------------------|
| 1   | Alarm 1               | Input     | White-Blue   | Critical alarm severity (default) |
| 2   | Alarm 2               | Input     | Blue-White   | Major alarm severity (default)    |
| 3   | NC                    | —         |              | Not connected                     |
| 4   | Alarm output 3, pin 2 | Output    | Red-Blue     | Contact opens on minor alarm      |
| 5   | Alarm output 3, pin 1 | Output    | Blue-Red     | Contact opens on minor alarm      |
| 6   | NC                    | —         |              | Not connected                     |
| 7   | Ground                | Reference | White-Green  | Reference output for alarm inputs |
| 8   | Alarm output 2, pin 2 | Output    | White-Slate  | Contact opens on major alarm      |
| 9   | NC                    | —         |              | Not connected                     |
| 10  | Alarm output 2, pin 1 | Output    | Slate-White  | Contact opens on major alarm      |
| 11  | Alarm 3               | Input     | White-Orange | Major alarm severity (default)    |
| 12  | Alarm 4               | Input     | Orange-White | Minor alarm severity (default)    |
| 13  | NC                    | —         |              | Not connected                     |
| 14  | Alarm output 1, pin 2 | Output    | White-Brown  | Contact closes on critical alarm  |
| 15  | Alarm output 1, pin 1 | Output    | Brown-White  | Contact closes on critical alarm  |

# RJ-45 Distribution Panel Pinouts

Figure 63 shows the pin numbering for the RJ-45 Distribution Panel RJ-45 connectors. Table 44 describes the pinout assignments. These pinout mappings follow the TIA/EIA-568-A and TIA/EIA-568-B industry standards for commercial building cabling of telecom products and services.

Figure 63: RJ-45 Distribution Panel Connector Pin Numbers



19593

Table 44: RJ-45 Distribution Panel Pinout Assignments

| Pin | Pair | Signal   |
|-----|------|----------|
| 1   | R    | Rx Ring  |
| 2   | T    | Rx Tip   |
| 3   | —    | Reserved |
| 4   | R1   | Tx Ring  |
| 5   | T1   | Tx Tip   |
| 6   | —    | Reserved |
| 7   | —    | Shield   |
| 8   | —    | Shield   |

## **Adapter Card Pinouts**

Refer to the appropriate adapter card installation guide for port and pinout information on a specific adapter card.

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# Standards and Protocol Support

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## Standards Compliance

|                 |   |
|-----------------|---|
| IEEE 802.1ag    | Service Layer OAM   |
| IEEE 802.1p/q   | VLAN Tagging  |
| IEEE 802.3      | 10BaseT   |
| IEEE 802.3ah    | Ethernet OAM  |
| IEEE 802.3u     | 100BaseTX   |
| IEEE 802.3x     | Flow Control  |
| IEEE 802.3z     | 1000BaseSX/LX   |
| IEEE 802.3-2008 | Revised base standard                                       |
| ITU-T Y.1731    | OAM functions and mechanisms<br>for Ethernet-based networks |

## Telecom Compliance

|                                      |   |
|--------------------------------------|---|
| IC CS-03 Issue 9                     | Spectrum Management and<br>Telecommunications   |
| ACTA TIA-968-A                       |   |
| AS/ACIF S016 (Australia/New Zealand) | Requirements for Customer<br>Equipment for connection to<br>hierarchical digital interfaces   |
| ITU-T G.703                          | Physical/electrical characteristics<br>of hierarchical digital interfaces   |
| ITU-T G.707                          | Network node interface for the<br>Synchronous Digital Hierarchy (SDH)   |
| ITU-T G.712-2001                     | Transmission performance<br>characteristics of pulse code<br>modulation channels  |
| ITU-T G.957                          | Optical interfaces for equipments<br>and systems relating to the<br>synchronous digital hierarchy   |
| ITU-T V.24                           | List of definitions for interchange<br>circuits between data terminal<br>equipment (DTE) and data circuit-<br>terminating equipment (DCE)       |
| ITU-T V.36                           | Modems for synchronous data<br>transmission using 60-108 kHz group<br>band circuits   |
| ITU-T X.21                           | Interface between Data Terminal<br>Equipment and Data Circuit-<br>Terminating Equipment for<br>Synchronous Operation on Public<br>Data Networks |

## Protocol Support

### ATM

|                              |  |
|------------------------------|--|
| RFC 2514                     | Definitions of Textual Conventions and<br>OBJECT_IDENTITIES for ATM<br>Management, February 1999                                   |
| RFC 2515                     | Definition of Managed Objects for ATM<br>Management, February 1999   |
| RFC 2684                     | Multiprotocol Encapsulation over ATM<br>Adaptation Layer 5   |
| af-tm-0121.000               | Traffic Management Specification<br>Version 4.1, March 1999  |
| ITU-T Recommendation I.610   | B-ISDN Operation<br>and Maintenance Principles and Functions version<br>11/95  |
| ITU-T Recommendation I.432.1 | B-ISDN user-<br>network interface - Physical layer specification:<br>General characteristics                                       |
| GR-1248-CORE                 | Generic Requirements for<br>Operations of ATM Network Elements (NEs). Issue<br>3 June 1996   |
| GR-1113-CORE                 | Bellcore, Asynchronous Transfer<br>Mode (ATM) and ATM Adaptation Layer (AAL)<br>Protocols Generic Requirements, Issue 1, July 1994 |
| AF-PHY-0086.001              | Inverse Multiplexing for ATM<br>(IMA)  |

### BFD

|                                 |   |
|---------------------------------|---|
| draft-ietf-bfd-mib-00.txt       | Bidirectional Forwarding<br>Detection Management Information Base |
| draft-ietf-bfd-base-o5.txt      | Bidirectional Forwarding<br>Detection                             |
| draft-ietf-bfd-v4v6-1hop-06.txt | BFD IPv4 and IPv6<br>(Single Hop)                                 |
| draft-ietf-bfd-multihop-06.txt  | BFD for Multi-hop<br>Paths  |

### **BGP**

- RFC 1397 BGP Default Route Advertisement
- RFC 1997 BGP Communities Attribute
- RFC 2385 Protection of BGP Sessions via MDS
- RFC 2439 BGP Route Flap Dampening
- RFC 2547bis BGP/MPLS VPNs
- RFC 2918 Route Refresh Capability for BGP-4
- RFC 3107 Carrying Label Information in BGP-4
- RFC 3392 Capabilities Advertisement with BGP-4
- RFC 4271 BGP-4 (previously RFC 1771)
- RFC 4360 BGP Extended Communities Attribute
- RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs) (previously RFC 2574bis BGP/MPLS VPNs)
- RFC 4456 BGP Route Reflection: Alternative to Full-mesh IBGP (previously RFC 1966 and RFC 2796)
- RFC 4724 Graceful Restart Mechanism for BGP - GR Helper
- RFC 4760 Multi-protocol Extensions for BGP (previously RFC 2858)
- RFC 4893 BGP Support for Four-octet AS Number Space

### **DHCP/DHCPv6**

- RFC 1534 Interoperation between DHCP and BOOTP
- RFC 2131 Dynamic Host Configuration Protocol (REV)
- RFC 3046 DHCP Relay Agent Information Option (Option 82)
- RFC 3315 Dynamic Host Configuration Protocol for IPv6

### **DIFFERENTIATED SERVICES**

- RFC 2474 Definition of the DS Field in the IPv4 and IPv6 Headers
- RFC 2597 Assured Forwarding PHB Group
- RFC 2598 An Expedited Forwarding PHB
- RFC 3140 Per-Hop Behavior Identification Codes

### **DIGITAL DATA NETWORK MANAGEMENT V.35**

- RS-232 (also known as EIA/TIA-232)

### **GRE**

- RFC 2784 Generic Routing Encapsulation (GRE)

### **IPv6**

- RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
- RFC 2462 IPv6 Stateless Address Autoconfiguration
- RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
- RFC 3587 IPv6 Global Unicast Address Format
- RFC 3595 Textual Conventions for IPv6 Flow Label
- RFC 4007 IPv6 Scoped Address Architecture
- RFC 4193 Unique Local IPv6 Unicast Addresses
- RFC 4291 IPv6 Addressing Architecture
- RFC 4443 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 Specification
- RFC 4649 DHCPv6 Relay Agent Remote-ID Option
- RFC 4861 Neighbor Discovery for IP version 6 (IPv6)

### **LDP**

- RFC 5036 LDP Specification

### **IS-IS**

- RFC 1142 OSI IS-IS Intra-domain Routing Protocol (ISO 10589)
- RFC 1195 Use of OSI IS-IS for routing in TCP/IP & dual environments
- RFC 2763 Dynamic Hostname Exchange for IS-IS
- RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
- RFC 2973 IS-IS Mesh Groups
- RFC 3373 Three-Way Handshake for Intermediate System to Intermediate System (IS-IS) Point-to-Point Adjacencies
- RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
- RFC 3719 Recommendations for Interoperable Networks using IS-IS
- RFC 3784 Intermediate System to Intermediate System (IS-IS) Extensions for Traffic Engineering (TE)
- RFC 3787 Recommendations for Interoperable IP Networks
- RFC 4205 for Shared Risk Link Group (SRLG) TLV draft-ietf-isis-igp-p2p-over-lan-05.txt
- RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols

## MPLS

- RFC 3031 MPLS Architecture
- RFC 3032 MPLS Label Stack Encoding
- RFC 3815 Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP)
- RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

## NETWORK MANAGEMENT

- ITU-T X.721: Information technology- OSI-Structure of Management Information
- ITU-T X.734: Information technology- OSI-Systems Management: Event Report Management Function
- M.3100/3120 Equipment and Connection Models
- TMF 509/613 Network Connectivity Model
- RFC 1157 SNMPv1
- RFC 1305 Network Time Protocol (Version 3) Specification, Implementation and Analysis
- RFC 1850 OSPF-MIB
- RFC 1907 SNMPv2-MIB
- RFC 2011 IP-MIB
- RFC 2012 TCP-MIB
- RFC 2013 UDP-MIB
- RFC 2030 Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
- RFC 2096 IP-FORWARD-MIB
- RFC 2138 RADIUS
- RFC 2206 RSVP-MIB
- RFC 2571 SNMP-FRAMEWORKMIB
- RFC 2572 SNMP-MPD-MIB
- RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB
- RFC 2574 SNMP-USER-BASED-SMMIB
- RFC 2575 SNMP-VIEW-BASED ACM-MIB
- RFC 2576 SNMP-COMMUNITY-MIB
- RFC 2588 SONET-MIB
- RFC 2665 EtherLike-MIB
- RFC 2819 RMON-MIB
- RFC 2863 IF-MIB
- RFC 2864 INVERTED-STACK-MIB
- RFC 3014 NOTIFICATION-LOG MIB
- RFC 3164 The BSD Syslog Protocol
- RFC 3273 HCRMON-MIB
- RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks

- RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
- RFC 3413 Simple Network Management Protocol (SNMP) Applications
- RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)
- RFC 3418 SNMP MIB
- draft-ietf-disman-alarm-mib-04.txt
- draft-ietf-mpls-ldp-mib-07.txt
- draft-ietf-ospf-mib-update-04.txt
- draft-ietf-mpls-lsr-mib-06.txt
- draft-ietf-mpls-te-mib-04.txt
- IANA-IFType-MIB

## OSPF

- RFC 1765 OSPF Database Overflow
- RFC 2328 OSPF Version 2
- RFC 2370 Opaque LSA Support
- RFC 3101 OSPF NSSA Option
- RFC 3137 OSPF Stub Router Advertisement
- RFC 3630 Traffic Engineering (TE) Extensions to OSPF
- RFC 4203 Shared Risk Link Group (SRLG) sub-TLV

## PPP

- RFC 1332 PPP Internet Protocol Control Protocol (IPCP)
- RFC 1570 PPP LCP Extensions
- RFC 1619 PPP over SONET/SDH
- RFC 1661 The Point-to-Point Protocol (PPP)
- RFC 1662 PPP in HDLC-like Framing
- RFC 1989 PPP Link Quality Monitoring
- RFC 1990 The PPP Multilink Protocol (MP)
- RFC 2686 The Multi-Class Extension to Multi-Link PPP

## PSEUDOWIRES

- RFC 3550 RTP: A Transport Protocol for Real-Time Applications
- RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
- RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
- RFC 4446 IANA Allocation for PWE3
- RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)

RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks  
RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)  
RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks  
RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires  
RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)  
draft-ietf-pwe3-redundancy-02 Pseudowire (PW) Redundancy

### **RADIUS**

RFC 2865 Remote Authentication Dial In User Service  
RFC 2866 RADIUS Accounting

### **RSVP-TE and FRR**

RFC 2430 A Provider Architecture for DiffServ & TE  
RFC 2961 RSVP Refresh Overhead Reduction Extensions  
RFC 2702 Requirements for Traffic Engineering over MPLS  
RFC 2747 RSVP Cryptographic Authentication  
RFC 3097 RSVP Cryptographic Authentication - Updated Message Type Value  
RFC 3209 Extensions to RSVP for LSP Tunnels  
RFC 3210 Applicability Statement for Extensions to RSVP for LSP Tunnels  
RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels

### **SONET/SDH**

GR-253-CORE SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000  
ITU-T Recommendation G.841 Telecommunication Standardization Section of ITU, Types and Characteristics of SDH Networks Protection Architecture, issued in October 1998 and as augmented by Corrigendum1 issued in July 2002

### **SSH**

draft-ietf-secsh-architecture.txt SSH Protocol Architecture  
draft-ietf-secsh-userauth.txt SSH Authentication Protocol  
draft-ietf-secsh-transport.txt SSH Transport Layer Protocol  
draft-ietf-secsh-connection.txt SSH Connection Protocol  
draft-ietf-secsh-newmodes.txt SSH Transport Layer Encryption Modes

### **SYNCHRONIZATION**

G.813 Timing characteristics of SDH equipment slave clocks (SEC)  
G.8261 Timing and synchronization aspects in packet networks  
G.8262 Timing characteristics of synchronous Ethernet equipment slave clock  
GR 1244 CORE Clocks for the Synchronized Network: Common Generic Criteria  
IEEE 1588v2 1588 PTP 2008

### **TACACS+**

IETF draft-grant-tacacs-02.txt The TACACS+ Protocol

### **TCP/IP**

RFC 768 User Datagram Protocol  
RFC 791 Internet Protocol  
RFC 792 Internet Control Message Protocol  
RFC 793 Transmission Control Protocol  
RFC 826 Ethernet Address Resolution Protocol  
RFC 854 Telnet Protocol Specification  
RFC 1350 The TFTP Protocol (Rev. 2)  
RFC 1812 Requirements for IPv4 Routers

### **VPLS**

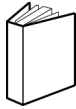
RFC 4762 Virtual Private LAN Services Using LDP

**Proprietary MIBs**

TIMETRA-ATM-MIB.mib  
TIMETRA-CAPABILITY-7705-V1.mib  
TIMETRA-CFLOWD-MIB.mib  
TIMETRA-CHASSIS-MIB.mib  
TIMETRA-CLEAR-MIB.mib  
TIMETRA-FILTER-MIB.mib  
TIMETRA-GLOBAL-MIB.mib  
TIMETRA-LDP-MIB.mib  
TIMETRA-LOG-MIB.mib  
TIMETRA-MPLS-MIB.mib  
TIMETRA-OAM-TEST-MIB.mib  
TIMETRA-PORT-MIB.mib  
TIMETRA-PPP-MIB.mib  
TIMETRA-QOS-MIB.mib  
TIMETRA-ROUTE-POLICY-MIB.mib  
TIMETRA-RSVP-MIB.mib  
TIMETRA-SAP-MIB.mib  
TIMETRA-SDP-MIB.mib  
TIMETRA-SECURITY-MIB.mib  
TIMETRA-SERV-MIB.mib  
TIMETRA-SYSTEM-MIB.mib  
TIMETRA-TC-MIB.mib



# Customer documentation and product support



## Customer documentation

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

Product manuals and documentation updates are available at [alcatel-lucent.com](http://www.alcatel-lucent.com). If you are a new user and require access to this service, please contact your Alcatel-Lucent sales representative.



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