



Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER | RELEASE 1.0
SAR-8 CHASSIS INSTALLATION GUIDE

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List of Acronyms

Acronym	Expansion
2G	second generation wireless telephone technology
3G	third generation mobile telephone technology
ABR	available bit rate
AC	alternating current attachment circuit
ACL	access control list
AIS	alarm indication signal
Apipe	ATM VLL
ARP	address resolution protocol
AS	autonomous system
ASAP	any service, any port
ATM	asynchronous transfer mode
ATM PVC	ATM permanent virtual circuit
B-bit	beginning bit (first packet of a fragment)
Batt A	battery A
BFD	bidirectional forwarding detection
BOF	boot options file
BSTA	Broadband Service Termination Architecture
BTS	base transceiver station
CBN	common bonding networks
CBS	committed buffer space
CC	control channel
CE	customer edge circuit emulation

List of Acronyms

Acronym	Expansion
CEM	circuit emulation
CES	circuit emulation services
CESoPSN	circuit emulation services over packet switched network
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
CPU	central processing unit
CRC	cyclic redundancy check
CRON	a time-based scheduling service (from chronos = time)
CSM	Control and Switching Module
CSPF	constrained shortest path first
CV	connection verification customer VLAN (tag)
CW	control word
DC	direct current
DC-C	DC return - common
DC-I	DC return - isolated
DDoS	distributed DoS
DHCP	dynamic host configuration protocol
DNS	domain name server
DoS	denial of service
dot1q	IEEE 802.1q encapsulation for Ethernet interfaces

Acronym	Expansion
DSCP	differentiated services code point
DTE	data termination equipment
DU	downstream unsolicited
e911	enhanced 911 service
E-bit	ending bit (last packet of a fragment)
ECMP	equal cost multi-path
EFM	Ethernet in the first mile
ELER	egress label edge router
Epipe	Ethernet VLL
ESD	electrostatic discharge
FC	forwarding class
FCS	frame check sequence
FDB	forwarding database
FEC	forwarding equivalence class
FIB	forwarding information base
FTN	FEC-to-NHLFE
GigE	Gigabit Ethernet
GRE	generic router encapsulation
GSM	Global System for Mobile Communications (2G)
HSDPA	high-speed downlink packet access
HSPA	high-speed packet access
IBN	isolated bonding networks
ICMP	Internet control message protocol
ICP	IMA control protocol cells
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force

List of Acronyms

Acronym	Expansion
ILER	ingress label edge router
ILM	incoming label map
IMA	inverse multiplexing over ATM
IOM	input/output module
IP	Internet Protocol
LCP	link control protocol
LDP	label distribution protocol
LER	label edge router
LLID	loopback location ID
LSP	label switched path
LSR	label switch router
LTN	LSP ID to NHLFE
MAC	media access control
MBB	make-before-break
MBS	maximum buffer space maximum burst size media buffer space
MD5	message digest version 5 algorithm
MDA	media dependent adapter
MEF	Metro Ethernet Forum
MFC	multi-field classification
MIB	management information base
MIR	minimum information rate
MLPPP	multilink point-to-point protocol
MP	multilink protocol
MPLS	multiprotocol label switching

Acronym	Expansion
MRRU	maximum received reconstructed unit
MRU	maximum receive unit
MTSO	mobile trunk switching office
MTU	maximum transmission unit multi-tenant unit
NHLFE	next hop label forwarding entry
NNI	network-to-network interface
Node-B	similar to BTS but used in 3G networks (term used in UMTS (3G systems while BTS is used in GSM (2G systems))
OAM	operations, administration, and maintenance
OAMPDU	OAM protocol data units
OS	operating system
OSS	operations support system
PDU	protocol data units
PE	provider edge router
PHY	physical layer
PID	protocol ID
PIR	peak information rate
POP	point of presence
PPP	point-to-point protocol
PSN	packet switched network
PVCC	permanent virtual channel connection
PW	pseudowire
PWE3	pseudowire emulation edge-to-edge
QoS	quality of service
RDI	remote defect indication

List of Acronyms

Acronym	Expansion
RED	random early discard
RSVP	resource reservation protocol
RSVP-TE	resource reservation protocol - traffic engineering
R&TTE	Radio and Telecommunications Terminal Equipment
RT	receive/transmit
RTM	route table manager
RTN	battery return
RTP	real-time protocol
SAP	service access point
SAR	service aggregation router
SAR-8	service aggregation router - 8-slot chassis
SDP	service destination point
SIR	sustained information rate
SLA	Service Level Agreement
SNTP	simple network time protocol
SPF	shortest path first
SSH	secure shell
TCP	transmission control protocol
TDM	time division multiplexing
TLDP	targeted LDP
TLV	type length value
TOS	type of service
TPID	tag protocol identifier
TTM	tunnel table manager
UDP	user datagram protocol
UMTS	Universal Mobile Telecommunications System (3G)

Acronym	Expansion
UNI	user-to-network interface
VC	virtual circuit
VCCV	virtual circuit connectivity verification
VCI	virtual circuit identifier
VLAN	virtual LAN
VLL	virtual leased line
VoIP	voice over IP
VP	virtual path
VPC	virtual path connection
VPI	virtual path identifier
VPN	virtual private network
WCDMA	wideband code division multiple access (transmission protocol used in UMTS networks)
WRED	weighted random early discard

About This Guide

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

After the hardware installation process is completed, refer to the 7705 SAR OS documentation set 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-series 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) 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, user services, and Operations, Administration and Management (OAM) tools.

- 7705 SAR OS Quality of Service Guide
This guide describes how to configure Quality of Service (QoS) policy management.

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.

Audience

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

Information Symbols

[Table 1](#) describes symbols contained in this guide.

Table 1: Information Symbols





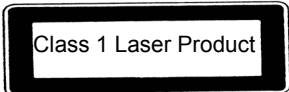
Symbol	Meaning	Description
	Danger	This symbol warns that improper handling and installation could result in bodily injury. An electric shock hazard could exist. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be familiar with networking environments, and 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.

Table 1: Information Symbols (Continued)

Symbol	Meaning	Description
	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.

Technical Support

If you purchased a service agreement for your 7705 SAR-8 and related products from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance. If you purchased an Alcatel-Lucent service agreement, contact technical assistance at:

Web: http://www1.alcatel-lucent.com/comps/pages/carrier_support.jhtml

Mandatory Regulations

In This Chapter

The following sections describe the mandatory regulations that govern the installation and operation of the 7705 SAR-8:

- [List of Terms on page 24](#)
- [General Requirements on page 25](#)
- [Canada Regulations on page 28](#)
- [United States Regulations on page 29](#)
- [European Union Regulations on page 31](#)
- [Australia/New Zealand Regulations on page 35](#)
- [China Regulations on page 36](#)

List of Terms

Table 2 lists the terms used in this chapter.

Table 2: List of Terms

Term	Expansion
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
FCC	Federal Communications Commission
ICES	Interference Causing Equipment Standard
IEC	International Electrotechnical Commission
IEE	Institute of Electrical Engineers (UK)
ETSI	European Telecommunications Standards Institute
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-8. You must adhere to these instructions so that your system meets regulatory requirements.



Danger: When removing cards from a shelf under power, some of the components such as the DC converters may be extremely hot. Handle by the card guides only.



Warning: There are no user-serviceable parts in this unit. Refer servicing to qualified personnel.

Warning: To prevent accidental electrical short circuits, align the card correctly between the card guides before inserting it in the slot.

Warning: The unit should be connected to a DC branch circuit with a maximum 10A circuit breaker or fuse that meets the requirements for branch circuit protection. A suitable disconnect device, such as a circuit breaker or switch, must be provided in the DC branch circuit and must be used to disconnect power to the system during servicing.

Equipment Interconnection Points

Interconnection points of the 7705 SAR-8 are defined as the following SELV connectors:

- T1/E1
- Ethernet (10/100/1000 Base-T)
- alarms
- clock inputs and clock outputs (BITS, 2 MHz, 5 MHz, 10 MHz)

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 IEC60950-1.

Prevention of Access

The 7705 SAR-8 must be accessible only to authorized personnel. Install this apparatus in a restricted access location or similar environment to prevent unauthorized access.

Laser Interface

The 7705 SAR-8 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 and yellow in color, and of sufficient length to connect the building earth point to the chassis ground connection (refer to the installation chapter 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
 - Management (Ethernet), DB9 Console, and Synchronization interfaces
- 8-port Ethernet Adapter card
 - Fast Ethernet interface (CAT5 shielded cable)
 - Gigabit Ethernet interface (CAT5E shielded cable)
- 16-port T1/E1 ASAP Adapter card
 - T1 and E1 interfaces
- Fan module
 - DB15 Alarm port

Regulatory Symbols

The 7705 SAR-8 uses various regulatory approvals symbols. They may be used on product markings such as approvals labels. These symbols are described in IEC 417.

[Figure 1](#) and [Figure 2](#) show symbols of a terminal that you must connect to earth ground before you make any other connections to the equipment.

Figure 1: Protective Earth (ground)



9717

Figure 2: Earth (ground)



9718

Canada Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-8 in Canada.

Industry Canada Regulations

ICES-003: Interference-Causing Equipment Standard Digital Apparatus

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: IC: 1737F-0010.

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 grounded reliably.

The 7705 SAR-8 is safety certified according to CSA standard C22.2 No. 60950-1 by CSA.

United States Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-8 in the United States.

Federal Communications Commission

FCC Part 15

Important! Changes or modifications not expressly approved by Alcatel-Lucent could void the user's authority 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. On the equipment is a label that contains, among other information, a product identifier in the format of AAAEQ##TXXXX.

Identification Number: GQ6DENAN7705SAR

In the event that repairs to this equipment are needed, contact:

Technical Support Services
Alcatel-Lucent

Within the United States: 1-866-582-3688, prompt 1

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 grounded reliably.

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
12424 Research Parkway, Suite 125
Orlando, FL 32826-3274

European Union Regulations

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 1999/5/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 99/05/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 and yellow colored earth wire must be connected from the site equivalent of the AC earth to all shelves in accordance with IEE Wiring Regulations (16th edition). This connection is made via the chassis ground connection (refer to the installation chapter 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 Environmental Health and Safety organization.

For installations not performed by Alcatel-Lucent, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services
+1 630 224 4672, prompt 2

Recycling / take-back / disposal of product

Electronic products bearing or referencing the symbol shown in [Figure 3](#), 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 3: 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.

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.

Australia/New Zealand Regulations

This section describes the mandatory regulations that govern the installation and operation of the 7705 SAR-8 in Australia and New Zealand.

ACMA Regulations

The 7705 SAR-8 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 to comply with an applicable Australian Standard electrical safety standard.

The 7705 SAR-8 complies with the AS/NZS 60950 – Business Equipment, Computers, Telecommunications requirements.

China Regulations

The statements that follow are the product conformance statements that apply to the 7705 SAR-8 when deployed in China.

Safety

The equipment complies with the Product Safety specification of IEC 60950-1.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 Alcatel-Lucent Environmental Health and Safety organization. For installations not performed by Alcatel-Lucent, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services
+1 630 224 4672, prompt 2

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 Product" (SJ/T11364-2006), customers may access Alcatel-Lucent's Hazardous Substances Table information at either of the following two URLs:

- Access via the Alcatel-Lucent Corporate website at:
<http://www.alcatel-lucent.com/cn>
 - Access via the Alcatel Shanghai Bell website at:
http://www.alcatel-sbell.com.cn/product_solution/in4.asp
-

7705 SAR-8 Overview

In This Chapter

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

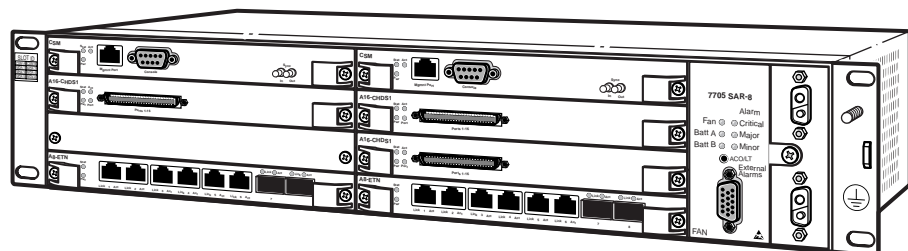
- [7705 SAR-8 Components on page 40](#)
 - [Chassis on page 40](#)
 - [CSM on page 41](#)
 - [Adapter Cards on page 42](#)
 - [Slot Covers on page 43](#)
 - [Power System on page 43](#)
 - [Fan Module on page 44](#)
 - [Distribution Panels on page 46](#)
- [SAR System Installation Process on page 49](#)

7705 SAR-8 Components

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

Figure 4 shows the front view of the 7705 SAR-8. There are eight horizontal slots for the CSMs and adapter cards, and one vertical slot for the Fan module. The connectors for the DC power feeds are located to the right of the Fan module and are factory-installed. The CSM, adapter cards, and Fan module are installed by the customer. All physical connections are made from the front of the unit, including the chassis ground point. There are no back panel connections.

Figure 4: 7705 SAR-8 Front View

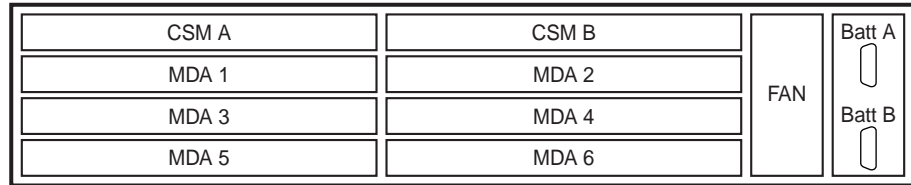


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Chassis

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

Figure 5 identifies the slots used for the CSMs, adapter cards (MDA), and Fan module. In redundant systems, the CSMs go in slots CSM A and CSM B, and the adapter cards are installed in slots MDA 1 through MDA 6. In simplex systems, the CSM goes in slot CSM A, a slot cover goes on slot CSM B, and the adapter cards go in slots MDA 1 through MDA 6.

Figure 5: 7705 SAR-8 Slot Identification

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CSM

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

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

Each CSM is shipped with one compact flash memory device that stores system boot images, software images, and configuration files and logs. The compact flash device cannot be accessed or removed by an operator or installer.

Figure 6 shows the CSM faceplate. Refer to [CSM Connectors and LEDs on page 112](#) for identification and description of the CSM faceplate features.

Figure 6: 7705 SAR-8 CSM Features

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

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

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



Note: There is an IOM software module on the CSM that must be activated before any adapter card and port parameter can be provisioned and configured. The IOM is activated using the `card` and `card-type` CLI commands to specify its slot number and card type. See [Provisioning CSM and Adapter Card Parameters on page 108](#) for more information.

Adapter Cards

[Figure 7](#) shows a sample adapter card. Adapter cards on the 7705 SAR-8 provide a wide variety of interfaces of different speed and type, including Ethernet (10/100/1000 Base-T and optical), T1/E1 with ATM and IMA, and TDM (channelized and unchannelized).

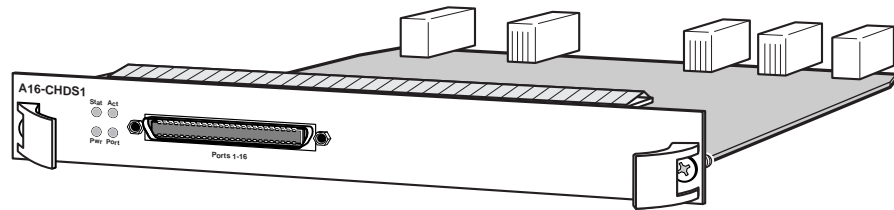
The following adapter cards are supported in the 7705 SAR-8:

- 16-port T1/E1 ASAP Adapter card
- 8-port Ethernet Adapter card

The 16-port T1/E1 ASAP Adapter cards can support T1/E1 connections via a distribution panel. The 8-port Ethernet Adapter adapter cards can support six 10/100 Base-T ports and 2 SFP ports.

Adapter cards are hot-swappable and field-replaceable by qualified personnel. Adapter cards install in slots MDA 1 through MDA 6. Refer to [Figure 5](#) for adapter card slot locations on the 7705 SAR-8, and to the appropriate adapter card installation guide for installation and LED information.

Figure 7: 7705 SAR-8 Adapter Card



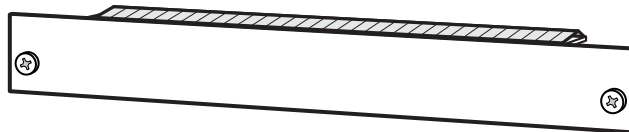
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Slot Covers

Figure 8 shows a slot cover. Slot covers (blank panels) are required on all empty slots to prevent dust accumulation, help control airflow and confine electromagnetic interference, and for safety reasons. Slot covers do not have board components or connector pins.

Figure 4 shows a cover on slot MDA 3.

Figure 8: 7705 SAR-8 Slot Cover



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Power System

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

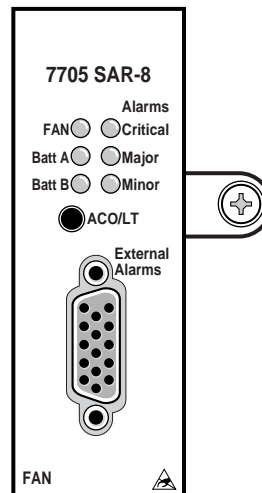
The DC power LEDs are located on the Fan module (see Figure 9). Refer to [Fan Module Connectors and LEDs on page 114](#) for a description of the Fan module LEDs.

Refer to [DC Power Connections on page 77](#) for requirements and information regarding preparing DC power cables.



Note: For sites that operate using +24VDC supplies, a +24VDC to -48VDC converter is needed to provide power to the 7705 SAR-8.

Figure 9: Fan Module



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Fan Module

[Figure 9](#) shows the Fan module. The Fan module provides cooling for the system, as well as alarm indicators (LEDs), an external alarm I/O connector, and an Audible Alarm Cutoff/Lamp Test (ACO/LT) pushbutton.

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

Fan Operation

The Fan module houses eight fans. Air enters from the intake vent on the right side of the chassis and exits through the exhaust vent on the left side. The fans have one operating speed (full speed) and are always operational, regardless of ambient temperature.

Individual fans are not field-replaceable; however, there is sufficient cooling even if one of the fans fails. A critical alarm is generated when one or more fans fails. If one fan has failed the module should be replaced as soon as possible. If more than one fan has failed, the Fan module must be replaced immediately.

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

- green: normal operation
- amber: one or more fans out of operation
- unlit: fan power failure

Monitoring Temperature

Each CSM and adapter card has temperature sensors to continuously monitor its own temperature and report the temperature to the CSM. If the temperature of any card exceeds the preset threshold of 75°C (167°F), then an alarm is generated. The `show chassis` CLI command displays the problem; check the **Over Temperature state** value, which will show “Out of range”.

If the temperature inside the chassis becomes high enough to damage a card or the system, safety mechanisms are activated until a safe operating level is reached. Normal operating conditions do not activate any safety mechanisms. Safety mechanisms include shutting down a card until its temperature returns to an operationally safe value, at which time the card resets and returns to service.

If the FAN LED is amber (indicating a fan problem), a Fan Fail Alarm or a Temperature Threshold Alarm is raised and the Fan module should be replaced.

Distribution Panels

Distribution panels are used with 16-port T1/E1 ASAP Adapter cards to connect to T1/E1 circuits.

There are two distribution panels:

- BNC
- RJ45



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

BNC Distribution Panel

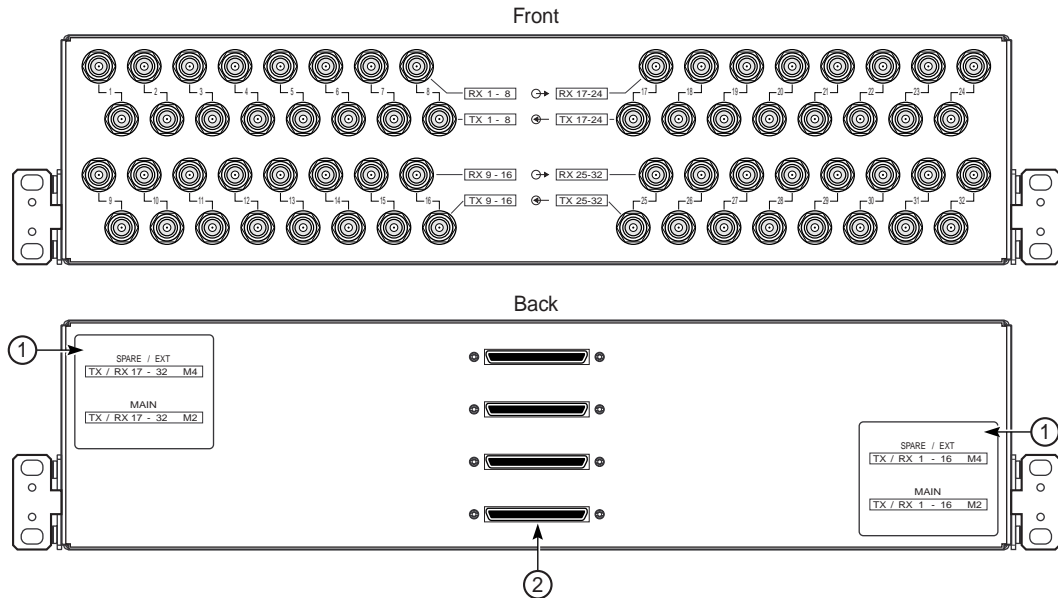
[Figure 10](#) shows the BNC Distribution panel. [Table 3](#) lists the panel features.

The BNC panel provides 75-ohm E1 access for up to 32 ports. On the customer side, each access port has separate transmit and receive BNC female connectors. On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see [T1/E1 Cables on page 48](#)). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.



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

Figure 10: BNC Distribution Panel



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Table 3: Distribution Panel Features

Key	Description
1	Label
2	68-pin AMP connectors

RJ45 Distribution Panel

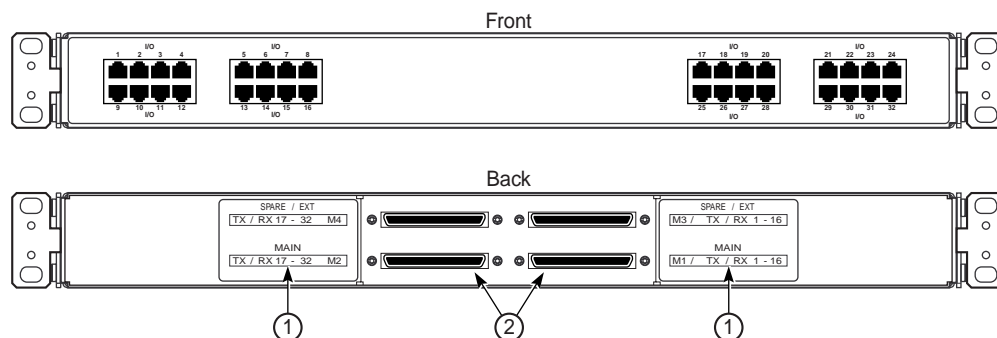
Figure 11 shows the RJ45 Distribution panel. Table 3 lists the panel features.

The RJ45 panel provides 100-ohm T1 or 120-ohm E1 access to 32 ports. On the customer side, each port has an RJ45 connector. On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see [T1/E1 Cables on page 48](#)). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.



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

Figure 11: RJ45 Distribution Panel



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T1/E1 Cables

Table 4 describes the T1/E1 cables that are available for the 7705 SAR-8, and gives the name used in the various installation guides as well as the name used in the orderable parts catalog.

Table 4: T1/E1 Cables

Installation Guide Name	Orderable Parts Name	Description
68-pin AMP connector to open-ended wire T1/E1 cable	T1/E1 Cable 28 AWG Open-ended 30m	<ul style="list-style-type: none"> 68-pin AMP connector to open-ended wire for equipment connection to telecom equipment
	T1/E1 Cable 28 AWG Open-ended 15m	
	T1/E1 Cable 26 AWG Open-ended 30m	
	T1/E1 Cable 26 AWG Open-ended 15m	
68-pin AMP to 68-pin AMP T1/E1 cable	T1/E1 Cable for Distribution Panel, 1m	<ul style="list-style-type: none"> 68-pin AMP to 68-pin AMP connectors for equipment connection to a distribution panel

For pinout information on the cables listed above, refer to the 7705 SAR 16-port T1/E1 ASAP Adapter Card Installation Guide.

SAR System Installation Process

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

- Step 1.** Prepare the site.
 - Step 2.** Unpack the chassis.
 - Step 3.** Mount and ground the chassis.
 - Step 4.** Prepare and connect the DC input power cables.
 - Step 5.** Install the components.
 - Step 6.** Power up the system.
 - Step 7.** Connect the network cables.
 - Step 8.** Provision (preconfigure) the system.
-

Site Preparation

In This Chapter

This chapter provides information about preparing your site to install a 7705 SAR-8:

- [Warnings and Notes on page 52](#)
- [System Specifications on page 54](#)
 - [Chassis Specifications on page 54](#)
 - [Environmental Specifications on page 54](#)
 - [Adapter Card Specifications on page 55](#)
 - [CSM Specifications on page 56](#)
 - [Fan Module Specifications on page 56](#)
 - [Component Power Consumption on page 56](#)
 - [Component Operating Requirements on page 57](#)
- [Installation Locations on page 58](#)
 - [Chassis Location Requirements on page 59](#)
- [Safety Considerations on page 61](#)
 - [Placement on page 61](#)
 - [Grounding on page 61](#)
 - [Cabling on page 63](#)
 - [Power on page 63](#)
 - [Fan Module on page 64](#)
 - [Storage on page 64](#)

Warnings and Notes



Warning:

- Do not transport and relocate a 7705 SAR-8 chassis that has any cards or modules installed. To properly transport and relocate a 7705 SAR-8 chassis, do the following:
 - (optional) label cards and modules to facilitate reassembly
 - remove all CSMs, adapter cards, and the Fan module from the chassis
 - disconnect any connected power cables from the chassis
 - repackage the cards and modules in their original shipping containers for relocation
- The 7705 SAR-8 uses external circuit breakers or fuses as a disconnect means. Disconnect both A and B feeds before servicing.
- Do not assume that power has been disconnected from a circuit. Be sure to disconnect power to the equipment rack and external cables before installing or removing the 7705 SAR-8.
- Do not install equipment that appears to be damaged.
- 7705 SAR-8 systems equipped with DC-input power supplies should be installed in restricted access areas, 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.
- This product 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 on page 58](#) and [Chassis Location Requirements on page 59](#) will cause thermal failure.
- The 7705 SAR-8 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.



Notes:

- Prepare the equipment rack and site before installing the router. Plan the router placement near the power sources and network interface connections.
- An empty 7705 SAR-8 chassis weighs approximately 8.5 lbs (3.8 kg).
- A fully loaded 7705 SAR-8 chassis with the heaviest components/cards weighs approximately 15 lbs (6.8 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.

**Notes:** (continued)

- 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 router for cable management.
 - Maintain a clearance of at least 3 in. (7.6 cm) on each side to ensure adequate air intake and exhaust. When mounting the router in a rack, ensure that the rack complies with all requirements outlined in [Chassis Location Requirements on page 59](#).
 - The 7705 SAR-8 includes factory-installed rack-mounting brackets to mount in a 19-inch equipment rack.
-

System Specifications

Chassis Specifications

Table 5: 7705 SAR-8 Chassis Specifications

Parameter	Description
Dimensions (without mounting brackets)	(3.50 x 17.48 x 9.84 in.) (H x W x D) (8.89 x 44.4 x 25 cm)
Chassis weight (unpopulated)	8.4 lbs. (3.8 kg)
Chassis weight (FAM, 2 x CSM, 2 x Ethernet cards, 4 x ASAP cards)	16.1 lbs. (7.3 kg)
Adapter card slots	6
Fan module slots	1
CSM slots	2
Mounting	Mount in a recommended 19-inch equipment rack Rack-mount brackets are factory-installed for 19-inch NEBS mounting

Environmental Specifications

Table 6: Environmental Specifications

Parameter	Description
Normal operating temperature	5 to 45°C (41 to 113°F)
Short-term operating temperature ⁽¹⁾	-5 to 55°C (23 to 131°F)
Relative humidity	5 to 85% (non-condensing)
Short-term relative humidity ⁽¹⁾	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)

Table 6: Environmental Specifications (Continued)

Parameter	Description
Shock and vibration	Very low levels for continuous duration (similar to modern office building, for example)
Earthquake	Suitable for high risk areas (Zone 4/California, for short duration)
Pollution degree ⁽²⁾	2
Rated voltage (DC)	-48/-60 VDC (-60 VDC is for various European countries)
Operating voltage range (DC)	-40 to -75 VDC
Heat dissipation (worst case configuration)	190 Watts
Acoustic noise level	52.0 dBA

Notes:

1. Short-term is a period of less than 96 consecutive hours and a total of no more than 15 days per year. This is equivalent to 360 hours per year, with short-term periods occurring no more than 15 times per year.
2. Pollution degree is as defined in IEC 60950.

Adapter Card Specifications

Table 7: Adapter Card Specifications

Parameter	Description
Dimensions (H x W x D)	(6.69 x 0.88 x 8.66 in.) (17.0 x 2.24 x 22.0 cm)
Weight	0.84 lbs (0.38 kg) (16-port T1/E1 ASAP card) 0.77 lbs (0.35 kg) (8-port Ethernet card)

CSM Specifications

Table 8: CSM Specifications

Parameter	Description
Dimensions (H x W x D)	(6.69 x 0.88 x 8.66 in.) (17.0 x 2.24 x 22.0 cm)
Weight	0.88 lbs (0.4 kg)

Fan Module Specifications

Table 9: Fan Module Specifications

Parameter	Description
Dimensions (H x W x D)	(3.32 x 0.88 x 8.66 in.) (8.43 x 2.24 x 22.0 cm)
Weight	0.81 lbs (0.37 kg)

Component Power Consumption

Table 10: Component Power Consumption

Component	Power (Watts) (conservative estimate)
Chassis ⁽¹⁾ (all fans operating, no adapter cards)	28 W
Fan module	28 W
CSM	17 W
Adapter cards	
a16-chds1	17 W
a8-eth	20 W

Note:

- In Release 1.0, the chassis itself consumes no power because an external DC power supply provides system power. Thus, power consumption of the chassis with all fans operating is equivalent to the power consumption of the Fan module.

Refer to the 7705 SAR-8 adapter card installation guides for more information on these components.

Component Operating Requirements

Table 11: 7705 SAR-8 Hardware Components for DC Operational Requirements

Component	Minimum	Maximum	Field-Replaceable
Backplane (factory-installed)	1	1	N
CSM	1	2	Y
Fan module	1	1	Y
Adapter cards	1	6	Y
DC power harness ⁽¹⁾	1	2	Y

Note:

1. DC power harnesses are available from Alcatel-Lucent. Each harness has two wires. Use two harnesses when redundant DC supplies are used. All power cables used on the 7705 SAR-8 chassis must meet your local safety codes.

Installation Locations

The 7705 SAR-8 is intended to be installed in facilities that provide weather protection and a temperature-controlled environment. The facilities provide protection from mold growth, pest incursion, and precipitation. The 7705 SAR-8 is not intended for installation in outdoor facilities.



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 [Chassis Location Requirements on page 59](#) will impede proper airflow and will result in the system overheating.

Airflow on the 7705 SAR-8 is defined as EC Class (S) SR-SL per GR3028. For proper thermal performance, the following conditions must be met.

- The rack must be constructed using channel or angle rack uprights that are at least 1.25 in. (3.2 cm) deep, 3 in. (7.6 cm) wide (maximum), and oriented away from the chassis such that no solid metal from the uprights is located immediately adjacent to the chassis side walls (see [Figure 12](#)).
Example: Telect 02008-02011 Series or Newton 0040140XXX Relay Racks.
- The rack must not be an unequal flange rack that has solid walls located immediately adjacent to the chassis side walls. This will cause thermal failure.
Example: Telect 02033-02036 series.
- For seismic applications, the rack must be a Telect Global Seismic Frame (GS series).
- 7705 SAR-8 deployments in closed cabinets are not recommended. If closed cabinets must be used, they must not restrict shelf airflow in any way. Furthermore, they must not cause the shelf inlet bulk air temperatures to rise above those defined in GR-63 under worst case environmental conditions, including any preheating of the cabinet air by other equipment.
- The rail mounting holes in the equipment rack must align with the mounting holes on the chassis mounting brackets. The 7705 SAR-8 mounting brackets are factory-installed for a NEBS mount in a 19-inch rack.

Follow the equipment rack manufacturer's instructions for proper rack installation.

Required tools:

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

Chassis Location Requirements

Allow at least 3 in. (7.6 cm) clearance on the sides of the chassis for proper airflow and at least 2.5 in. (6.4 cm) in front for cable management. See [Figure 12](#).



Warning: Failure to comply with the location requirements outlined in [Installation Locations on page 58](#) and [Chassis Location Requirements on page 59](#) will impede proper airflow and will result in thermal failure.

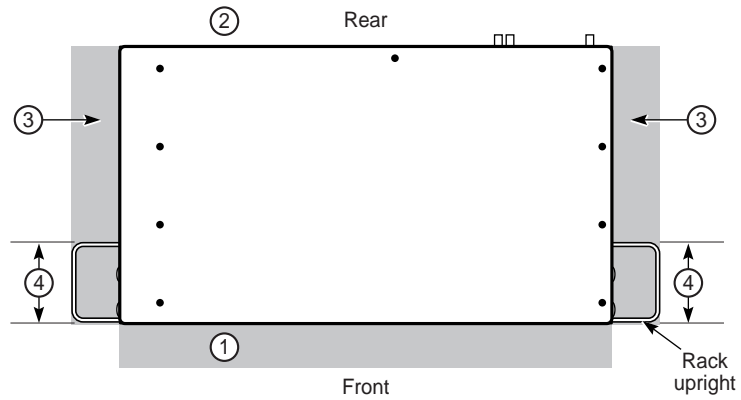


Note: The Fan module provides 120 CFM of airflow through the 7705 SAR-8 (8 fans at 14.8 CFM/fan).

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 104°F (40°C) under full system power loading combined with worst-case environmental deployment conditions per GR-63.
- Ensure that the 7705 SAR-8 system intake is not located immediately adjacent to the exhaust of another chassis such that preheated air above 40°C long term or 55°C short term (per GR-63) is drawn into the system.
- Ensure that the 7705 SAR-8 system intake is not located immediately adjacent to the intake of another chassis such that 7705 SAR-8 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 12](#).

Figure 12: Chassis Clearance Requirements (View from Top)



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Table 12: Chassis Clearance Specifications

Key	Description
1	Front: 2.5 in. (6.4 cm) required for cable management
2	Rear: No clearance required
3	Side: 3 in. (7.6 cm) minimum required for airflow
4	Rack upright: 5 in. (12.7 cm) maximum required for airflow

Safety Considerations

Placement

**Warning:**

- Install the 7705 SAR-8 in recommended equipment racks.
- Install in clean, dry, ventilated, and temperature-controlled rooms.
- Verify that the rack is properly bolted and braced and is properly grounded to a grounding electrode.
- Install the chassis in the equipment rack before installing components.

Grounding

**Warning:**

- The router 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.
- Electrostatic discharge (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 site grounding point (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- The 7705 SAR-8 includes a chassis ground stud on the mounting bracket attached to the right-hand side of the router (when viewed from the front). The chassis ground must be connected to the building ground, using either a direct connection or a ground bus.
- 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.
- Do not use the chassis ground wire connection on the chassis ground stud for any other purpose. That is, the washers and nut used to secure the chassis ground wire on the ground stud must only be used for that purpose.
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.

Safety Considerations

The 7705 SAR-8 supports both Common Bonding Networks (CBN) and Isolated Bonding Networks (IBN). The positive battery inputs (Batt A and Batt B) are floating inputs relative to digital or chassis ground within the chassis and on the CSM, the adapter cards, and the Fan module.

To use the system in a CBN installation, the 0V RTN terminal must be connected to the frame ground on the rack in which the 7705 SAR-8 is installed. For IBN installations, no additional grounding is needed.



Warning: In an IBN installation, the 0V RTN terminal must be connected to the building ground at the source.

Warning: In a CBN installation, if you use the 7705 SAR-8 chassis ground stud (located on the right-hand side mounting bracket) to connect the 0V RTN terminal to the frame ground on the rack, then you must use a second nut on the stud to secure the attachment. The first nut is used to secure the building ground point wire to the chassis ground lug, which must be a single-purpose permanent connection. Refer to [Chassis Ground Wiring on page 73](#).

Cabling



Warning:

- 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 cables that are shielded and grounded at both ends.
- To meet surge protection requirements, the shield 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 or Type 4 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 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-8 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.

Power



Danger:

- Only electrical service personnel should perform wiring and cabling to the system.
- All power to the equipment rack or cabinet should be disconnected before the installation.
- Power cable(s) must meet your local electric code requirements.
- An external circuit breaker no greater than 10A must be located within a readily accessible distance from the equipment. This is intended as the disconnect device.
- When removing the DC power harness from the system, first disconnect the power from the source and then disconnect the harness from the 7705 SAR-8.

DC Power Requirements

- A means of disconnect must be provided within 10 ft (3 m) of the 7705 SAR-8.
- A maximum 10A circuit breaker or fuse must be provided.
- A minimum #18 AWG power conductor must be used for each DC input connection.

Fan Module

The 7705 SAR-8 supports a field-replaceable Fan module housing eight fans. The Fan module is replaceable as a single unit; individual fans are not replaceable.

The 7705 SAR-8 cooling system requires a minimum of 3 in. (7.6 cm) of unrestricted, unobstructed airflow on each side of the chassis to function properly.



Warning: Failure to comply with the location requirements outlined in [Installation Locations on page 58](#) and in this section will impede proper airflow and will result in thermal failure.



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

Storage

To store an uninstalled 7705 SAR-8 or extra field-replaceable parts (if applicable), re-wrap the components in the original packaging and keep them in a dry, dust-free temperature-controlled environment.

Table 13: Storage Specifications

Parameter	Description
Storage and shipping temperature	From -40° to 158°F (-40° to 70°C)
Non-condensing relative humidity	Within 5 to 95%

Compliance

Refer to [Standards and Protocol Support on page 137](#) for compliance information.

Installing the Chassis

In This Chapter

This chapter provides information on installing a 7705 SAR-8 chassis:

- [Unpacking the Chassis on page 68](#)
 - [Unpacking Precautions on page 68](#)
- [Installing the Chassis in a Rack on page 70](#)
 - [Rack-Mounting the Chassis on page 70](#)
- [Chassis Ground Wiring on page 73](#)
 - [Making the Ground Connection on page 73](#)

Unpacking the Chassis

The Control and Switching Module (CSM), adapter cards, Fan module, and cables are field-installable and field-replaceable components. Refer to [Installing the Components on page 83](#) for more details. The DC power connectors are part of the 7705 SAR-8 chassis and are not field-replaceable.



Warning:

If the 7705 SAR-8 is to be relocated at a later time, observe the following warning:

- Do not transport and relocate a 7705 SAR-8 chassis that has any cards or modules installed. To properly transport and relocate a 7705 SAR-8 chassis, do the following:
 - (optional) label cards and modules to facilitate reassembly
 - remove all CSMs, adapter cards, and the Fan module from the chassis
 - disconnect any connected power cables from the chassis
 - repackage the cards and modules in their original shipping containers for relocation

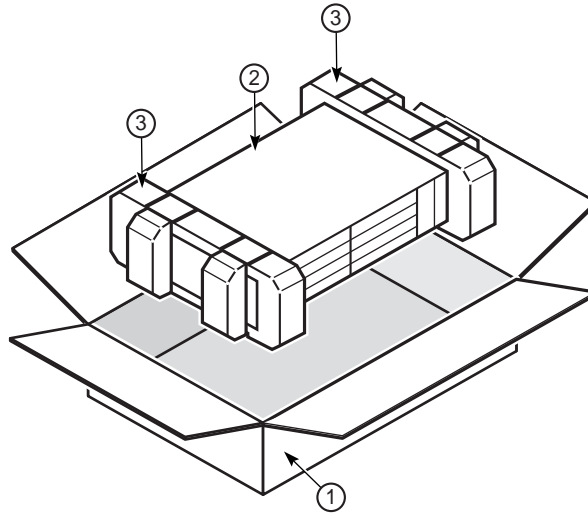
Unpacking Precautions

Review the following list to avoid injury and to prevent damage to the 7705 SAR-8.

- The shipping weight of the chassis is approximately 10 lbs. (4.5 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 re-used if it is necessary to reship the router.
- Keep the chassis wrapped in the anti-static packaging until you are ready to install the router.

Figure 13 displays the components of a packed 7705 SAR-8 chassis.

Figure 13: Unpacking the 7705 SAR-8 Chassis



19600

Table 14: Unpacking the 7705 SAR-8 Chassis

Key	Description
1	Shipping container
2	7705 SAR-8 chassis (wrapped in an anti-static bag)
3	Foam end caps

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



Caution: Lift the chassis by the bottom of the chassis. Do not put your hands inside a card slot to lift the unit.

Step 1. Carefully lift the router out of the carton and place it on a flat surface.

The chassis shipping weight is approximately 10 lbs. (4.5 kg) without any components installed.

Step 2. Remove the foam end caps on the sides of the router.

Step 3. Remove the protective anti-static wrapping when you are ready to install the router.

Installing the Chassis in a Rack



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



Caution:

- 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 (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- Lift the chassis by the bottom of the chassis. 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 other 7705 SAR-8 units or any other equipment directly on top (where the bottom unit is supporting other devices). Each unit must be secured in the rack with the appropriate mounting apparatus.



Warning:

- Failure to comply with the location requirements outlined in [Installation Locations on page 58](#) and [Chassis Location Requirements on page 59](#) will impede proper airflow and will result in thermal failure.
- 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.

Rack-Mounting the Chassis

The 7705 SAR-8 router chassis is designed for installation in a 19-inch rack. The rack-mount brackets are factory-installed. [Figure 14](#) illustrates the installation of the chassis in a rack.

It is easier to install the 7705 SAR-8 chassis in the rack with two people, one person to hold the router and one person to secure it to the rack.

Figure 14: Installing the 7705 SAR-8 Chassis in a Rack

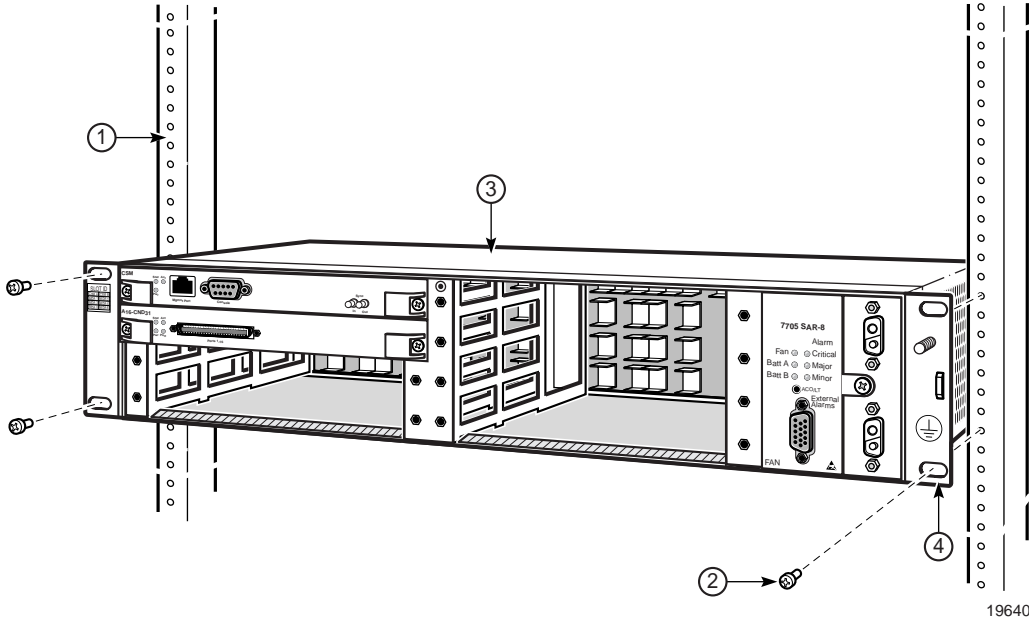


Table 15: Rack-Mounting the 7705 SAR-8 Chassis

Key	Description
1	Equipment rack
2	Rack-mounting screws
3	7705 SAR-8 chassis
4	Rack-mounting bracket

Installing the Chassis in a Rack

Before you begin, verify that:

- the equipment rack is securely installed, anchored, and grounded. Refer to the rack manufacturer's documentation for instructions.
- the power to the rack is **OFF**

Required tools:

- a torque driver for Phillips screws

To install the chassis in the rack:

- Step 1.** Lift the 7705 SAR-8 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](#) (below).
-

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 router and proximity to the proper grounding facilities.



Caution: The 7705 SAR-8 chassis ground stud located on the right-hand side mounting bracket must be a single-purpose permanent connection to the earth (building) ground point. Therefore, the connection requires its own washers and nut.



Note:

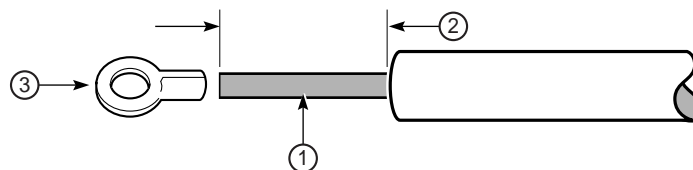
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before connecting them.
- All surfaces that are used for intentionally grounding the 7705 SAR-8 must be brought to a bright finish and an antioxidant solution must be applied to the surfaces being joined.

Making the Ground Connection

Tools and hardware required:

- wire stripper
- wire cutter
- crimping tool
- torque driver for hex nut
- M4 ring lug
- minimum #18 AWG wire (green/yellow)

Figure 15: Preparing the Ground Wire

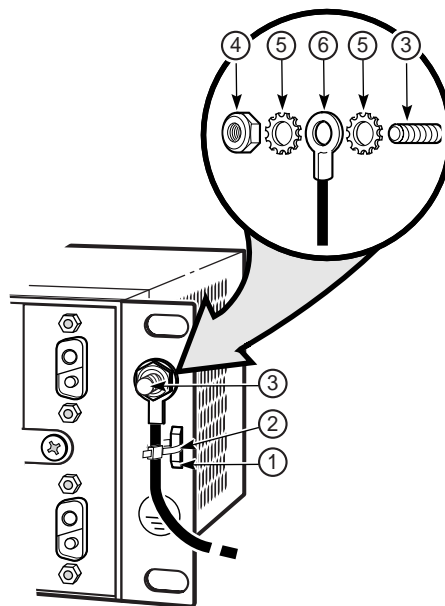


19641

Table 16: Ground Wire Descriptions

Key	Description
1	Copper ground wire with green/yellow shield (minimum #18 AWG)
2	Insulation stripped according to local safety code
3	Ring lug

Figure 16: Attaching the Chassis Ground Connector



19599

Table 17: Chassis Ground Connection

Key	Description
1	Lance
2	Cable tie
3	Chassis ground stud
4	Nut
5	Star washer
6	Ring lug and chassis ground wire (green/yellow)

To make the chassis ground connection:

- Step 1.** Run a single length of minimum #18 AWG wire from the ground point (building ground or equipment ground bus) to the chassis ground stud. 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 ([Figure 15](#)).
 - Step 3.** Remove the nut and star washers from the ground stud on the mounting bracket.
 - Step 4.** Place a star washer and the ring lug on the ground stud such that the wire runs down the rack upright. Secure the lug with the second star washer and nut ([Figure 16](#)). Tighten the nut to a torque of 8-10 lbf-in. 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).
 - Step 7.** Connect the opposite end of the ground wire to the appropriate ground point at your installation site. Ensure that the chassis ground connection is made according to local safety codes.
 - Step 8.** Connect the 7705 SAR-8 to the DC power source. See [DC Power Connections on page 77](#).
-

DC Power Connections

In This Chapter

This chapter provides information about wiring and connecting the DC power source to the 7705 SAR-8:

- [Wiring and Connecting DC Power on page 78](#)
 - [Warnings and Notes on page 78](#)
- [DC-Input Power Connections on page 79](#)
 - [Wiring the DC Inputs on page 79](#)

Wiring and Connecting DC Power

Warnings and Notes



Danger:

- Make the ground connections first.
- Only qualified personnel should install or replace this equipment.
- Confirm that the DC power source is OFF during installation. The power source should be a safety extra-low voltage (SELV) source.
- Turn off power at the power source before you install or remove power cables or cords.
- The unit should be connected to a DC branch circuit with a maximum 10A circuit breaker or fuse that meets the requirements for branch circuit protection. A suitable disconnect device must be provided in the DC branch, either a circuit breaker or switch that can be employed to disconnect power to the system during servicing.
- 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.



Warning:

- Do not install equipment that appears to be damaged.
- The router and equipment rack must be properly grounded. Electrostatic discharge (ESD) damage can occur if components 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 (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- The 0V RTN terminal must always be connected to the building ground at the source.
- If the disconnect device for the 7705 SAR-8 is not permanently incorporated, a readily accessible disconnect device to shut off power during servicing must be incorporated in your building's branch circuit.

**Note:**

- The 7705 SAR-8 requires a minimum of one DC power source to operate, but using two DC power sources is recommended for redundancy.
- The 7705 SAR-8 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.
- 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 cables that are shielded and grounded at both ends.

DC-Input Power Connections

**Warning:**

- Ensure that all power is OFF from the DC circuit. Locate the circuit breaker on the panel board that services the DC circuit and switch the circuit breaker to the OFF position. 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.

Wiring the DC Inputs

The 7705 SAR-8 has two D-Sub 2W2 connectors mounted on the front of the chassis. These connectors are the DC power feed points for DC source voltage from the DC circuit. A 13 ft (4 m) wiring harness is available from Alcatel-Lucent to facilitate the DC source-to-router connection. The harness has a 2W2 connector at one end and open-ended wires at the other end.

For redundant power configurations, you must use two DC power feeds (one for each power connector on the 7705 SAR-8).

Each 2W2 connector is keyed to ensure proper attachment (one female and one male pin) and is secured with thumbscrews on the harness connector to prevent accidental removal. [Figure 17](#) shows the DC power harness.

Figure 17: DC Power Harness

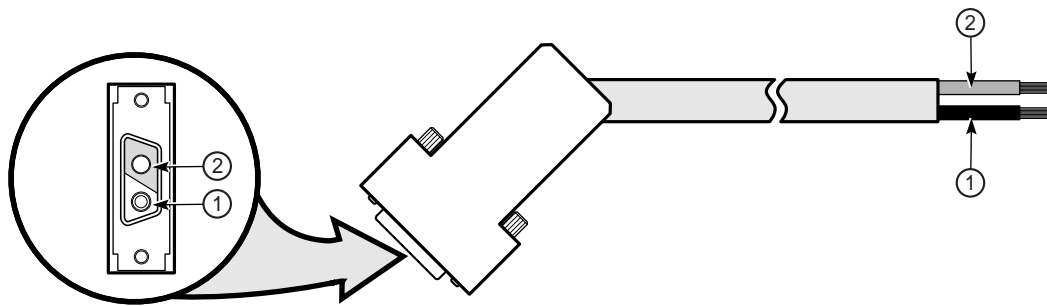


Table 18: DC Power Connection Descriptions

Key	Description
1	0V RTN (male pin on chassis, black wire, #12 AWG)
2	-VDC (female pin on chassis, blue wire, #12 AWG)

Required tools and hardware:

- one or two DC power wiring harnesses (3HE03400AA) (two harnesses are required for redundant power configurations)
- torque driver for slot screws

Follow these steps to wire and connect a DC power feed:

- Step 1.** Ensure power has been disconnected from the DC power source end. Typically, this is done via a circuit breaker or another disconnect device.
- Step 2.** Prepare the DC power harness at the DC power source end. Strip the wire insulation to the proper length according to your local safety codes.
- Step 3.** Attach the -VDC (blue) and RTN (black) wires at the DC power source end according to local safety codes.
- Step 4.** At the chassis end, attach the 2W2 connector on the wiring harness to the connector on the chassis.
- Step 5.** Use a slot screwdriver to secure the chassis connection by tightening the screws on the 2W2 connector.

- Step 6.** Secure the power harness to a rack upright within 6 inches (15.25 cm) of the power connection with a cable tie.
- Step 7.** For redundant configurations, repeat steps 2 through 6 for the second DC power source.
- Step 8.** Install the other 7705 SAR-8 components. See [Installing the Components on page 83](#).
-

Installing the Components

In This Chapter

This chapter provides information about installing the components in the 7705 SAR-8:

- [Installing Components on page 84](#)
 - [Warnings and Notes on page 84](#)
 - [CSM on page 84](#)
 - [Fan Module on page 86](#)
 - [Adapter Cards on page 88](#)
 - [SFPs on page 90](#)
- [Installing a Distribution Panel in a Rack on page 92](#)
 - [Rack-Mounting a BNC or RJ45 Distribution Panel on page 92](#)
- [Managing Cable Connections to Adapter Cards on page 95](#)
 - [Warnings and Notes on page 95](#)
 - [Ethernet and Copper Cables on page 96](#)
 - [Fiber Cables on page 97](#)
 - [Making a Shield Ground Connection on page 98](#)
- [Making External Synchronization Connections on page 99](#)
 - [Connecting an External Synchronization Input on page 100](#)
 - [Providing an External Synchronization Output on page 100](#)

Installing Components

The Control and Switching Module (CSM), adapter cards, Fan module, distribution panel, and cables are field-installable and field-replaceable components.

Warnings and Notes



Danger:

- Only trained and qualified personnel should install or replace this equipment.
- Use of procedures other than those specified in this Installation Guide can result in hazardous radiation exposure.
- 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.



Warning:

- Electrostatic discharge (ESD) damage can occur if adapter cards are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to site grounding point (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-8 until all components are installed and verified as having been installed correctly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.



Note:

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

CSM

The CSM includes one compact flash memory device that can be used to copy and store system boot, software images, and configuration files and logs. The CSM is shipped with the compact flash memory device installed. The CSM provides the console and management interfaces to the 7705 SAR-8, as well as external synchronization input and output interfaces.

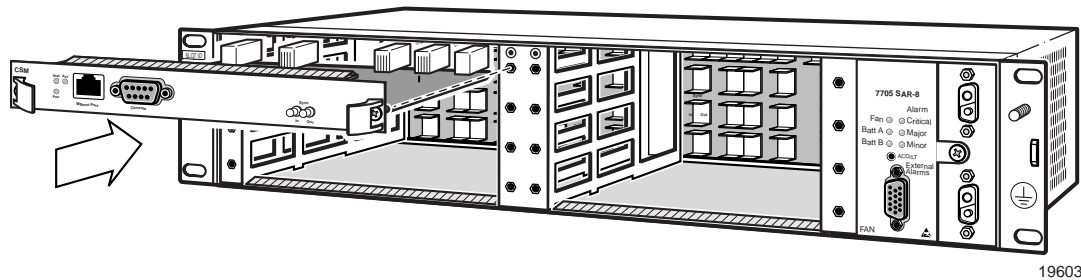
To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the Console, (Ethernet) Management, and Synchronization interfaces.

The 7705 SAR-8 cannot boot without a CSM installed. CSMs are installed in slots A and B. Install a CSM in slot A for a simplex control configuration. Install two CSMs—one in slot A and another in slot B—for a redundant control configuration. [Figure 18](#) illustrates the installation of a CSM in slot A.

Refer to [CSM Connectors and LEDs on page 112](#) for a description of the CSM LEDs.

Refer to [Replacing a CSM on page 119](#) for instructions on replacing a CSM.

Figure 18: Installing the CSM



19603

Table 19: CSM Installation Features

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

Tools required:

- torque driver for Phillips screws

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 must be installed in slot A. For redundant configurations, install a CSM in slot A and in slot B.

With the ejector levers rotated inward, hold the CSM by the levers, align the card with the slot guides, and slide the card inward until the connectors are seated in the backplane and the faceplate is flush with the front of the chassis.



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

Step 3. Secure the card in place by tightening the captive screws. Do not over-tighten. The recommended torque is 4-6 lbf.-in.



Note: The CSM cannot be removed if the captive screws are tightened. To remove the CSM, loosen the captive screws, rotate the ejector levers outward to loosen the backplane connectors, and pull the CSM out of the slot.

Fan Module

The Fan module has eight fans mounted on its circuit board. The Fan module must always be installed and fully operational while the 7705 SAR-8 is powered up. During routine maintenance and Fan module replacement, the system can operate safely for up to four minutes without the Fan module installed. [Figure 19](#) illustrates the installation of the Fan module.

To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the Alarm interface.

Refer to [Fan Module Connectors and LEDs on page 114](#) for a description of the Fan module LEDs.

Refer to [Replacing the Fan Module on page 127](#) for information on replacing the Fan module.

The Fan module provides an alarm interface equipped with relays that can be used to trigger external alarm indicators. It also provides inputs that can be used to trigger the generation of alarms on the 7705 SAR-8 that indicate environmental or external alarm conditions. Refer to [External Alarms Port Pinouts on page 135](#) for pinout definitions.

Warnings and Notes



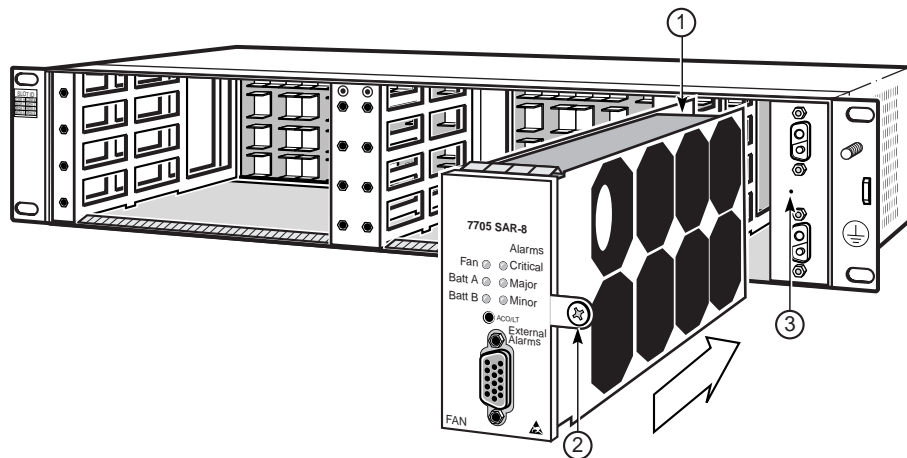
Warning:

- Always keep your fingers away from rotating fan blades.
- The Fan module is hot-swappable. The 7705 SAR-8 operates safely for up to four minutes while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent over-heating conditions.



Note: In the event of a single fan failure, the remaining fans continue to run. This is sufficient to continue to provide adequate cooling for the system but the Fan module needs to be replaced as soon as possible. The individual fans are not field-replaceable.

Figure 19: Installing the Fan Module



19642

Table 20: Fan Module Installation Features

Key	Description
1	Slot guide
2	Captive screw
3	Threaded receptacle

Tools required:

- torque driver for Phillips screws

To install a Fan module:

- Step 1.** Remove the Fan module from the packaging and place it on a flat 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 receptacle.
- Step 4.** Secure the Fan module to the chassis, using a calibrated torque screwdriver set at 4-6 lbf.in. Do not over-tighten.

Adapter Cards

The 7705 SAR-8 system supports the following adapter cards:

- 16-port T1/E1 ASAP Adapter card
- 8-port Ethernet Adapter card

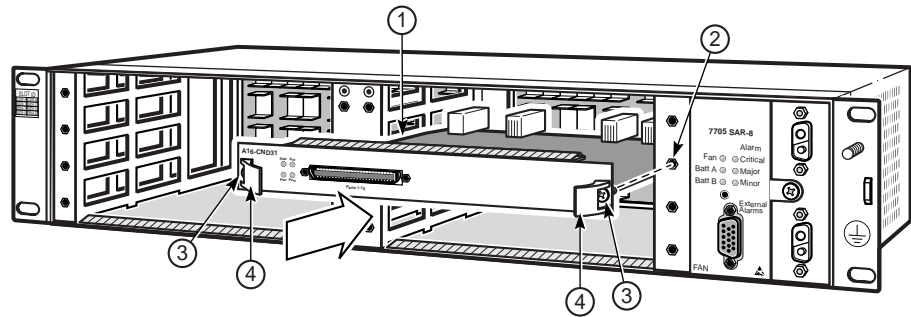
A maximum of up to six adapter cards may be installed on the 7705 SAR-8 in slots MDA 1 through MDA 6 (up to six 16-port T1/E1 ASAP Adapter cards or up to two 8-port Ethernet Adapter cards). See [Figure 5 on page 41](#) for slot identification. [Figure 20](#) illustrates the installation of an adapter card.

The 8-port Ethernet Adapter card has two small form-factor pluggable (SFP) ports for Gigabit Ethernet connections and six RJ45 ports for 10/100 BASE-T Ethernet connections. For more information on installing an SFP, see [SFPs on page 90](#).

To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the adapter card interfaces. Use CAT5 shielded cables with Fast Ethernet interfaces and CAT5E shielded cables with Gigabit Ethernet interfaces.

Refer to [Replacing Adapter Cards on page 122](#) 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 20: Installing an Adapter Card



19643

Table 21: Adapter Card Installation Features

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

Tools required:

- torque driver for Phillips screws

To install an adapter card:

Step 1. Remove the adapter card from the packaging and place on a flat 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 20](#)).



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 half way, 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 4-6 lbf.-in.



Note: The adapter card cannot be removed if the captive screws are tightened. To remove the adapter card, loosen the captive screws, rotate the ejector levers outward, and pull the adapter card out of the slot.

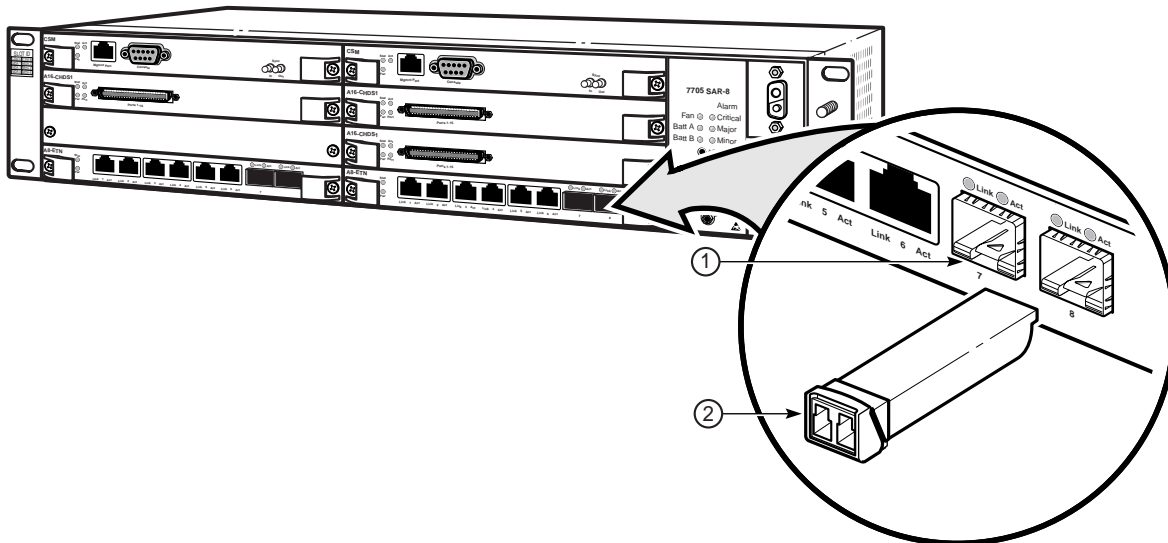
SFPs

A small form-factor pluggable (SFP) module can be installed on the following adapter cards:

- 8-port Ethernet Adapter card

Figure 21 illustrates the installation of an SFP. 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 21: Installing an SFP



19667

Table 22: 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 a flat anti-static work surface. Avoid touching any SFP components and connector pins.

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

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 BNC or RJ45 Distribution Panel

The distribution panel is designed for installation in a 19-inch rack. [Figure 22](#) illustrates the installation of a distribution panel.



Note: There should be at least 1 RU of space above and/or below the 7705 SAR-8 to run cables from the faceplate connectors. It is not necessary for the space to be immediately above or below the 7705 SAR-8.

Figure 22: Installing a Distribution Panel in a Rack

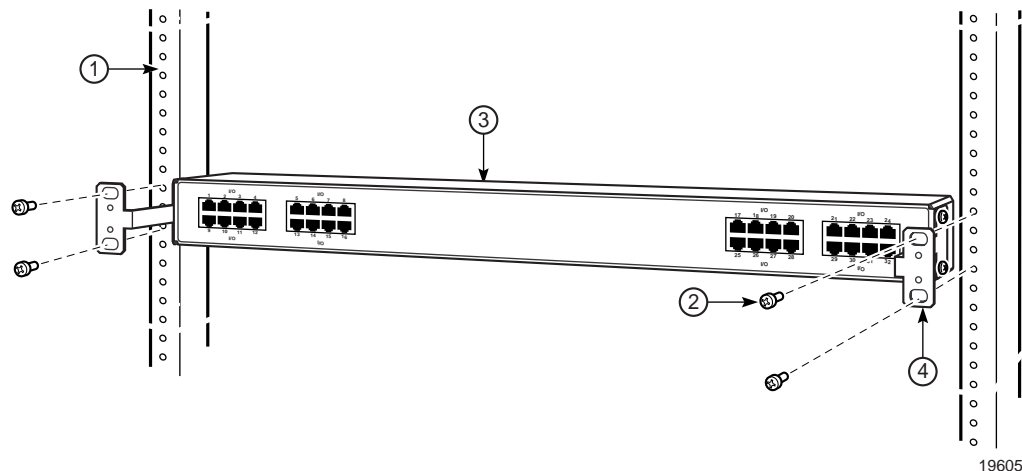


Table 23: Rack-Mounting the Distribution Panel

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.
- the power to the rack is **OFF**

Tools required:

- 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 22](#).

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-8 to run cables. See [Managing Cable Connections to Adapter Cards on page 95](#).

Step 3. Align the mounting holes on each bracket to the mounting holes on the rack uprights. 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 on page 73](#).



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.

Installing a Distribution Panel in a Rack

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.
-

Managing Cable Connections to Adapter Cards

All cable connections to adapter cards are made from the front of the 7705 SAR-8. The adapter cards can be connected using Ethernet, copper, or fiber-optic cables. A distribution panel is needed to make coaxial cable connections. Refer to the appropriate adapter card installation guide for details on connecting to a specific adapter card.



Note:

- Alcatel-Lucent recommends leaving at least 1 RU of space above and/or below the 7705 SAR-8 to run cables from the faceplate connectors. It is not necessary for the space to be immediately above or below the 7705 SAR-8.
- Ensure cables are dressed such that they do not impede the insertion or removal of field-replaceable units (FRUs), such as CSMs, adapter cards, and the Fan module.
- 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, 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.

Warnings and Notes



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



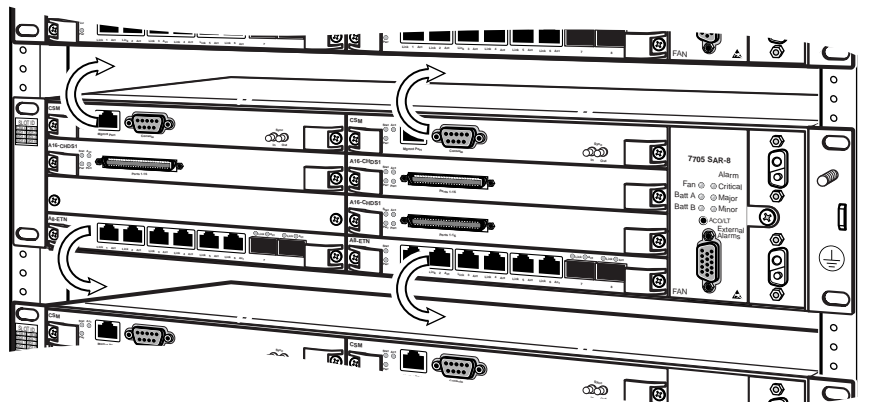
Warning:

- Electrostatic discharge (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 site grounding point (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- 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.
- Do not power up a 7705 SAR-8 until all components are installed and verified as having been installed correctly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.

Ethernet and Copper Cables

Figure 23 illustrates how Ethernet and copper wire cables are routed on the 7705 SAR-8. Cables can be routed under or over the chassis.

Figure 23: Managing Cable Connections



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Hardware required:

- cable ties

To attach Ethernet and copper wire cables:

Step 1. Attach the cable to the connector on the adapter card.

Step 2. Route the cables under or over the chassis. If desired, loosely bundle the cables from each slot together using a cable tie. Do not over-tighten the cable tie.



Note: Dress the cables such that they do not impede the insertion or removal of field-replaceable units, including the Fan module.

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

Fiber Cables

**Warning:**

- 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. (30 mm) 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 with respect to the use of dust covers and cleaning.

Fiber-optic cables are routed in a similar fashion to Ethernet and copper wire cables (see [Figure 23](#)). Cables are routed under or over the chassis.

Hardware required:

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

To attach fiber cables:

Step 1. Attach the cable to the connector on the adapter card. If necessary, attach the fiber cable boot according to the manufacturer's instructions.



Warning: Fiber cables are sensitive to bending, twisting and general over-exertion. Extreme caution is recommended when handling fiber cable.

Step 2. Route the cables under or over the chassis. If desired, loosely bundle the cables from each slot together using a cable tie. Do not over-tighten the cable tie.



Note: Dress the cables such that they do not impede the insertion or removal of field-replaceable units, including the Fan module.

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

Making a Shield Ground Connection

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

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

Hardware required:

- 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) off of 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.

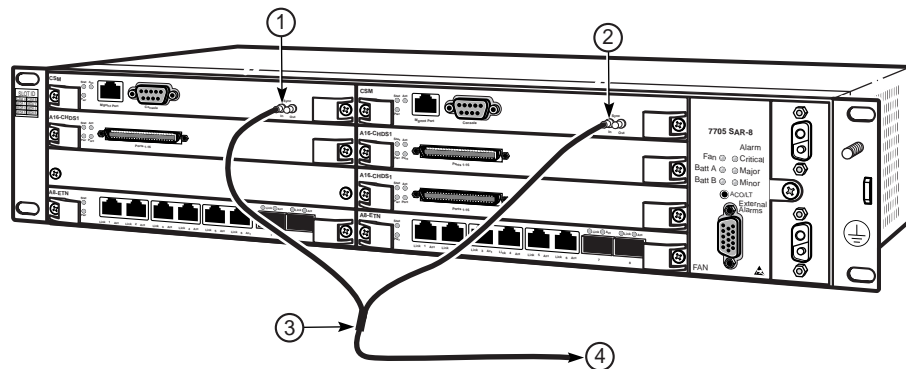
Step 4. Securely attach the shield to the chassis ground point. Use a screw and star washer large enough to make a proper ground connection. Use proper cable dressing and strain relief techniques.

Making External Synchronization Connections

The CSM provides 1.0/2.3 coaxial connectors for external synchronization input and output. For redundant CSM configurations, a Y-cable can be used to connect the Sync In connectors on both CSMs to the same external synchronization source. The Y-cable is available from Alcatel-Lucent.

Figure 24 illustrates the use of a Y-cable for redundant Sync In connections.

Figure 24: Installing Redundant External Synchronization Inputs



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Table 24: Redundant External Synchronization Input Features

Key	Description
1	Sync In – CSM A
2	Sync In – CSM B
3	Y-cable
4	From external synchronization source

Hardware required:

- coaxial cable with 1.0/2.3 coaxial connector (for single CSM systems)
- Y-cable available from Alcatel-Lucent (for redundant CSM systems)

Connecting an External Synchronization Input

To connect an external synchronization source input to the router:

Step 1. For single CSM systems, attach the synchronization cable to the Sync In connector on the CSM.

For redundant CSM systems, attach the two branch connectors on the Y-cable to the Sync In connectors on the CSMs—one connector for each Sync In connector.

Step 2. Attach the other end of the synchronization cable to the external synchronization source.

Providing an External Synchronization Output

To provide an external synchronization source output from the router:

Step 1. Attach the synchronization cable to the Sync Out connector on the CSM. In a redundant CSM system, either Sync Out connector can be used.

Step 2. Attach the other end of the synchronization cable to the device requiring a synchronization source.

Initializing and Provisioning

In This Chapter

This chapter provides information about initializing and provisioning the router:

- [Powering Up the Router on page 102](#)
 - [Power-Up and Initialization on page 102](#)
 - [Troubleshooting Initial Startup on page 103](#)
- [Establishing Router Management Connections on page 105](#)
 - [Console Connection on page 105](#)
 - [Telnet Connection on page 106](#)
 - [Running Telnet on page 107](#)
- [Provisioning CSM and Adapter Card Parameters on page 108](#)
 - [Card and Card-Type Commands on page 108](#)
 - [MDA and MDA-Type Commands for Adapter Cards on page 109](#)

Powering Up the Router

Complete the steps in [Wiring the DC Inputs on page 79](#) and [Installing the Components on page 83](#) before proceeding with the following instructions. Then power up the system and verify the LED activity of all components.

The primary copy of the 7705 SAR-8 TiMOS software is located on the compact flash memory device that is factory-installed on the CSM. The compact flash device is not field-replaceable.



Note:

- The DC-powered 7705 SAR-8 does not have a power switch or circuit breaker. The system is powered on by applying power from the DC power source. Typically, this is done via a circuit breaker or a disconnect device.
- Configurations and executable images can be stored on the compact flash memory device or an FTP file location.
- For proper thermal operation, ensure that slot covers are installed on all empty slots before powering up the router.
- You must have a console or Telnet connection to communicate with and provision the 7705 SAR-8. See [Establishing Router Management Connections on page 105](#).

Power-Up and Initialization

To power up the router, follow these steps:

- Step 1.** Turn on the power to the router at the remote DC power source(s) to initiate the boot process.

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

- Step 2.** Verify that the system is initializing.

The system searches the compact flash device on the CSM (cf3) for the `boot.ldr` 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 seconds), 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, refer to [Troubleshooting Initial Startup on page 103](#).

- Step 3.** Verify the operational status of the router components by checking all the LEDs on the following components:
- Fan module (refer to [Fan Module Connectors and LEDs on page 114](#))
 - CSM (refer to [CSM Connectors and LEDs on page 112](#))
 - Adapter cards (refer to the appropriate adapter card installation guide)
- Step 4.** After verifying the LEDs, establish communication with the router via the Console port. Refer to [Console Connection on page 105](#).
- Step 5.** (Optional at this time) Assign an IP address to the CSM. Refer to [Telnet Connection on page 106](#) for quick reference information and to the 7705 SAR OS Basic System Configuration Guide for detailed information.
- Step 6.** (Optional at this time) Configure or modify the primary, secondary, or tertiary BOF file locations. Refer to [Telnet Connection on page 106](#) for reference information and to the 7705 SAR OS Basic System Configuration Guide for detailed information.

Troubleshooting 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. In 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

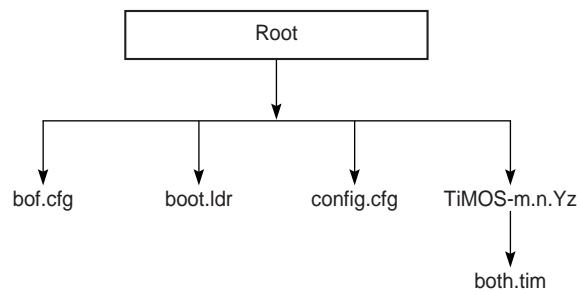
```
Rebooting...
Alcatel 7705 Boot ROM. Copyright 2007 Alcatel-Lucent.
All rights reserved. All use is subject to applicable license agreements.
Build: X-0.0.1166 on Wed Aug 8 23:22:35 EDT 2007 by csabuild
Version: 0x1C
Processor core is xxxXX
COLD boot on processor #1
?Preparing for jump to RAM...
Starting 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.
```

When 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 image and configuration file locations.

When the image is successfully loaded, control is passed from the boot loader file to the image. The runtime image 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 25 displays the compact flash directory structure and file names.

Figure 25: Files on the Compact Flash



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Files on the compact flash are:

- `bof.cfg` — Boot option file
- `boot.ldr` — Bootstrap image
- `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 image file

Establishing Router Management Connections

There are two ways to access management of the 7705 SAR-8:

- Console connection
- Telnet connection

Console Connection

The console connector on the CSM is a male DB9 connector. To establish a console connection, you need the following:

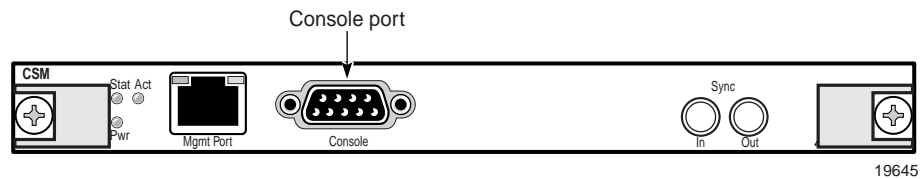
- an ASCII terminal or a PC running terminal emulation software set to the parameters shown in [Table 25](#)
- a standard serial cable with a female DB9 connector

For pinout information, refer to [Console Port Pinouts on page 133](#).

Table 25: Console Port Default Settings

Parameter	Value
Baud Rate	115 200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Figure 26: Console Port Connection



Establishing Router Management Connections

To establish a console connection:

- Step 1.** Connect the terminal to the Console port on the front panel ([Figure 26](#)) 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

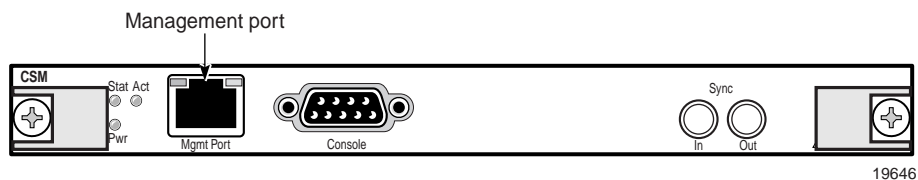
Telnet access provides the same options for user and administrator access as those available through the console port. You can access the router with a Telnet connection from a PC or workstation connected to the network once the following conditions are met:

- the router has successfully initialized
- the Management port ([Figure 27](#)) has been configured using the `bof>address` command (see **CLI Syntax**)

CLI Syntax: `bof`
`address ip-address/mask [primary|secondary]`

For more information about configuring router parameters, refer to the 7705 SAR OS Router Configuration Guide. For pinout information, refer to [Management Port Pinouts on page 132](#).

Figure 27: Management Port Connection



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

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



Notes:

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

Configure components in the following order:

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

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-8, when specifying the IOM, the slot number value is always 1 and the card type is always `iom-1g`.

	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-1g</code>

MDA and MDA-Type Commands for Adapter Cards



Note:

- In the `config` context, adapter cards are identified by their *mda-number*, where the *mda-number* is a number from 1 through 6. For example, an adapter card in slot MDA 4 is identified by *mda-number* 4.
- 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 1/5` displays information on the adapter card in slot MDA 5. For the 7705 SAR-8, the slot number is always 1.
- Adapter cards must be configured before their ports can be configured.

Adapter card slots with odd numbers are on the left side of the router (slots MDA 1, 3, and 5); adapter card slots with even numbers are on the right side (slots MDA 2, 4, and 6). See [Figure 5 on page 41](#), which identifies the slots.

After the IOM is activated, continue in the `config` context with the following CLI commands to provision the adapter card(s).

	Command	Example
Step 1.	<code>mda mda-number</code>	<code>mda 1</code>
Step 2.	<code>mda-type mda-type</code>	<code>mda-type a8-eth</code>
Step 3.	<code>exit</code>	<code>exit</code>

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

Step 4.	<code>mda mda-number</code>	<code>mda 3</code>
Step 5.	<code>mda-type mda-type</code>	<code>mda-type a16-chds1</code>
Step 6.	<code>exit</code>	<code>exit</code>

Example

The following example displays the `card`, `card-type`, `mda` and `mda-type` commands to specify the IOM as an `iom-1g` type, with an 8-port Ethernet Adapter card in slot MDA 1 and a 16-port T1/E1 ASAP Adapter card in slot MDA 2:

```
ALU-1>config# card 1
ALU-1>config>card# card-type iom-1g
ALU-1>config>card# mda 1
ALU-1>config>card>mda# mda-type a8-eth
ALU-1>config>card>mda# exit
ALU-1>config>card# mda 2
ALU-1>config>card>mda# mda-type a16-chdsl
ALU-1>config>card>mda# exit
```

The CLI display for the configuration example above looks similar to the following:

```
ALU-1>config# info
. . .
-----
echo "Card Configuration"
#-----
    card 1
      card-type iom-1g
      mda 1
        mda-type a8-eth
      exit
      mda 2
        mda-type a16-chdsl
      exit
    exit
-----
ALU-1>config#
```

To configure ports, refer to the Card and Port Configuration section of the 7705 SAR OS Interface Configuration Guide.

Appendix A: Connectors and LEDs

In This Chapter

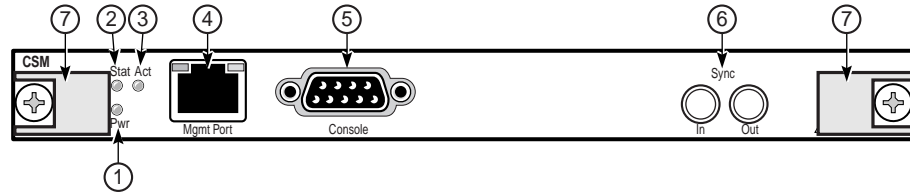
This chapter provides information on the connectors and LEDs seen on the front of the 7705 SAR-8. There are no connectors or LEDs on the back of the unit:

- [CSM Connectors and LEDs on page 112](#)
- [Fan Module Connectors and LEDs on page 114](#)
- [Adapter Card Connectors and LEDs on page 116](#)

CSM Connectors and LEDs

Figure 28 identifies the connectors and LEDs on the CSM.

Figure 28: CSM Connectors and LEDs



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Table 26 describes the connectors and LEDs on the CSM.

Table 26: 7705 SAR-8 CSM Connector and LED Descriptions

Key	Label/Part	Sub category	Description
1	Pwr	—	Blue: Indicates that power to the CSM is on Unlit: Indicates that there is no power to the CSM or the power is faulty
2	Stat (Status)	—	Green (solid): Indicates that the CSM is operationally up and administratively up Green (blinking): Indicates that the CSM is initializing the system Amber: Indicates that the CSM is operationally down but administratively up, or that hardware is booting up Unlit: Indicates that the CSM is operationally down and administratively down
3	Act (Active)	—	Green (solid): Indicates the active CSM Green (blinking): Indicates the standby CSM

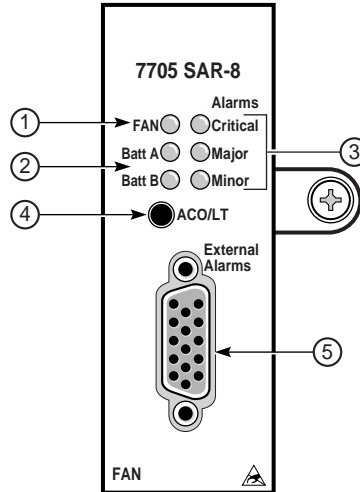
Table 26: 7705 SAR-8 CSM Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
4	Mgmt Port	Connector	The Ethernet Management port is provisioned with an RJ-45 port and used for the initial system startup as well as system configuration and monitoring. It supports both half and full duplex modes, and 10M/100M or autonegotiated communication. Refer to Management Port Pinouts on page 132 for pinout assignments.
		LEDs	The Link LED is located in the top left corner of the port and the Data LED is located in the top right corner.
		Link	Amber (blinking): Indicates that the Ethernet link has Rx/Tx activity Unlit: Indicates that the Ethernet link has no activity, or is down or disabled
		Data	Green: Indicates that there is a valid communications link Unlit: Indicates that there is no communications link, or that the link is operationally down or disabled or shut down Note: The Data LED is not affected by a Lamp Test
5	Console	—	The console port is provisioned with a DB9 male connector and is used for the initial system startup as well as system configuration and monitoring. The console port is a Universal Asynchronous Receiver/Transmitter (UART) port. Refer to Console Port Pinouts on page 133 for pinout assignments. Use an EIA/TIA-232 DTE console cable to connect a terminal to the console port. The factory default baud rate is 115.2KBaud, and can be reconfigured for 9.6, 19.2, 38.4, or 57.6 KBaud.
6	Sync	In	The “In” synchronization port is provisioned with a 1.0/2.3 coaxial connector that can be used to receive an external synchronization input signal.
		Out	The “Out” synchronization port is provisioned with a 1.0/2.3 coaxial connector that can be used to provide an external synchronization output signal.
7	Ejector lever	—	The ejector levers help insert and remove the CSM from its card slot. When rotated outward, the levers release the CSM connectors from the backplane.

Fan Module Connectors and LEDs

Figure 29 identifies the connectors and LEDs on the Fan module.

Figure 29: Fan Module Connectors and LEDs



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Table 27 describes the connectors and LEDs on the Fan module.

Table 27: 7705 SAR-8 Fan Module Connector and LED Descriptions

Key	Label/Part	Sub category	Description
1	FAN	—	<p>Green: Indicates that the fans are operational.</p> <p>Amber: Indicates that there is a fan failure.</p> <p>Unlit: Indicates that the fan has power failure.</p> <p>Note: The FAN LED is not affected by a Lamp Test.</p>
2	Batt A Batt B	—	<p>Green: Indicates that DC input power is present and operational.</p> <p>Unlit: Indicates that the DC power supply is not installed or the DC power feed is not connected.</p> <p>Note: The Batt A and Batt B LEDs are not affected by a Lamp Test.</p>

Table 27: 7705 SAR-8 Fan Module Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
3	Alarms	Critical	Red: Indicates that a critical condition exists, such as a fan failure or a power feed failure. Unlit: Indicates that there are no critical alarm conditions.
		Major	Red: Indicates that a serious condition exists, such as an over-temperature condition or a full compact flash device. Unlit: Indicates that there are no major alarm conditions.
		Minor	Amber: Indicates that a condition exists, such as a card removal or a synchronization reference failure. Unlit: Indicates that there are no minor alarm conditions.
4	ACO/LT		The Audible Alarm Cutoff/Lamp Test button has two functions. When pressed, the Lamp Test is enabled and the following LED activity occurs: all activity and status LEDs on the chassis glow green; all port LEDs on T1/E1 ASAP Adapter cards glow green; critical and major Alarm LEDs glow red and the minor Alarm LED glows amber. Note: The following LEDs are not affected by the Lamp Test: Management port LEDs on the CSM; Fan and Battery A/B LEDs on the Fan module; and all port LEDs on the Ethernet Adapter card. When released, all LEDs on CSM(s) and MDAs return to their pre-Lamp Test state. The Alarm LEDs become unlit until the next new alarm condition.
5	External Alarms	Connector	The External Alarms port is a DB15 serial port. It can receive input signals from four external alarm devices and provide output signals through three sets of contacts. Refer to External Alarms Port Pinouts on page 135 for pinout assignments.

Adapter Card Connectors and LEDs

Adapter card connectors and LEDs are described in the specific adapter card installation guide.

Appendix B: Field-Replaceable Units

In This Chapter

This chapter provides information about field-replaceable units (FRUs) in the 7705 SAR-8 chassis:

- [Warnings and Notes on page 118](#)
- [Replacing a CSM on page 119](#)
- [Replacing Adapter Cards on page 122](#)
- [Replacing the Fan Module on page 127](#)
- [Installing a Slot Cover on page 130](#)

Warnings and Notes



Danger:

- Only trained and qualified personnel should install or replace this equipment.
- Use of procedures other than those specified in this Installation Guide can result in hazardous radiation exposure.



Warning:

- Electrostatic discharge (ESD) damage can occur if 7705 SAR-8 components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to site grounding point (typically, the grounding stud on the 7705 SAR-8, 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 router components on an anti-static surface.
- Slot covers are required in 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” status.

Replacing a CSM

This section contains:

- [Warnings and Notes](#)
- [Removing a CSM](#)
- [Replacing a CSM](#)

Warnings and Notes



Warning:

- Electrostatic discharge (ESD) damage can occur if 7705 SAR-8 components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to site grounding point (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- Always place router components on an anti-static surface.
- Slot covers are required in all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



Note:

- When replacing CSMs, modifying the configuration is not required.
- The 7705 SAR-8 requires at least one CSM, which must be installed in slot CSM A. For redundancy, install a second CSM in slot CSM 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 slot cover and power off the system until the CSM is replaced.

Removing a CSM

Tools required:

- Phillips screwdriver

To remove a CSM:

Step 1. Disconnect all cable connections to the CSM.

Step 2. Use a Phillips screwdriver to loosen the captive screws that fasten the CSM to the chassis.

Step 3. Simultaneously rotate the ejector levers outward 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 slot cover to cover the empty slot. Refer to [Installing a Slot Cover on page 130](#) for instructions.

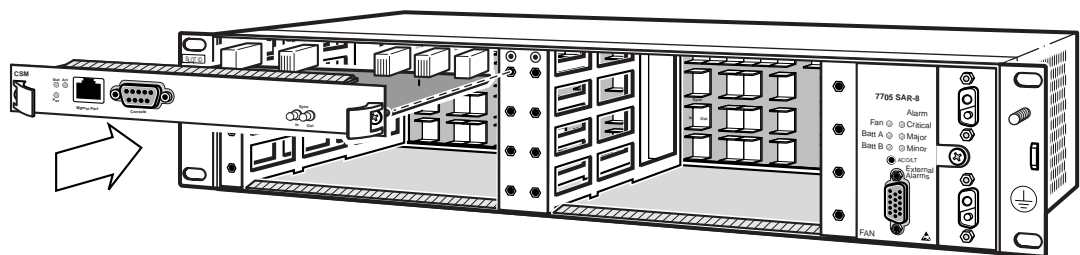
Replacing a CSM



Note: Each CSM has two ejector levers that release the card from the backplane connectors. During installation, the ejector levers must be rotated inward. The ejector levers must remain in the inward position while the card is installed in the chassis.

[Figure 30](#) illustrates replacing a CSM.

Figure 30: Replacing a CSM



Tools required:

- torque driver for Phillips screws

To replace a CSM:

- Step 1.** Remove the old CSM from the chassis.
- 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. With the ejector levers rotated inward, hold the CSM by the levers, align the card with the slot guides and slide the card into the slot until the connectors are seated in the backplane and the faceplate is flush with the front of the chassis.



Warning: Do not force a CSM into its slot if its connector pins do not mate smoothly with the backplane connectors. The card may not be seated properly and the pins can get damaged. Pull the card half way out and then reinsert it.

- Step 4.** Secure the card in place by tightening the captive screws. Do not over-tighten. The recommended torque is 4-6 lbf.-in.
-

Replacing Adapter Cards

This section contains:

- [Warnings and Notes](#)
- [Changing the Adapter Card Configuration](#)
- [Removing an Adapter Card](#)
- [Replacing an Adapter Card](#)

Warnings and Notes



Danger:

- Electrostatic discharge (ESD) damage can occur if 7705 SAR-8 components are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to site grounding point (typically, the grounding stud on the 7705 SAR-8, or a properly grounded rack or work bench).
- 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.



Warning:

- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-8 until all components are installed and their installation verified.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.
- Slot covers are required in all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



Note:

- Ports cannot be configured if the adapter card is not provisioned.
- Services cannot be configured if ports are not configured.
- Adapter card slots are numbered MDA 1 through 6.
- 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.

Changing the Adapter Card Configuration

If you replace an adapter card with a different type, you must change the configuration to reflect the new adapter card type prior to removing the installed card. Each active port must be shut down before you shut down and remove an adapter card configuration. If you replace an adapter card with the same type, no configuration change is necessary. Refer to the 7705 SAR OS Interface Configuration Guide for details on configuring cards and ports.

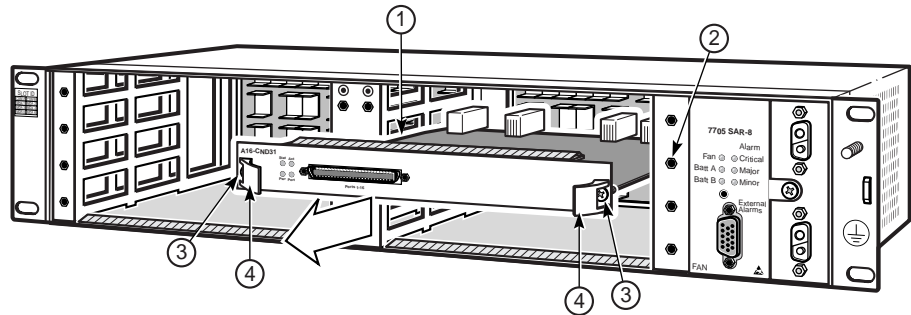
Issue the following commands in the `config` context to shut down ports, remove the adapter card from the configuration, and change to an 8-port Ethernet Adapter card:

	Command	Example
Step 1.	<code>port port-id*</code>	<code>port 1/1/5</code>
Step 2.	<code>shutdown</code>	<code>shutdown</code>
	*NOTE: The <code>port>shutdown</code> 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>
Step 9.	<code>mda mda-slot</code>	<code>mda 1</code>
Step 10.	<code>mda-type mda-type</code>	<code>mda a8-eth</code>
Step 11.	<code>no shutdown</code>	<code>no shutdown</code>
Step 12.	<code>exit</code>	<code>exit</code>

Removing an Adapter Card

Figure 31 illustrates removing an adapter card.

Figure 31: Removing an Adapter Card



19649

Table 28: Adapter Card Installation Features

Key	Description
1	Card guide
2	Threaded receptacle
3	Captive screws
4	Ejector lever

Tools required:

- Phillips screwdriver

To remove an adapter card:

Step 1. If you are replacing an adapter card with a different type, change the configuration to reflect the new adapter card type. See [Changing the Adapter Card Configuration on page 123](#).

Step 2. Disconnect all cables from the adapter card ports.

Step 3. 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 4. Simultaneously rotate the ejector levers outward to release the adapter card connectors from the backplane receptacles.

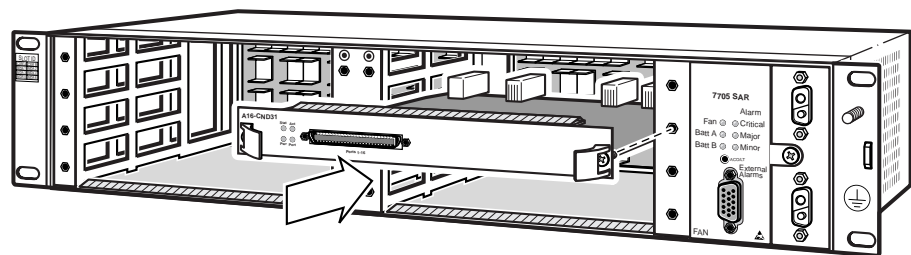
Step 5. Grip the adapter card by the ejector levers and slide the card out of the slot. Place the adapter card on an anti-static surface.

Step 6. If you are not replacing the adapter card immediately, cover the adapter card slot with a slot cover. See [Installing a Slot Cover on page 130](#) for instructions on installing a slot cover.

Replacing an Adapter Card

Figure 32 illustrates the replacement of an adapter card. Table 28 on page 124 identifies the installation features.

Figure 32: Replacing an Adapter Card



19650

Tools required:

- torque driver for Phillips screws

Replacing Adapter Cards

To replace an adapter card:

- Step 1.** Remove the replacement adapter card from the packaging and place on a flat anti-static work surface. Avoid touching board components and connector pins.
 - Step 2.** 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 3.** Press the adapter card firmly into the slot. Make sure that the card connectors are seated in the backplane connectors.
 - Step 4.** Secure the card in place by tightening the captive screws. Do not over-tighten. The recommended torque is 4-6 lbf.-in.
 - Step 5.** 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 6.** Reconnect all previously removed network cables to the adapter card ports.
-

Replacing the Fan Module

This section contains:

- [Warnings and Notes](#)
- [Removing the Fan Module](#)
- [Replacing the Fan Module](#)

Warnings and Notes



Warning:

- Always keep your fingers away from rotating fan blades.
- The Fan module is hot-swappable. The 7750 SAR chassis operates safely for up to four minutes while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent over-temperature conditions.

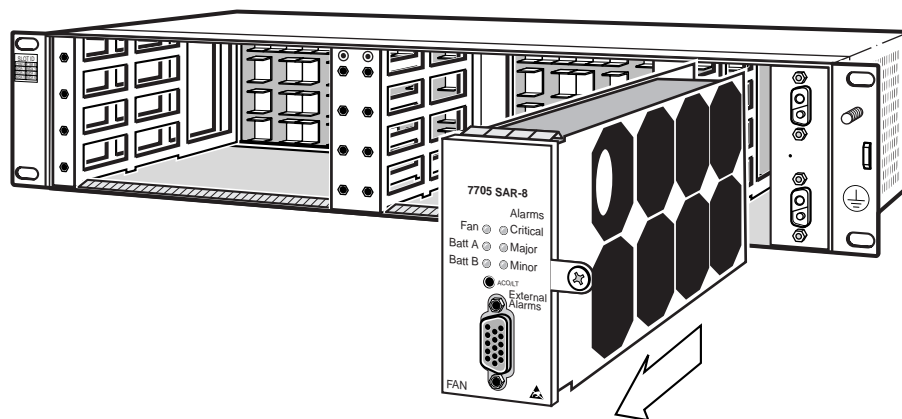


Note: In the event of a single fan failure, the remaining fans continue to run. This is sufficient to continue to provide adequate cooling for the system but the Fan module needs to be replaced as soon as possible. The individual fans are not field-replaceable.

Removing the Fan Module

Figure 33 illustrates removing the Fan module.

Figure 33: Removing the Fan Module



19651

Tools required:

- Phillips screwdriver

To remove the Fan module:

Step 1. Unpack the replacement Fan module from the protective packaging. Place the Fan module on an anti-static surface.

Step 2. Use a Phillips screwdriver to loosen the captive screw on the Fan module faceplate.

Step 3. Pull the Fan module halfway out of the chassis and allow the fans to stop spinning.



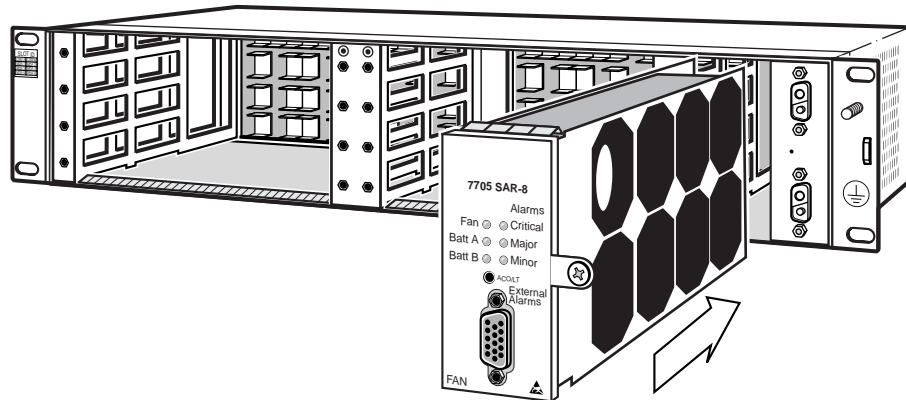
Caution: DO NOT put your fingers or any tool in the Fan module if the fans are still spinning. Wait until the fans stop spinning (about 20 seconds) before completely removing the Fan module from its slot.

Step 4. When the fans stop spinning, pull the Fan module completely out of the slot.

Replacing the Fan Module

Figure 33 illustrates replacing the Fan module.

Figure 34: Replacing the Fan Module



19652

Tools required:

- torque driver for Phillips screws

To replace the Fan module:

- Step 1.** Hold the replacement Fan module by its edges, align it with the slot guides, and slide it into the slot.
- Step 2.** Press the Fan module firmly into the slot. Make sure that the Fan module connectors are seated in the backplane connectors.
- Step 3.** Secure the Fan module by tightening the captive screw. Do not over-tighten. The recommended torque is 4-6 lbf.-in.
- Step 4.** Verify that the Batt A and/or Batt B LEDs on the Fan module faceplate are lit. When lit (green), the system is receiving power from power feeds A and/or B. At least one of the Batt LEDs must be lit. Refer to [Fan Module Connectors and LEDs on page 114](#) for more information on Fan module LEDs.

Installing a Slot Cover

A slot cover must be installed in all empty chassis slots.

Tools required:

- slot screwdriver

To install a slot cover:

Step 1. Align the slot cover and insert the cover into the chassis slot.

Step 2. Tighten the two captive screws that fasten the slot cover to the chassis. Do not over-tighten. Slot covers do not have backplane connectors.

Appendix C: Pinout Assignments

In This Chapter

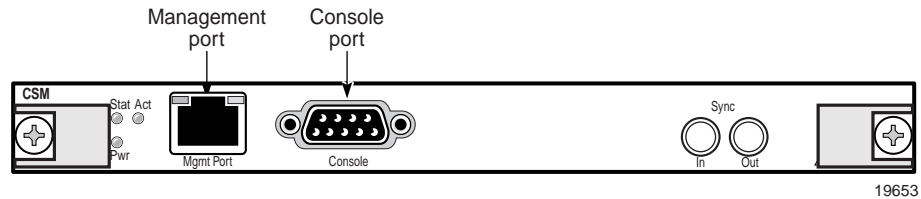
This chapter provides information about the pinout assignments for the port connectors on the 7705 SAR-8:

- [CSM Ports on page 132](#)
 - [Management Port on page 132](#)
 - [Management Port Pinouts on page 132](#)
 - [Console Port on page 133](#)
 - [Console Port Pinouts on page 133](#)
- [Fan Module Port on page 134](#)
 - [External Alarms Port on page 134](#)
 - [External Alarms Port Pinouts on page 135](#)
 - [Alarm examples on page 136](#)
- [Adapter Card Ports on page 136](#)

CSM Ports

The CSM has two ports: the (Ethernet) Management port and the Console port. [Figure 35](#) identifies these ports.

Figure 35: CSM Ports



Management Port

The Management port supports half and full duplex communication via 10/100 or autonegotiated Ethernet. The Management port provides a channel to download software and configuration images and manage the system. This port is provisioned with an RJ45 connector on the front panel. You must provide a CAT5 Ethernet cable to connect to the port.

Management Port Pinouts

[Table 29](#) displays the Management port pin assignments.

Table 29: Ethernet Management Port Pinouts – RJ45 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

Table 29: Ethernet Management Port Pinouts – RJ45 Female (Continued)

Pin	Signal	Direction	Description
7	NC	—	Not connected
8	NC	—	Not connected

Console Port

The Console port is a Universal Asynchronous Receiver/Transmitter (UART) port used to configure router and system parameters. It can also be used for monitoring purposes. The Console port is enabled by default and is configured as DTE. The default baud rate is 115 200. This port has a DB9 male connector. Connect the Console port to a terminal using an EIA/TIA-232 serial cable.

Console Port Pinouts

[Table 30](#) displays the Console port pin assignments. The Console port is configured for DTE mode.

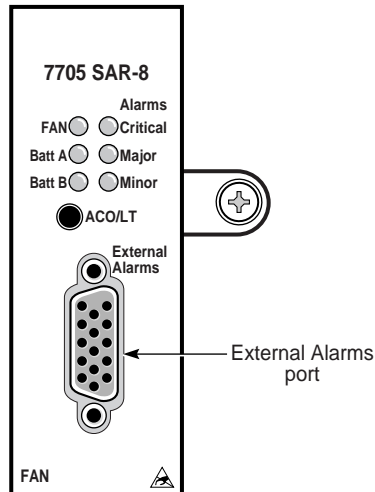
Table 30: Console Port Pinouts – DB9 Male

Pin	Signal	Direction	Description
1	DCD	Input	Data carrier detect
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	DTR	Output	Data terminal ready
5	GND	Signal ground	Signal ground
6	DSR	Input	Data set ready
7	RTS	Output	Request to send
8	CTS	Input	Clear to send
9	RI	Input	Ring indicator

Fan Module Port

Figure 36 identifies the connector for the External Alarms port on the Fan module.

Figure 36: Fan Module Port



19654

External Alarms Port

The External Alarms port provides access to three pairs of alarm output contacts and four alarm inputs. All alarm interfaces are rated for 5 VDC and 100 mA (source or sink). Each alarm input has a fixed severity associated with it – there is one Critical alarm input, two Major alarm inputs, and one Minor alarm input (see Table 31). State transitions on the inputs are debounced for 2 seconds.

You can display the status of the alarm inputs using the `show chassis environment` CLI command.

The port uses a DB15 connector. You must provide an appropriate cable configured according to your alarm panel.

External Alarms Port Pinouts

Table 31 specifies the External Alarms port connector pinouts.

Table 31: External Alarms Port Pinouts

Pin	Signal	Direction	Description
1	Alarm 1	Input	Critical alarm severity (fixed)
2	Alarm 2	Input	Major alarm severity (fixed)
3	nc	—	Not connected
4	Alarm output 3, pin 2	Output	Contact opens on minor alarm
5	Alarm output 3, pin 1	Output	Contact opens on minor alarm
6	nc	—	Not connected
7	Ground	Reference	Reference output for alarm inputs
8	nc	—	Not connected
9	Alarm output 2, pin 2	Output	Contact opens on major alarm
10	Alarm output 2, pin 1	Output	Contact opens on major alarm
11	Alarm 3	Input	Major alarm severity (fixed)
12	Alarm 4	Input	Minor alarm severity (fixed)
13	nc	—	Not connected
14	Alarm output 1, pin 2	Output	Contact closes on critical alarm
15	Alarm output 1, pin 1	Output	Contact closes on critical alarm

Alarm examples

[Table 32](#) lists critical, major, and minor alarm examples.

Table 32: Alarm Examples

Alarm Severity	Examples
Critical	<ul style="list-style-type: none">• one or more fans have failed• a power feed has failed• a critical external alarm has been detected
Major	<ul style="list-style-type: none">• one or more adapter or CSM cards has reported an over-temperature condition• a major external alarm has been detected
Minor	<ul style="list-style-type: none">• a minor external alarm has been detected

Adapter Card Ports

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

Standards and Protocol Support

Standards Compliance

IEEE 802.1p/q VLAN Tagging
IEEE 802.3 10BaseT
IEEE 802.3u 100BaseTX
IEEE 802.3x Flow Control
IEEE 802.3z 1000BaseSX/LX

Protocol Support

LDP

RFC 5036 LDP Specification

MPLS

RFC 3031 MPLS Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 4379 Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures

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

TCP/IP

RFC 768 UDP
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 Telnet
RFC 1350 The TFTP Protocol (Rev. 2)
RFC 1812 Requirements for IPv4 Routers

PPP

RFC 1332 PPP IPCP
RFC 1661 PPP
RFC 1989 PPP Link Quality Monitoring
RFC 1990 The PPP Multilink Protocol (MP)

ATM

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

PSEUDOWIRES

RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)
RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks

Standards and Protocol Support

- RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)
- RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires

RADIUS

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

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

TACACS+

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

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 1907 SNMPv2-MIB
- RFC 2011 IP-MIB
- RFC 2012 TCP-MIB
- RFC 2013 UDP-MIB
- RFC 2138 RADIUS
- 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 2665 EtherLike-MIB
- RFC 2819 RMON-MIB

- RFC 2863 IF-MIB
- RFC 2864 INVERTED-STACK-MIB
- RFC 3014 NOTIFICATION-LOG MIB
- 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
- IANA-IFType-MIB

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-SAP-MIB.mib
- TIMETRA-SDP-MIB.mib
- TIMETRA-SECURITY-MIB.mib
- TIMETRA-SERV-MIB.mib
- TIMETRA-SYSTEM-MIB.mib
- TIMETRA-TC-MIB.mib

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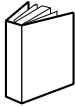
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Customer documentation and product support



Customer documentation

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

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



Technical support

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Customer documentation feedback

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