



Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER | RELEASE 2.1
SAR-8 CHASSIS INSTALLATION GUIDE

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

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

Copyright 2009 Alcatel-Lucent.
All rights reserved.

Disclaimers

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

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

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

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

Table of Contents

Preface	23
Mandatory Regulations	27
List of Terms	28
General Requirements	29
Canada Regulations	32
United States Regulations	33
European Union Regulations	35
EU Compliance Statement	35
Australia/New Zealand Regulations	39
China Regulations	40
7705 SAR-8 Overview	43
7705 SAR-8 Components	44
Chassis	44
CSM	45
Adapter Cards	46
Filler Plates	48
Power System	48
Fan Module	49
Distribution Panels and Cables	52
Notes on 7705 SAR-8 and 7705 SAR-F	59
SAR System Installation Process	61
Site Preparation	63
Warnings and Notes	64
System Specifications	66
Chassis Specifications	66
Environmental Specifications	66
Adapter Card Specifications	68
CSM Specifications	68
Fan Module Specifications	68
Component Power Consumption	69
Component Operating Requirements	70
Installation Locations	71
Chassis Location Requirements	72
Safety Considerations	74
Placement	74
Grounding	74
CBN and IBN support	75
Cabling	75
Power	76
Fan Module	77
Storage	77
Compliance	77

Table of Contents

Installing the Chassis	79
Unpacking the Chassis	80
Unpacking Precautions	80
Installing the Chassis in a Rack	82
Rack-Mounting the Chassis	82
Chassis Ground Wiring	85
Making the Ground Connection	85
DC Power Connections	89
Wiring and Connecting DC Power	90
Warnings and Notes	90
DC-Input Power Connections	91
Wiring the DC Inputs	91
For -48 VDC installations	93
For +24 VDC installations	94
Installing the Components	95
Installing Components	96
Warnings and Notes	96
CSM	96
Compact Flash	98
Fan Module	99
Warnings and Notes	100
Adapter Cards	101
SFPs	103
Installing a Distribution Panel in a Rack	105
Rack-Mounting a Distribution Panel	105
Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel	107
Managing Cable Connections to Adapter Cards	109
Warnings and Notes	109
Ethernet and Copper Cables	110
T3/E3 SFP Connections	111
Fiber Cables	111
Making a Shield Ground Connection	112
Wire Identification by Color	113
Making External Synchronization Connections	114
Connecting an External Synchronization Input	115
Providing an External Synchronization Output	115
Initializing and Provisioning	117
Powering Up the Router	118
Power-Up and Initialization	118
Troubleshooting Initial Startup	119
Establishing Router Management Connections	121
Console Connection	121
Telnet Connection	122
Running Telnet	123
Provisioning CSM and Adapter Card Parameters	124
Card and Card-Type Commands	124

MDA and MDA-Type Commands for Adapter Cards	125
Example	126
Appendix A: Connectors and LEDs	127
CSM Connectors and LEDs	128
Fan Module Connectors and LEDs	130
Adapter Card Connectors and LEDs	133
Appendix B: Field-Replaceable Units	135
Warnings and Notes	136
Replacing a CSM	137
Warnings and Notes	137
Removing a CSM	138
Replacing a CSM	138
Replacing Adapter Cards	140
Warnings and Notes	140
Changing the Adapter Card Configuration	141
Removing an Adapter Card	142
Replacing an Adapter Card	144
Replacing the Fan Module	145
Warnings and Notes	145
Removing the Fan Module	146
Replacing the Fan Module	147
Installing a Filler Plate	148
Appendix C: Pinout Assignments	149
CSM Ports	150
Management Port	150
Management Port Pinouts	151
Console Port	151
Console Port Pinouts	152
Fan Module Port	153
External Alarms Port	153
External Alarms Port Pinouts	154
Alarm Examples	155
RJ-45 Distribution Panel	156
RJ-45 Distribution Panel Pinouts	156
Adapter Card Ports	157
Standards and Protocol Support	159

List of Tables

Preface	23
Table 1: Information Symbols	24
Mandatory Regulations	27
Table 2: List of Terms	28
7705 SAR-8 Overview	43
Table 3: Distribution Panel Features	53
Table 4: T1/E1 Cables	57
Table 5: 7705 SAR-8 and 7705 SAR-F Comparison	59
Site Preparation	63
Table 6: 7705 SAR-8 Chassis Specifications	66
Table 7: Environmental Specifications	66
Table 8: Adapter Card Specifications	68
Table 9: CSM Specifications	68
Table 10: Fan Module Specifications	68
Table 11: Component Power Consumption	69
Table 12: 7705 SAR-8 Hardware Components for DC Operational Requirements	70
Table 13: Chassis Clearance Specifications	73
Table 14: Storage Specifications	77
Installing the Chassis	79
Table 15: Unpacking the 7705 SAR-8 Chassis	81
Table 16: Rack-Mounting the 7705 SAR-8 Chassis	83
Table 17: Ground Wire Descriptions	86
Table 18: Chassis Ground Connection	86
DC Power Connections	89
Table 19: DC Power Connection Descriptions	92
Table 20: Wiring the DC Power Supplies Descriptions	93
Installing the Components	95
Table 21: CSM Installation Features	97
Table 22: Fan Module Installation Features	100
Table 23: Adapter Card Installation Features	102
Table 24: SFP Installation Features	104
Table 25: Rack-Mounting the Distribution Panel	106
Table 26: Quad Identification Wire Color	113

List of Tables

Table 27:	Redundant External Synchronization Input Features	114
Initializing and Provisioning		117
Table 28:	Console Port Default Settings	121
Appendix A: Connectors and LEDs		127
Table 29:	7705 SAR-8 CSM Connector and LED Descriptions	128
Table 30:	7705 SAR-8 Fan Module Connector and LED Descriptions	130
Appendix B: Field-Replaceable Units		135
Table 31:	Adapter Card Installation Features	142
Appendix C: Pinout Assignments		149
Table 32:	Ethernet Management Port Pinouts—RJ-45 Female	151
Table 33:	Console Port Pinouts—DB9 Male	152
Table 34:	External Alarms Port Pinouts	154
Table 35:	Alarm Examples	155
Table 36:	RJ-45 Distribution Panel Pinout Assignments	156

List of Figures

Mandatory Regulations	27
Figure 1: Protective Earth (ground)	31
Figure 2: Earth (ground)	31
Figure 3: WEEE Symbol for post-August 13, 2005 Product	37
7705 SAR-8 Overview	43
Figure 4: 7705 SAR-8 Front View	44
Figure 5: 7705 SAR-8 Slot Identification	45
Figure 6: 7705 SAR-8 CSM Features	46
Figure 7: 7705 SAR-8 Adapter Card	48
Figure 8: 7705 SAR-8 Filler Plate	48
Figure 9: Fan Module	49
Figure 10: BNC Distribution Panel	53
Figure 11: Mini-Coaxial Distribution Panel	54
Figure 12: RJ-45 Distribution Panel	54
Figure 13: 6-Port V.35 Distribution Panel	55
Figure 14: 6-Port V.35 Distribution Panel M34 Pinouts (Female)	55
Figure 15: 6-Port RS-232 Distribution Panel	56
Figure 16: 6-Port RS-232 Distribution Panel DB25 Pinouts (Female)	56
Site Preparation	63
Figure 17: Chassis Clearance Requirements (View from Top)	72
Installing the Chassis	79
Figure 18: Unpacking the 7705 SAR-8 Chassis	81
Figure 19: Installing the 7705 SAR-8 Chassis in a Rack	83
Figure 20: Preparing the Ground Wire	85
Figure 21: Attaching the Chassis Ground Connector	86
DC Power Connections	89
Figure 22: DC Power Harness	92
Figure 23: Wiring the -48 VDC Power Supplies	92
Figure 24: Wiring the +24 VDC Power Supplies	94
Installing the Components	95
Figure 25: Installing the CSM	97
Figure 26: Installing the Fan Module	100
Figure 27: Installing an Adapter Card	102

List of Figures

Figure 28:	Installing an SFP	104
Figure 29:	Installing a Distribution Panel in a Rack	105
Figure 30:	Mini-Coaxial Connector Disconnection Tool	107
Figure 31:	Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel	107
Figure 32:	Managing Cable Connections	110
Figure 33:	Installing Redundant External Synchronization Inputs	114
Initializing and Provisioning		117
Figure 34:	Files on the Compact Flash	120
Figure 35:	Console Port Connection	121
Figure 36:	Management Port Connection	122
Appendix A: Connectors and LEDs		127
Figure 37:	CSM Connectors and LEDs	128
Figure 38:	Fan Module Connectors and LEDs	130
Appendix B: Field-Replaceable Units		135
Figure 39:	Replacing a CSM	138
Figure 40:	Removing an Adapter Card	142
Figure 41:	Replacing an Adapter Card	144
Figure 42:	Removing the Fan Module	146
Figure 43:	Replacing the Fan Module	147
Appendix C: Pinout Assignments		149
Figure 44:	CSM Ports	150
Figure 45:	Management Port Pin Numbers	150
Figure 46:	Console Port Pin Numbers	151
Figure 47:	Fan Module Port	153
Figure 48:	External Alarms Port Pin Numbers	154
Figure 49:	RJ-45 Distribution Panel Connector Pin Numbers	156

List of Acronyms

Acronym	Expansion
2G	second generation wireless telephone technology
3DES	triple DES (data encryption standard)
3G	third generation mobile telephone technology
5620 SAM	5620 Service Aware Manager
7705 SAR	7705 Service Aggregation Router
7710 SR	7710 Service Router
7750 SR	7750 Service Router
9500 MPR	9500 Microwave Packet Radio
ABR	available bit rate area border router
AC	alternating current attachment circuit
ACL	access control list
ACR	adaptive clock recovery
AFI	authority and format identifier
AIS	alarm indication signal
ANSI	American National Standards Institute
Apip	ATM VLL
ARP	address resolution protocol
AS	autonomous system
ASAP	any service, any port
ASBR	autonomous system boundary router
ATM	asynchronous transfer mode
ATM PVC	ATM permanent virtual circuit

Acronym	Expansion
Batt A	battery A
B-bit	beginning bit (first packet of a fragment)
Bellcore	Bell Communications Research
BFD	bidirectional forwarding detection
BITS	building integrated timing supply
BOF	boot options file
BRAS	Broadband Remote Access Server
BSC	Base Station Controller
BSTA	Broadband Service Termination Architecture
BTS	base transceiver station
CAS	channel associated signaling
CBN	common bonding networks
CBS	committed buffer space
CC	control channel continuity check
CCM	continuity check message
CE	customer edge circuit emulation
CEM	circuit emulation
CES	circuit emulation services
CESoPSN	circuit emulation services over packet switched network
CFM	connectivity fault management
CIDR	classless inter-domain routing
CIR	committed information rate
CLI	command line interface
CLP	cell loss priority

Acronym	Expansion
CoS	class of service
CPE	customer premises equipment
Cpipe	circuit emulation (or TDM) VLL
CPM	Control and Processing Module (CPM is used instead of CSM when referring to CSM filtering – to align with CLI syntax used with other SR products)
CPU	central processing unit
CRC	cyclic redundancy check
CRON	a time-based scheduling service (from chronos = time)
CSM	Control and Switching Module
CSNP	complete sequence number PDU
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
DCE	data communications equipment
DCO	digitally controlled oscillator
DDoS	distributed DoS
DES	data encryption standard
DHCP	dynamic host configuration protocol
DIS	designated intermediate system
DNS	domain name server
DoS	denial of service

Acronym	Expansion
dot1p	IEEE 802.1p bits, found in Ethernet or VLAN ingress packet headers and used to map traffic to up to eight forwarding classes
dot1q	IEEE 802.1q encapsulation for Ethernet interfaces
DPLL	digital phase locked loop
DSCP	differentiated services code point
DSL	digital subscriber line
DSLAM	digital subscriber line access multiplexer
DTE	data termination equipment
DU	downstream unsolicited
e911	enhanced 911 service
E-bit	ending bit (last packet of a fragment)
ECMP	equal cost multi-path
EFM	Ethernet in the first mile
EGP	exterior gateway protocol
EIA/TIA-232	electronic industries alliance/telecommunications industry association standard 232 (also known as RS-232)
ELER	egress label edge router
Epipe	Ethernet VLL
ERO	explicit route object
ESD	electrostatic discharge
ETE	end-to-end
ETH-CFM	Ethernet connectivity fault management (IEEE 802.1ag)
EVDO	evolution - data optimized
EXP bits	experimental bits
FC	forwarding class
FCS	frame check sequence

Acronym	Expansion
FDB	forwarding database
FDL	facilities data link
FEC	forwarding equivalence class
FF	fixed filter
FIB	forwarding information base
FIFO	first in, first out
FNG	fault notification generator
FRR	fast reroute
FTN	FEC-to-NHLFE
FTP	file transfer protocol
GigE	Gigabit Ethernet
GRE	generic routing encapsulation
GSM	Global System for Mobile Communications (2G)
HCM	high capacity multiplexing
HEC	header error control
HMAC	hash message authentication code
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
IEEE 1588v2	Institute of Electrical and Electronics Engineers standard 1588-2008
IES	Internet Enhanced Service
IETF	Internet Engineering Task Force

Acronym	Expansion
IGP	interior gateway protocol
ILER	ingress label edge router
ILM	incoming label map
IMA	inverse multiplexing over ATM
IOM	input/output module
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
Ipipe	IP interworking VLL
IS-IS	Intermediate System-to-Intermediate System
IS-IS-TE	IS-IS-traffic engineering (extensions)
ISO	International Organization for Standardization
LB	loopback
LBM	loopback message
LBR	loopback reply
LCP	link control protocol
LDP	label distribution protocol
LER	label edge router
LIB	label information base
LLF	link loss forwarding
LLID	loopback location ID
LSA	link-state advertisement
LSDB	link-state database
LSP	label switched path link-state PDU (for IS-IS)
LSR	label switch router link-state request

Acronym	Expansion
LSU	link-state update
LT	linktrace
LTM	linktrace message
LTN	LSP ID to NHLFE
LTR	linktrace reply
MA	maintenance association
MAC	media access control
MBB	make-before-break
MBS	maximum buffer space maximum burst size media buffer space
MBSP	Mobile Backhaul Service Provider
MC-MLPPP	multi-class multilink point-to-point protocol
MD	maintenance domain
MD5	message digest version 5 (algorithm)
MDA	media dependent adapter
ME	maintenance entity
MEF	Metro Ethernet Forum
MEN	Metro Ethernet network
MEP	maintenance association end point
MFC	multi-field classification
MHF	MIP half function
MIB	management information base
MIP	maintenance association intermediate point
MIR	minimum information rate
MLPPP	multilink point-to-point protocol

Acronym	Expansion
MP	merge point multilink protocol
MPLS	multiprotocol label switching
MPR	see 9500 MPR
MRRU	maximum received reconstructed unit
MRU	maximum receive unit
MSDU	MAC Service Data Unit
MS-PW	multi-segment pseudowire
MTSO	mobile trunk switching office
MTU	maximum transmission unit multi-tenant unit
MW	microwave
NBMA	non-broadcast multiple access (network)
NET	network entity title
NHLFE	next hop label forwarding entry
NHOP	next-hop
NNHOP	next next-hop
NNI	network-to-network interface
Node B	similar to BTS but used in 3G networks — term is used in UMTS (3G systems) while BTS is used in GSM (2G systems)
NSAP	network service access point
NSSA	not-so-stubby area
NTP	network time protocol
OAM	operations, administration, and maintenance
OAMPDU	OAM protocol data units
OC3	optical carrier, level 3
OS	operating system

Acronym	Expansion
OSI	Open Systems Interconnection (reference model)
OSINLCP	OSI Network Layer Control Protocol
OSPF	Open Shortest Path First
OSPF-TE	OSPF-traffic engineering (extensions)
OSS	operations support system
PDU	protocol data units
PDV	packet delay variation
PDVT	packet delay variation tolerance
PE	provider edge router
PHB	per-hop behavior
PHY	physical layer
PID	protocol ID
PIR	peak information rate
PLR	point of local repair
POP	point of presence
POS	packet over SONET
PPP	point-to-point protocol
PSN	packet switched network
PSNP	partial sequence number PDU
PTP	precision time protocol
PVC	permanent virtual circuit
PVCC	permanent virtual channel connection
PW	pseudowire
PWE3	pseudowire emulation edge-to-edge
QoS	quality of service
RADIUS	Remote Authentication Dial In User Service

Acronym	Expansion
RAN	Radio Access Network
RDI	remote defect indication
RED	random early discard
RESV	reservation
RIB	routing information base
RNC	Radio Network Controller
RRO	record route object
RS-232	recommended standard 232 (also known as EIA/TIA-232)
RSVP-TE	resource reservation protocol - traffic engineering
R&TTE	Radio and Telecommunications Terminal Equipment
RT	receive/transmit
RTM	routing table manager
RTN	battery return
RTP	real-time protocol
SAA	service assurance agent
SAP	service access point
SAR-8	7705 Service Aggregation Router - 8-slot chassis
SAR-F	7705 Service Aggregation Router - fixed form-factor chassis
SAToP	structure-agnostic TDM over packet
SCP	secure copy
SDH	synchronous digital hierarchy
SDI	serial data interface
SDP	service destination point
SE	shared explicit
SFP	small form-factor pluggable (transceiver)
SGT	self-generated traffic

Acronym	Expansion
SHA-1	secure hash algorithm
SIR	sustained information rate
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SNPA	subnetwork point of attachment
SNTP	simple network time protocol
SONET	synchronous optical networking
S-PE	switching provider edge router
SPE	source provider edge router
SPF	shortest path first
SPT	shortest path tree
SR	service router (includes 7710 SR, 7750 SR)
SRLG	shared risk link group
SSH	secure shell
SSU	system synchronization unit
STM1	synchronous transport module, level 1
SVC	switched virtual circuit
TACACS+	Terminal Access Controller Access-Control System Plus
TCP	transmission control protocol
TDM	time division multiplexing
TE	traffic engineering
TFTP	trivial file transfer protocol
TLDP	targeted LDP
TLV	type length value
ToS	type of service
T-PE	terminating provider edge router

Acronym	Expansion
TPE	target provider edge router
TPID	tag protocol identifier
TTL	time to live
TTM	tunnel table manager
UBR	unspecified bit rate
UDP	user datagram protocol
UMTS	Universal Mobile Telecommunications System (3G)
UNI	user-to-network interface
V.35	v-series recommendation 35
VC	virtual circuit
VCC	virtual channel connection
VCCV	virtual circuit connectivity verification
VCI	virtual circuit identifier
VID	VLAN ID
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
VPRN	virtual private routed network
VRF	virtual routing and forwarding table
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), Resource Reservation Protocol for Traffic Engineering (RSVP-TE), and Label Distribution Protocol (LDP).

- **7705 SAR OS Services Guide**
This guide describes how to configure service parameters such as service access points (SAPs), service destination points (SDPs), customer information, user services, and Operations, Administration and Maintenance (OAM) tools.
- **7705 SAR OS Quality of Service Guide**
This guide describes how to configure Quality of Service (QoS) policy management.
- **7705 SAR OS Routing Protocols Guide**
This guide provides an overview of dynamic routing concepts and describes how to configure them.

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





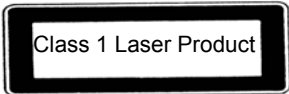
Symbol	Meaning	Description
	Danger	This symbol warns that improper handling and installation could result in bodily injury. An electric shock hazard could exist. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be familiar with networking environments, and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

Table 1: Information Symbols (Continued)

Symbol	Meaning	Description
	Caution	This symbol warns that improper handling may reduce your component or system performance.
	Note	This symbol provides additional operational information.
		Class 1 laser products are identified in the adapter card installation guides. Only approved Class 1 replaceable laser transceivers should be used with this product.

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://www.alcatel-lucent.com/support>

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 28](#)
- [General Requirements on page 29](#)
- [Canada Regulations on page 32](#)
- [United States Regulations on page 33](#)
- [European Union Regulations on page 35](#)
- [Australia/New Zealand Regulations on page 39](#)
- [China Regulations on page 40](#)

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
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
ICES	Interference Causing Equipment Standard
IEC	International Electrotechnical Commission
IEE	Institute of Electrical Engineers (UK)
LVD	Low Voltage Directive
NRTL	Nationally Recognized Testing Laboratory
OSHA (USA)	Occupational Safety and Health Administration (USA)
RoHS	Restriction of the use of certain Hazardous Substances
SELV	Safety Extra Low Voltage
UL	Underwriters Laboratories
WEEE	Waste Electrical and Electronic Equipment

General Requirements

The sections that follow outline the mandatory regulations that govern the installation and operation of the 7705 SAR-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 minimum 6 A and maximum 10 A 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
- management ports
- external clock inputs and clock outputs (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 [Chassis Ground Wiring on page 85](#) 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 1999/05/EC and 2004/108/EC.

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

EU Compliance Statement

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

EMC/EMI Compliance

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

General

This equipment must be permanently grounded.

Laser Interface

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

Safety Approval for DC Systems

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

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

Protective Earth

Protective earth is referred to as chassis ground in this document. A green 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 [Chassis Ground Wiring on page 85](#) 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 Products" (SJ/T11364-2006), customers may access the Alcatel-Lucent Hazardous Substances Table, in Chinese, from the following location:

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

7705 SAR-8 Overview

In This Chapter

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

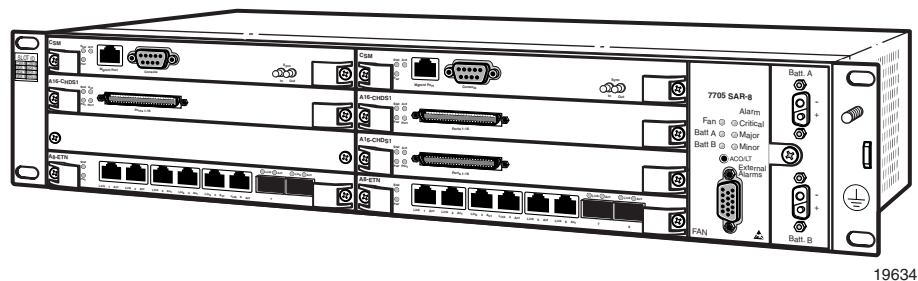
- [7705 SAR-8 Components on page 44](#)
 - [Chassis on page 44](#)
 - [CSM on page 45](#)
 - [Adapter Cards on page 46](#)
 - [Filler Plates on page 48](#)
 - [Power System on page 48](#)
 - [Fan Module on page 49](#)
 - [Distribution Panels and Cables on page 52](#)
- [Notes on 7705 SAR-8 and 7705 SAR-F on page 59](#)
- [SAR System Installation Process on page 61](#)

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



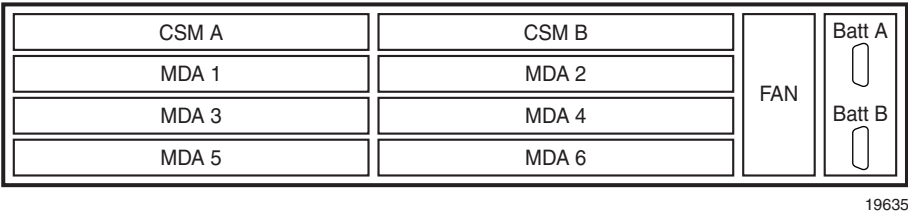
Note: The 7705 SAR-F and the 7705 SAR-8 are products in the SAR product line. The main difference between these products is their hardware configuration. The 7705 SAR-F has a fixed, single circuit board configuration while the 7705 SAR-8 is an 8-slot modular configuration. Refer to [Notes on 7705 SAR-8 and 7705 SAR-F on page 59](#) for more information.

Chassis

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

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

Figure 5: 7705 SAR-8 Slot Identification



CSM

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

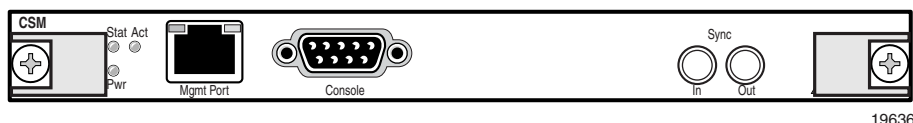
The Control and Switching Module (CSM) has three main functions:

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

Each CSM is shipped with one compact flash memory device that stores system boot software, OS software, and configuration files and logs. The compact flash device is field-replaceable; see Compact Flash in Installing Components on page 96.

Figure 6 shows the CSM faceplate. Refer to [CSM Connectors and LEDs on page 128](#) for identification and description of the CSM faceplate features.

Figure 6: 7705 SAR-8 CSM Features



There must be at least one CSM installed in the 7705 SAR-8. Install two CSMs for system redundancy. The redundant CSM operates in standby mode and takes over system operation if the active (primary) CSM fails. CSMs are field-replaceable and hot-swappable. Refer to 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 124](#) for more information.

Adapter Cards

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), and T1/E1 (channelized and unchannelized). The 7705 SAR-8 also supports SONET/SDH (OC3/STM1) channelized and unchannelized interfaces, and V.35 and RS-232 (also known as EIA/TIA-232) serial data interfaces.

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

The 7705 SAR-8 supports the following adapter cards:

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

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



Notes:

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

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

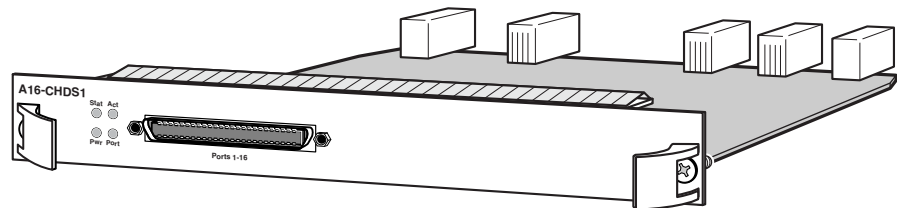
The 4-port OC3/STM1 Clear Channel Adapter card has four hot-pluggable SFP-based ports (optical or electrical) that can be configured for ATM in access mode or for Packet over SONET/SDH (POS) in network mode. The port type can be independently configured to be SONET (OC3) or SDH (STM1). The 4-port OC3/STM1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

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

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

Figure 7 shows a sample 7705 SAR-8 adapter card.

Figure 7: 7705 SAR-8 Adapter Card



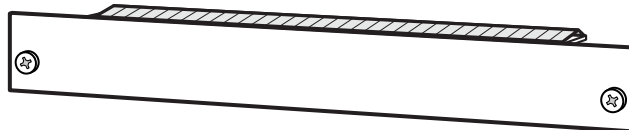
19637

Filler Plates

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

Figure 4 shows a filler plate on slot MDA 3.

Figure 8: 7705 SAR-8 Filler Plate



19638

Power System

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

The 7705 SAR-8 can also be used for +24 VDC operation. This requires that +24 VDC variants of the Fan module, CSM, T1/E1 ASAP Adapter card, and Ethernet Adapter card be installed in the chassis. The +24 VDC variants are identified by a yellow label located on the faceplate.

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

The DC power LEDs are located on the Fan module (see [Figure 9](#)). Refer to [Fan Module Connectors and LEDs on page 130](#) for a description of the Fan module LEDs.

Refer to [DC Power Connections on page 89](#) for requirements and information regarding preparing DC power cables.

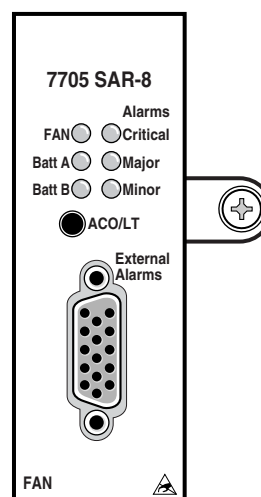
Fan Module

[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.



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

Figure 9: Fan Module



19639

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

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



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

Fan Operation

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



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

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

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

Monitoring Temperature

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

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

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

Card Temperatures

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

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

Distribution Panels and Cables

Distribution panels are used with 16-port T1/E1 ASAP Adapter cards to connect to T1/E1 circuits, and with 12-port Serial Data Interface cards to connect to V.35 or RS-232 circuits. There are three distribution panels that are used with the T1/E1 ASAP Adapter cards:

- BNC
- mini-coaxial
- RJ-45



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

The 12-port Serial Data Interface card is connected to either a V.35 or RS-232 distribution panel or to a customer-supplied distribution panel.

BNC Distribution Panel

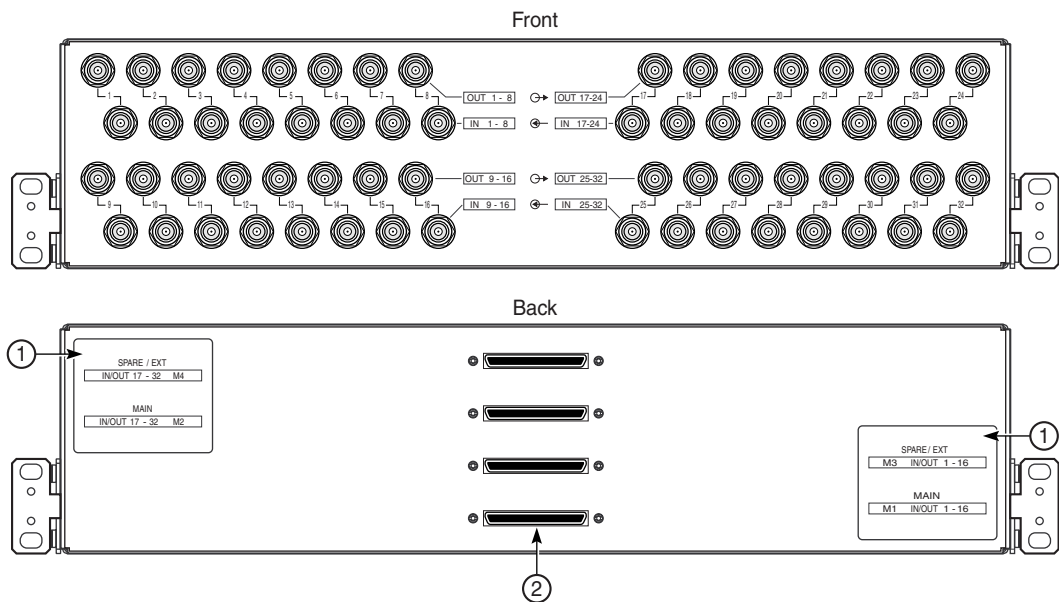
[Figure 10](#) shows the BNC Distribution panel. [Table 3](#) lists the panel features.

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 57](#)). 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



19788

Table 3: Distribution Panel Features

Key	Description
1	Label
2	68-pin AMP connectors

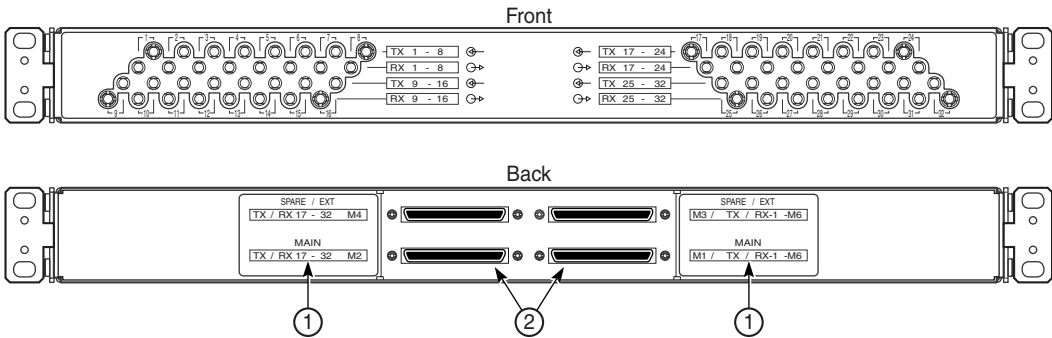
1.0/2.3 Mini-Coaxial Distribution Panel

Figure 11 shows the Mini-Coaxial Distribution panel. Table 3 lists the panel features. The mini-coaxial panel provides 75-ohm E1 access for up to 32 ports. On the customer side, each access port has separate transmit and receive 1.0/2.3 mini-coaxial, female connectors. On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see T1/E1 Cables on page 57). 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: Mini-Coaxial Distribution Panel



19946

RJ-45 Distribution Panel

Figure 12 shows the RJ-45 Distribution panel. Table 3 lists the panel features.

The RJ-45 panel provides 100-ohm T1 or 120-ohm E1 access to 32 ports. On the customer side, each port has an RJ-45 connector (see [RJ-45 Distribution Panel on page 156](#) for pinout information). On the equipment side, the panel has two sets of 68-pin AMP connectors for connection to two 16-port T1/E1 ASAP cards via 68-pin AMP to 68-pin AMP T1/E1 cables (see [T1/E1 Cables on page 57](#)). One set of AMP connectors on the panel is for network ports 1 to 16, and the other set is for network ports 17 to 32.


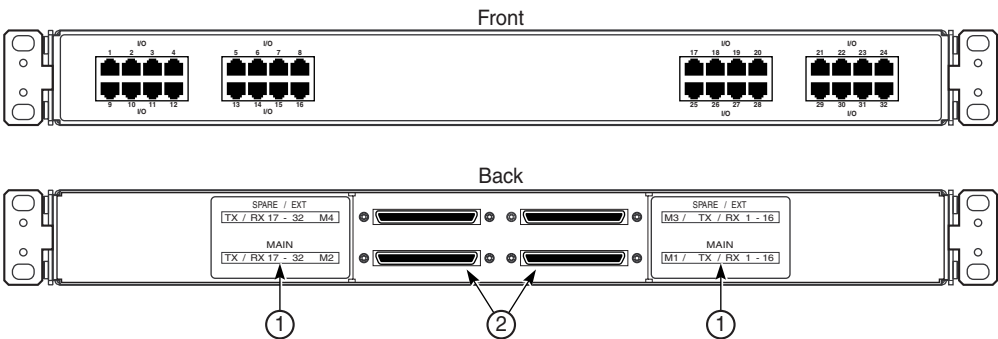
 **Note:** A set of connectors consists of one MAIN connector and one SPARE connector. When connecting to 16-port T1/E1 ASAP Adapter cards, always use the (bottom) connectors labeled MAIN.

Figure 12: RJ-45 Distribution Panel



19604

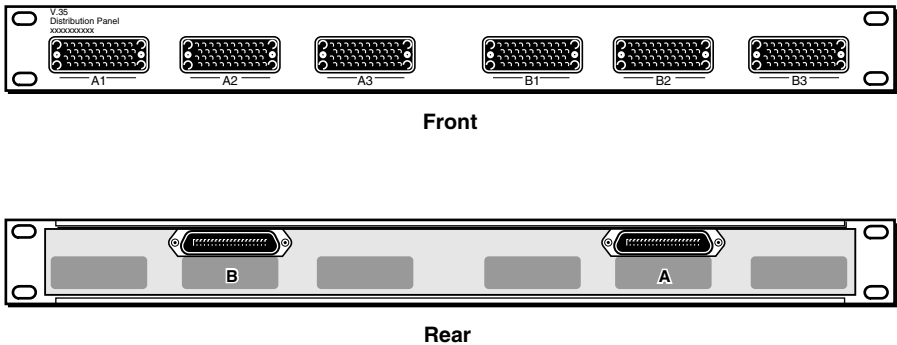
V.35 Distribution Panel

Figure 13 shows a front and back view of the 6-port V.35 distribution panel. It has six M34 female connectors on the front faceplate (A1 to A3 and B1 to B3) and two 25-pair connectors on the rear faceplate (A and B). The V.35 interfaces A1 to A3 are associated with 25-pair connector A; interfaces B1 to B3 are associated with 25-pair connector B. Figure 14 shows the M34 connector pinouts.



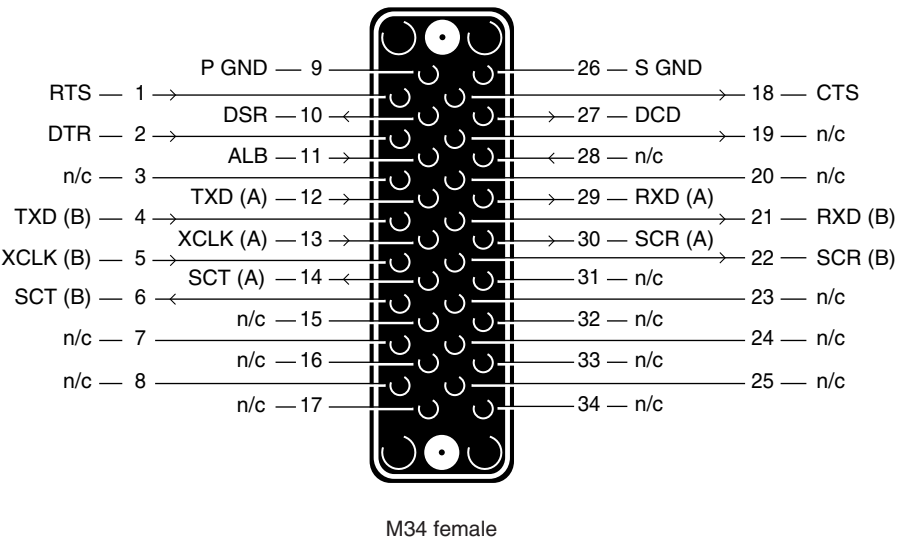
Note: The pinouts shown in Figure 14 and Figure 16 are for a typical DCE connection.

Figure 13: 6-Port V.35 Distribution Panel



20418

Figure 14: 6-Port V.35 Distribution Panel M34 Pinouts (Female)



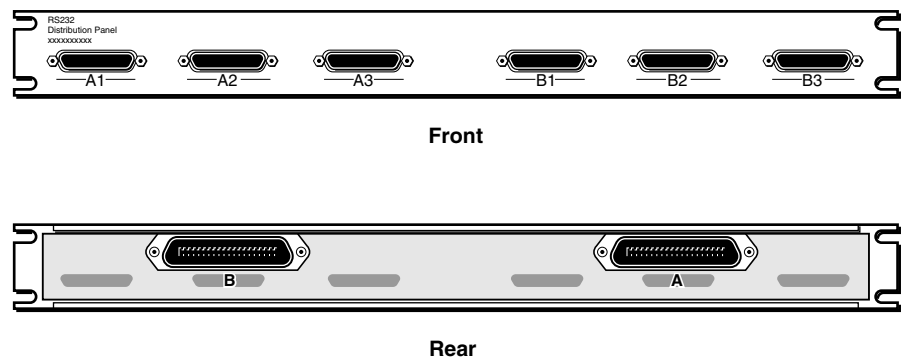
20419

RS-232 Distribution Panel

Figure 15 shows a front and back view of the 6-port RS-232 distribution panel. It has six DB25 female connectors on the front faceplate (A1 to A3 and B1 to B3) and two 25-pair connectors on the rear faceplate (A and B). The RS-232 interfaces A1 to A3 are associated with 25-pair connector A; interfaces B1 to B3 are associated with 25-pair connector B.

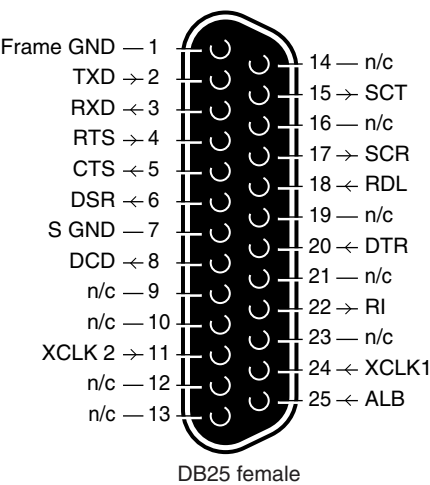
Figure 16 shows the DB25 connector pinouts.

Figure 15: 6-Port RS-232 Distribution Panel



20420

Figure 16: 6-Port RS-232 Distribution Panel DB25 Pinouts (Female)



20421

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. These cables are used to make the connection between the equipment (7705 SAR-8) and the distribution panel.

Table 4: T1/E1 Cables

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

Note:

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

For pinout information on the cables listed above, refer to the 7705 SAR 16-port T1/E1 ASAP Adapter Card Installation Guide. For information about wire identification by color, see [Wire Identification by Color on page 113](#).

Serial Data Interface Card Cables

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



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

The cable assemblies have a 68-Pos plug that attaches to the 68-pin mini-Champ connectors on the 12-port Serial Data Interface card faceplate and a 50-pin Champ connector that attaches to the rear of the V.35 or RS-232 distribution panel.

For pinout information on the Serial Data Interface card V.35 and RS-232 cables, refer to the Serial Data Interface Card Installation Guide.

Notes on 7705 SAR-8 and 7705 SAR-F

The 7705 SAR-8 and the 7705 SAR-F run the same operating system software. The main difference between the products is their hardware platforms. The 7705 SAR-8 has an 8-slot chassis that supports two CSMs, six adapter cards, and a Fan module. The 7705 SAR-F chassis has a fixed hardware configuration. The 7705 SAR-F replaces the 7705 SAR-8 physical components (the CSM, Fan module, and adapter cards) with an all-in-one unit that provides comparable functional blocks, as detailed in [Table 5](#).

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



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

Table 5: 7705 SAR-8 and 7705 SAR-F Comparison

7705 SAR-8	7705 SAR-F	Notes
CSM	Control and switching functions	The control and switching functions include the console and management interfaces, the alarm and fan functions, the synchronization interfaces, system LEDs, and so on.
Fan module	Integrated with the control and switching functions	
16-port T1/E1 ASAP Adapter card	16 individual T1/E1 ports on the faceplate	<p>The T1/E1 ports on the 7705 SAR-F are equivalent to the T1/E1 ports on the 16-port T1/E1 ASAP Adapter card, except that the 16 T1/E1 ports on the 7705 SAR-F support multiple synchronization sources to support two timing references.</p> <p>On the 7705 SAR-8, the CLI indicates the MDA type for the 16-port T1/E1 ASAP Adapter card as <code>a16-chds1</code>. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F ports as <code>a16-chds1v2</code>.</p>

Table 5: 7705 SAR-8 and 7705 SAR-F Comparison (Continued)

7705 SAR-8	7705 SAR-F	Notes
8-port Ethernet Adapter card	8 individual Ethernet ports on the faceplate	<p>The –48 VDC versions of the 7705 SAR-8 support two versions of the 8-port Ethernet Adapter card, with version 2 having additional support for Synchronous Ethernet. The Ethernet ports on the 7705 SAR-F are equivalent to the Ethernet ports on version 2 of the 8-port Ethernet Adapter card and support multiple synchronization sources to support two timing references.</p> <p>The +24 VDC version of the 7705 SAR-8 only supports version 2 of the 8-port Ethernet Adapter card.</p> <p>On the 7705 SAR-8, the CLI indicates the MDA type for the 8-port Ethernet Adapter card as <code>a8-eth</code> or <code>a8-ethv2</code>. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F Ethernet ports as <code>a8-ethv3</code>, to distinguish it from the actual version 2 of the 8-port Ethernet Adapter card.</p>
Configuration at card (IOM) and MDA (adapter card) levels is done by the user	Configuration at card (IOM) and MDA (adapter card) levels is preset and users cannot change these types	

SAR System Installation Process

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

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

Site Preparation

In This Chapter

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

- [Warnings and Notes on page 64](#)
- [System Specifications on page 66](#)
 - [Chassis Specifications on page 66](#)
 - [Environmental Specifications on page 66](#)
 - [Adapter Card Specifications on page 68](#)
 - [CSM Specifications on page 68](#)
 - [Fan Module Specifications on page 68](#)
 - [Component Power Consumption on page 69](#)
 - [Component Operating Requirements on page 70](#)
- [Installation Locations on page 71](#)
 - [Chassis Location Requirements on page 72](#)
- [Safety Considerations on page 74](#)
 - [Placement on page 74](#)
 - [Grounding on page 74](#)
 - [Cabling on page 75](#)
 - [Power on page 76](#)
 - [Fan Module on page 77](#)
 - [Storage on page 77](#)
 - [Compliance on page 77](#)

Warnings and Notes



Warnings:

- 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:
 - label cards and modules to facilitate reassembly (optional)
 - 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 71](#) and [Chassis Location Requirements on page 72](#) 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 16 lbs (7.3 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 72](#).
 - The 7705 SAR-8 includes factory-installed rack-mounting brackets to mount in a 19-inch equipment rack.
-

System Specifications

Chassis Specifications

Table 6: 7705 SAR-8 Chassis Specifications

Parameter	Description
Dimensions (without mounting brackets)	(3.5 x 17.5 x 9.8 in.) (H x W x D) (8.9 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 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 7: Environmental Specifications

Parameter	Description
Normal operating temperature	41 to 113°F (5 to 45°C) or -40° to 149°F (-40° to 65°C – extended temperature range)
Short-term operating temperature ⁽¹⁾	23 to 131°F (-5 to 55°C) or -40° to 149°F
Cold-start temperature	-4°F (-20°C)
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)

Table 7: Environmental Specifications (Continued)

Parameter	Description
Altitude range	Between 197 ft. (60 m) below sea level and 5906 ft (1800 m) above sea level (70kPa to 106kPa)
Shock and vibration	Very low levels for continuous duration disturbance (similar to modern office building, for example) Shock: 3 g half sine 11 ms Vibration: 0.1 g from 5 to 100 Hz
Earthquake	Suitable for high risk areas (Zone 4/California, for short duration disturbance)
Pollution degree ⁽²⁾	2
Rated voltage (DC)	–48/–60 VDC (–60 VDC is for various European countries) or +24 VDC
Operating voltage range (DC)	–40 to –75 VDC or +20.0 to +28.3 VDC
Heat dissipation (worst case configuration)	190 W
Acoustic noise level	73.5 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 8: Adapter Card Specifications

Parameter	Description
Dimensions (H x W x D)	(6.7 x 0.9 x 8.7 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) 0.88 lbs (0.4 kg) (2-port OC3/STM1 Channelized Adapter card) 0.91 lbs (0.41 kg) (12-port Serial Data Interface card)

CSM Specifications

Table 9: CSM Specifications

Parameter	Description
Dimensions (H x W x D)	(6.7 x 0.9 x 8.7 in.) (17.0 x 2.24 x 22.0 cm)
Weight	0.88 lbs (0.4 kg)

Fan Module Specifications

Table 10: Fan Module Specifications

Parameter	Description
Dimensions (H x W x D)	(3.32 x 0.9 x 8.7 in.) (8.43 x 2.24 x 22.0 cm)
Weight	0.81 lbs (0.37 kg)

Component Power Consumption

Table 11: Component Power Consumption

Component	Power (Watts) (conservative estimate)
Chassis ⁽¹⁾ (no fans, no cards)	0 W
Fan module	28 W
CSM	17 W
Adapter cards	
16-port T1/E1 ASAP Adapter card (a16-chds1)	17 W
8-port Ethernet Adapter card (a8-eth)	20 W
8-port Ethernet Adapter card, version 2 (a8-ethv2)	20 W
4-port OC3/STM1 Clear Channel Adapter card (a4-oc3)	30 W
2-port OC3/STM1 Channelized Adapter card (a2-choc3)	25 W
Serial Data Interface card (a12-sdi)	26 W

Note:

1. The chassis itself consumes no power because it has no power dissipating components once the fans and cards are removed.



Note: Power consumption for DC systems cannot exceed 190 W for both –48 VDC and +24 VDC systems. When configuring the system, ensure that the combination of adapter cards (along with the CSM and Fan module) does not exceed this limit.

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

Component Operating Requirements

Table 12: 7705 SAR-8 Hardware Components for DC Operational Requirements

Component	Minimum	Maximum	Field-Replaceable
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 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.



Warning: Follow the equipment rack manufacturer's instructions for proper rack installation. Failure to comply with the requirements and the location requirements outlined in this section and in [Chassis Location Requirements](#) (next section) 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 17](#)).

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).
- 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 17](#).

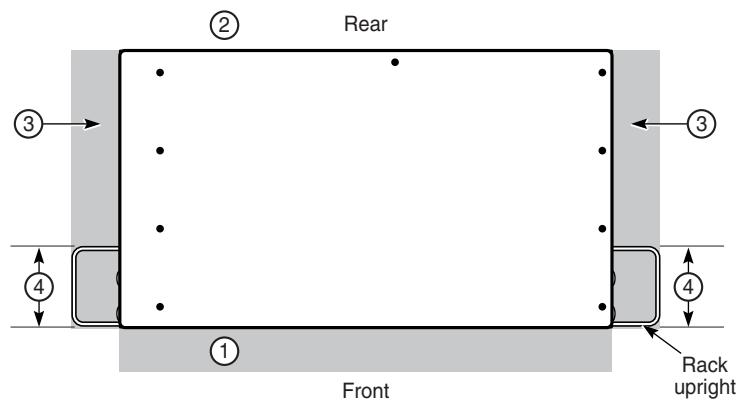


Warning: Failure to comply with the location requirements outlined in this section and in [Installation Locations](#) (previous section) will impede proper airflow and will result in thermal failure.

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 149°F (65°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 149°F (65°C) 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 17](#).

Figure 17: Chassis Clearance Requirements (View from Top)



19765

Table 13: 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



Warnings:

- Install the 7705 SAR-8 in recommended equipment racks.
- Install in clean, dry, ventilated, and temperature-controlled rooms or in weather-protected environments (for outdoor installations).
- 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



Warnings:

- 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 a 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 or fuse on the panel board that services the DC circuit and switch the circuit breaker to the OFF position or remove the fuse.
- 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.

CBN and IBN support

The 7705 SAR-8 supports both Common Bonding Networks (CBN) and Isolated Bonding Networks (IBN). The battery terminals, labeled Batt. A (+ and -) and Batt. B (+ and -) on the chassis, are floating inputs relative to digital or chassis ground within the chassis.



Warnings:

- In an IBN installation, the chassis ground terminal must be connected to ground at the building ground point.
- In a CBN installation, if you use the 7705 SAR-8 chassis ground stud (located on the right-hand side mounting bracket) to connect the chassis ground terminal(s) 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 stud, and that connection must be a single-purpose permanent connection.

For information on grounding the chassis and connecting the DC supply, refer to [Chassis Ground Wiring on page 85](#) and [Wiring and Connecting DC Power on page 90](#).

Cabling



Warnings:

- To meet surge protection requirements, the shield on any open-ended cable must be grounded by attaching the shield to a convenient chassis ground point, using hardware suitable to provide a solid electrical and mechanical connection. In addition, ensure that there is sufficient strain relief to remove any mechanical strain on the ground connection due to cable movement.
- The intra-building port(s) of the equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or sub-assembly must not be metallically connected to interfaces that connect to the Outside Plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. 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



Dangers:

- 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 or fuse 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 circuit breaker or fuse with the following recommended ratings must be provided:
 - for –48 VDC systems: 5 A (minimum) and 10 A (maximum)
 - for +24 VDC systems: 10 A (minimum) and 20 A (maximum)
- The minimum AWG power conductor for the DC input connections must be based on the application, and on the local codes, practices and regulations applicable for the region.

The DC power harnesses available through Alcatel-Lucent is #12 AWG (4 mm).

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 .



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



Warning: Failure to comply with the location requirements outlined in [Installation Locations on page 71](#) and in this section will impede proper airflow and will result in thermal failure.

Storage

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

Table 14: 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 159](#) 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 80](#)
 - [Unpacking Precautions on page 80](#)
- [Installing the Chassis in a Rack on page 82](#)
 - [Rack-Mounting the Chassis on page 82](#)
- [Chassis Ground Wiring on page 85](#)
 - [Making the Ground Connection on page 85](#)

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 95](#) 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:
 - label cards and modules to facilitate reassembly (optional)
 - 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

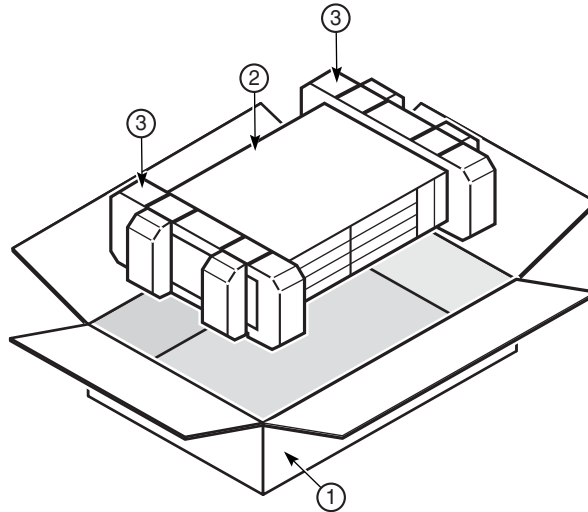
Unpacking Precautions

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 reused 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 18 displays the components of a packed 7705 SAR-8 chassis.

Figure 18: Unpacking the 7705 SAR-8 Chassis



19600

Table 15: 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.



Cautions:

- Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to a nearby ground point that is connected to the site grounding point (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.



Warnings:

- Failure to comply with the location requirements outlined in [Installation Locations on page 71](#) and [Chassis Location Requirements on page 72](#) 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 19](#) 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 19: Installing the 7705 SAR-8 Chassis in a Rack

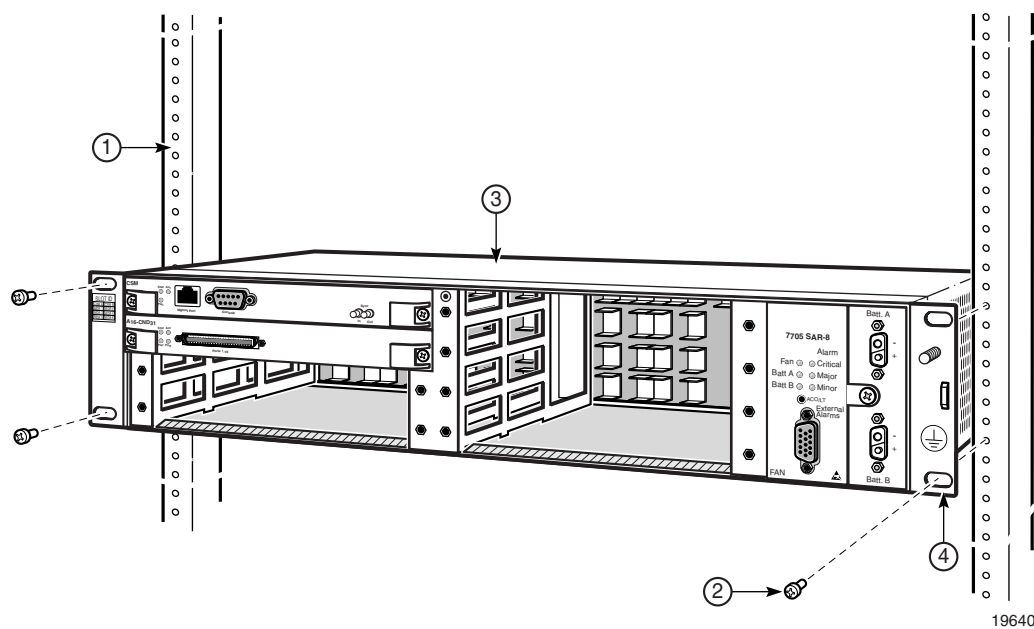


Table 16: Rack-Mounting the 7705 SAR-8 Chassis

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

Installing the Chassis

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](#).
-

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.



Notes:

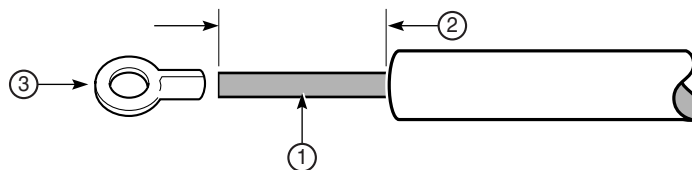
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before connecting them.
- All surfaces that are used for intentionally grounding the 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 20: Preparing the Ground Wire

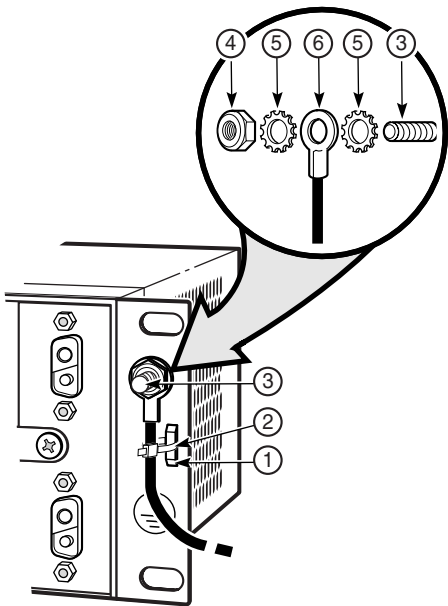


19641

Table 17: 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 21: Attaching the Chassis Ground Connector



19599

Table 18: Chassis Ground Connection

Key	Description
1	Lance
2	Cable tie
3	Chassis ground stud (4 mm diameter, nominal)
4	Nut
5	Star washer (optional)
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 20](#)).
 - Step 3.** Remove the nut and star washers from the ground stud on the mounting bracket.
 - Step 4.** Place a star washer (optional) 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 (optional) and nut ([Figure 21](#)). 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](#).
-

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 90](#)
 - [Warnings and Notes on page 90](#)
- [DC-Input Power Connections on page 91](#)
 - [Wiring the DC Inputs on page 91](#)

Wiring and Connecting DC Power

Warnings and Notes



Dangers:

- 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 circuit breaker or fuse that meets the requirements for branch circuit protection, as follows:
 - for –48 VDC systems: 5 A (minimum) and 10 A (maximum)
 - for +24 VDC systems: 10 A (minimum) and 20 A (maximum)
- 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.



Warnings:

- 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).
- For IBN installations, the battery return terminal(s) on the 7705 SAR-8 must always be connected to the building ground at the power source. For redundant supply configurations, separate battery return wires must be used.
- For CBN installations, the battery return terminal should be connected to chassis ground at the chassis or frame.



Notes:

- The 7705 SAR-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.

DC-Input Power Connections

**Dangers:**

- Ensure that all power is OFF from the DC circuit. Locate the circuit breaker or fuse on the panel board that services the DC circuit and switch the circuit breaker to the OFF position or remove the fuse. 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. The following wiring harnesses are available from Alcatel-Lucent to facilitate the DC source-to-router connection. They can be used for either –48 VDC or +24 VDC installations:

- 4 m (13 ft) – part number 3HE03400AA
- 8 m (26 ft) – part number 3HE03400BA
- 12 m (39 ft) – part number 3HE03400CA

The harnesses each have a 2W2 connector at one end and open-ended wires at the other end, and are #12 AWG (4 mm).

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

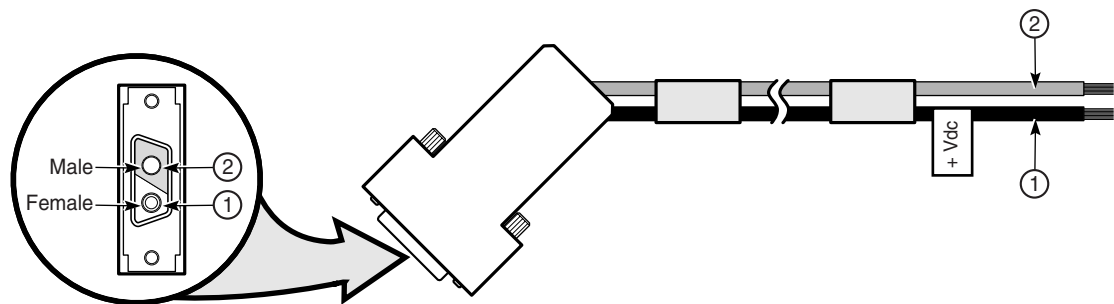
Each 2W2 connector is keyed to ensure proper attachment (one female and one male pin) and is secured with thumbscrews on the harness connector to prevent accidental removal.

[Figure 22](#) shows the DC power harness.



Note: The minimum AWG power conductor for the DC input connections must be based on the application, and on the local codes, practices and regulations applicable for the region.

Figure 22: DC Power Harness



19601

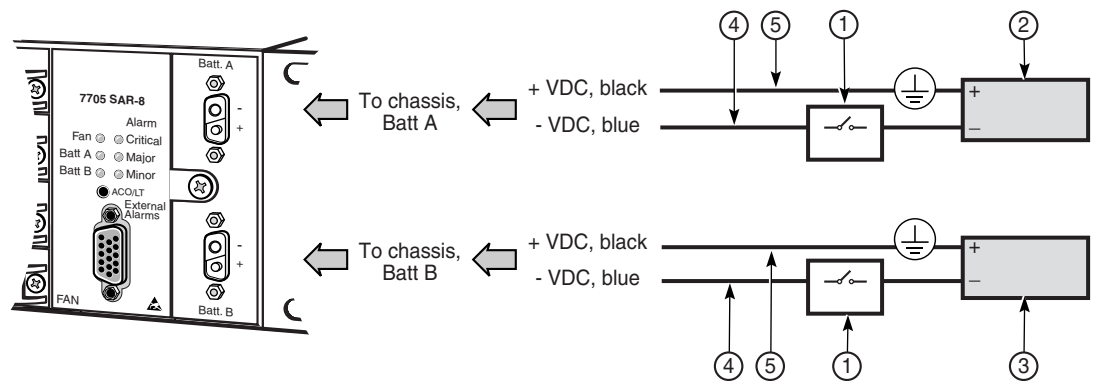
Table 19: DC Power Connection Descriptions

Key	Description
1	+VDC (female pin on power cable connector, black wire) ⁽¹⁾
2	-VDC (male pin on power cable connector, blue wire)

Note:
1. For D-Sub 2W2 connectors located on the 7705 SAR-8 chassis, the male pin is the positive (+) input terminal and the female pin is the negative (-) input terminal.

Figure 23 and Figure 24 show the terminal connections for -48 VDC and +24 VDC installations. Table 20 identifies the key items in both figures. The main difference between the figures is the placement of the ground symbol and disconnect device.

Figure 23: Wiring the -48 VDC Power Supplies



20239

Table 20: Wiring the DC Power Supplies Descriptions

Key	Description
1	Disconnect device
2	DC source A
3	DC source B
4	Battery wire
5	Battery return wire

Required tools and hardware:

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



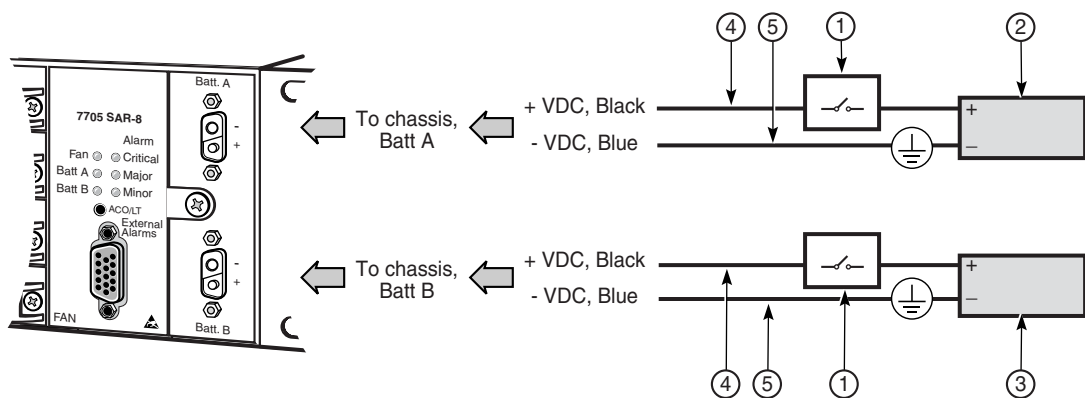
Note: Ensure that the leads on the DC power harness are prepared according to local safety practices.

For -48 VDC installations

Follow these steps to wire and connect –48 VDC power feeds (see [Figure 23](#)):

- Step 1.** For CBN installations only, ensure that the positive terminal on the DC power source is connected to ground.
- Step 2.** Make the battery return ground connection(s) ([Figure 23](#), key item 5).
Attach the black lead (+VDC) on the power harness to the positive terminal on the power source.
- Step 3.** Make the battery connection(s) to the disconnect device ([Figure 23](#), key item 1).
Attach the blue lead (-VDC) on the power harness to the disconnect device.
Attach the other side of the disconnect device to the negative terminal of the power source.
- Step 4.** For redundant supply configurations, repeat Steps 1 and 2 for the other power harness.
- Step 5.** Check that the DC supply wiring is correct.
- Step 6.** Attach the connector on the power harness to the D-Sub 2W2 connector on the 7705 SAR-8.
- Step 7.** Install the other 7705 SAR-8 components. See [Installing the Components](#).

Figure 24: Wiring the +24 VDC Power Supplies



20240

For +24 VDC installations

Follow these steps to wire and connect +24 VDC power feeds (see [Figure 24](#)):

- Step 1.** For CBN installations only, ensure that the negative terminal on the DC power source is connected to ground.
- Step 2.** Make the battery return ground connection(s) ([Figure 24](#), key item 5).
Attach the blue lead (-VDC) on the power harness to the negative terminal on the power source.
- Step 3.** Make the battery connection(s) to the disconnect device ([Figure 24](#), key item 1).
Attach the black lead (+VDC) on the power harness to the disconnect device.
Attach the other side of the disconnect device to the positive terminal of the power source.
- Step 4.** For redundant supply configurations, repeat Steps 1 and 2 for the other power harness.
- Step 5.** Check that the DC supply wiring is correct.
- Step 6.** Attach the connector on the power harness to the D-Sub 2W2 connector on the 7705 SAR-8.
- Step 7.** Install the other 7705 SAR-8 components. See [Installing the Components](#).

Installing the Components

In This Chapter

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

- [Installing Components on page 96](#)
 - [Warnings and Notes on page 96](#)
 - [CSM on page 96](#)
 - [Fan Module on page 99](#)
 - [Adapter Cards on page 101](#)
 - [SFPs on page 103](#)
- [Installing a Distribution Panel in a Rack on page 105](#)
 - [Rack-Mounting a Distribution Panel on page 105](#)
 - [Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel on page 107](#)
- [Managing Cable Connections to Adapter Cards on page 109](#)
 - [Warnings and Notes on page 109](#)
 - [Ethernet and Copper Cables on page 110](#)
 - [Fiber Cables on page 111](#)
 - [Making a Shield Ground Connection on page 112](#)
 - [Wire Identification by Color on page 113](#)
- [Making External Synchronization Connections on page 114](#)
 - [Connecting an External Synchronization Input on page 115](#)
 - [Providing an External Synchronization Output on page 115](#)

Installing Components

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

Warnings and Notes



Dangers:

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



Warnings:

- Electrostatic discharge (ESD) damage can occur if the CSM, compact flash, or adapter cards are mishandled. Always wear an ESD-preventive wrist or ankle strap connected to a nearby ground point that is connected to a site grounding point (typically, 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 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly and that the fan module and all cards in the chassis have the same voltage type.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.



Notes:

- 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, OS software, 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.

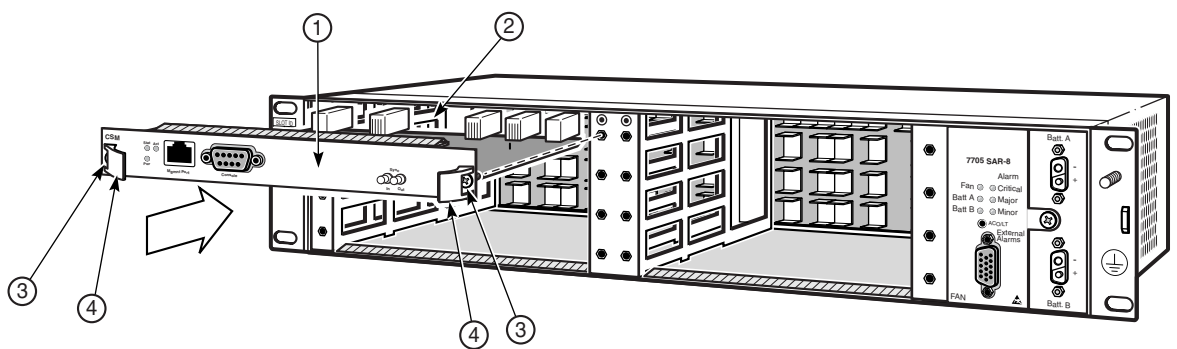
To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with the Console, (Ethernet) Management, and Synchronization interfaces.

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 25](#) illustrates the installation of a CSM in slot A.

Refer to [CSM Connectors and LEDs on page 128](#) for a description of the CSM LEDs.

Refer to [Replacing a CSM on page 137](#) for instructions on replacing a CSM.

Figure 25: Installing the CSM



19603

Table 21: 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.

Compact Flash

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

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

These files can be transferred to the new compact flash by:

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

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 4 minutes without the Fan module installed. [Figure 26](#) 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 130](#) for a description of the Fan module LEDs.

Refer to [Replacing the Fan Module on page 145](#) 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 154](#) for pinout definitions.

Warnings and Notes



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

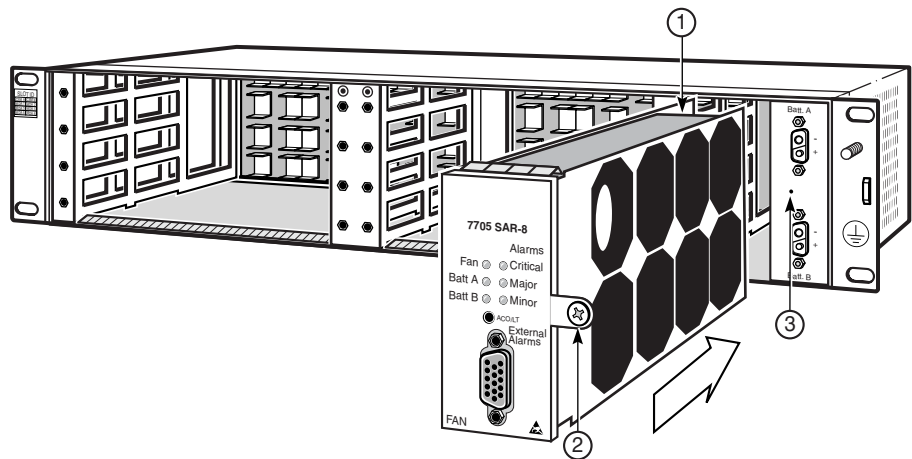


Warning: The Fan module is hot-swappable. The 7705 SAR-8 operates safely for up to 4 minutes while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent over-heating conditions.



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 26: Installing the Fan Module



19642

Table 22: 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 an anti-static work surface. Avoid touching the board components and connector pins.
- Step 2.** Insert the Fan module into the Fan slot. Align the Fan module with the slot guides and the captive screw with the threaded receptacle.
- Step 3.** Press the Fan module firmly into the slot. Make sure that the connectors are fully seated in the backplane connectors.
- Step 4.** Secure the Fan module to the chassis, using a calibrated torque screwdriver set at 4-6 lbf-in. Do not over-tighten.

Adapter Cards

The 7705 SAR-8 supports the following adapter cards:

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

Adapter cards are installed in slots MDA 1 through MDA 6. The 7705 SAR-8 supports up to six adapter cards, in any combination that does not exceed the maximum. See [Figure 5 on page 45](#) for slot identification. [Figure 27](#) illustrates the installation of an adapter card.

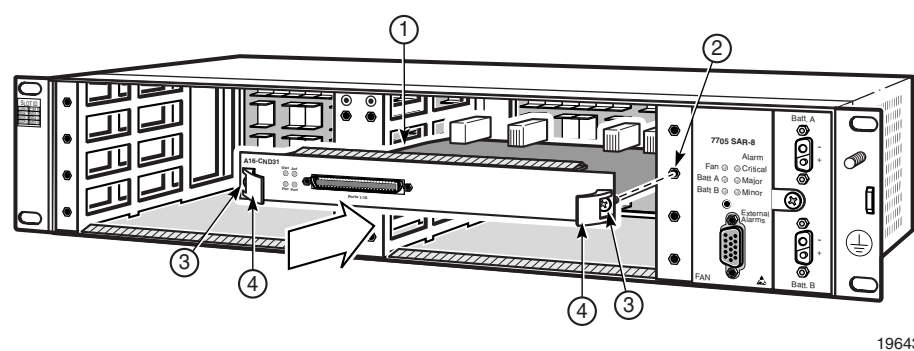
The 16-port T1/E1 ASAP Adapter card supports 16 individual T1/E1 ports through a single cable connection to a distribution panel. The 8-port Ethernet Adapter card supports six 10/100 Base-T ports and two SFP ports for 10/100/Gigabit Ethernet SFPs (optical or electrical) and T3 SFPs. Four SFP ports are supported on the 4-port OC3/STM1 Clear Channel Adapter card and two SFP ports are supported on the 2-port OC3/STM1 Channelized Adapter card, for fiber or copper connectivity using SFP modules. For more information on installing an SFP, see [SFPs on page 103](#).

The 12-port Serial Data Interface card has four 68-pin connectors on its faceplate. Each connector supports three data ports. The Serial Data Interface card data ports operate in access mode only and can be configured for a V.35 or RS-232 (also known as EIA/TIA-232) interface.

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 (electrical).

Refer to [Replacing Adapter Cards on page 140](#) 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 27: Installing an Adapter Card



19643

Table 23: 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 an anti-static work surface. Avoid touching board components and connector pins.

With the ejector levers rotated inward, hold the adapter card by the levers, align the card with the slot guides, and slide the adapter card into the slot (see [Figure 27](#)).



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.



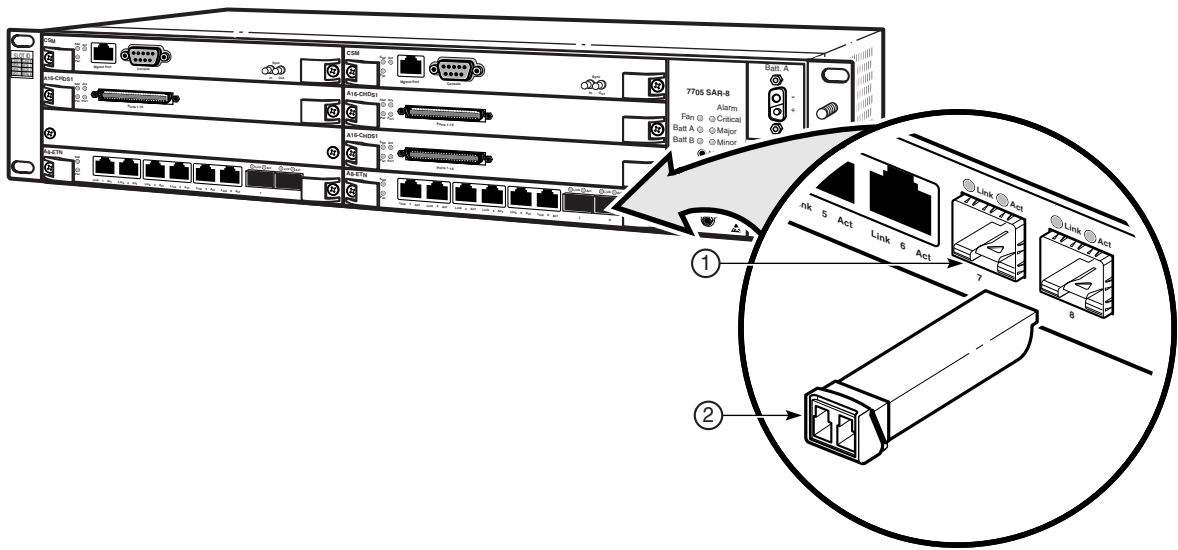
Note: The adapter card cannot be removed if the captive screws are tightened. To remove the adapter card, loosen the captive screws, rotate the ejector levers outward, and pull the adapter card out of the slot.

SFPs

A small form-factor pluggable (SFP) module can be installed on the 8-port Ethernet Adapter card, the 4-port OC3/STM1 Clear Channel Adapter card, and the 2-port OC3/STM1 Channelized Adapter card.

Figure 28 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 28: Installing an SFP



19667

Table 24: SFP Installation Features

Key	Description
1	SFP receptacle
2	SFP

To install an SFP:

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

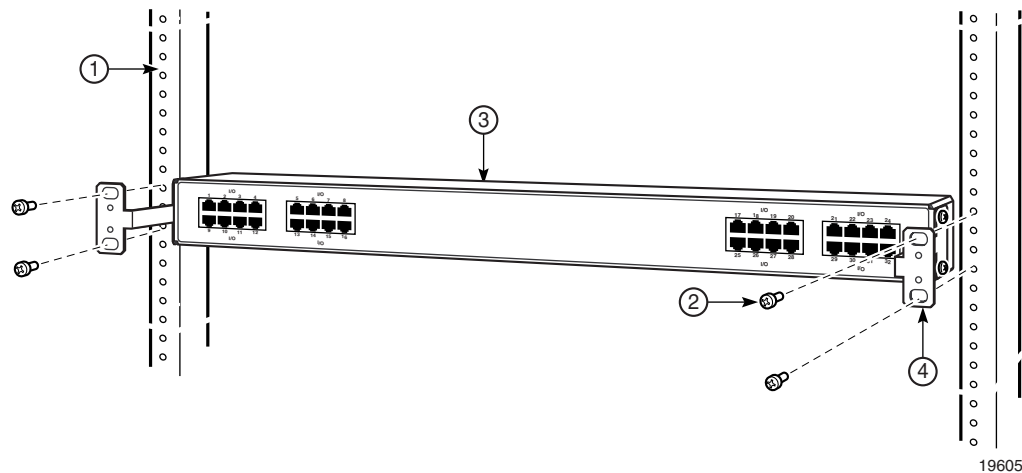
Rack-Mounting a Distribution Panel

The distribution panels are designed for installation in a 19-inch rack. [Figure 29](#) 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 29: Installing a Distribution Panel in a Rack



19605

Table 25: 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 29](#).

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 109](#).

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 85](#).



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

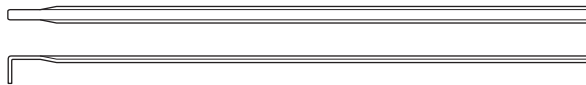
b) Alternatively, the panel may be grounded to the rack through its mounting screws while adhering to the following requirements.

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

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

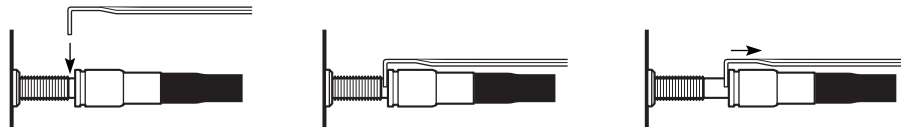
Some installations have the 1.0/2.3 Mini-Coaxial Distribution panel installed with no rack space between the equipment above and below the panel. This type of installation may require the use of a disconnection tool to facilitate the removal of a mini-coaxial cable. [Figure 30](#) shows the tool (top and side views). [Figure 31](#) illustrates the use of the tool, which is shipped with the distribution panel.

Figure 30: Mini-Coaxial Connector Disconnection Tool



20008

Figure 31: Disconnecting a 1.0/2.3 Mini-Coaxial Cable from a Distribution Panel



19447

Tool required:

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

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

- Step 1.** Hook the tool over the end of the mini-coaxial connector, as shown in [Figure 31](#). Take care to avoid scratching or damaging nearby cable.
- Step 2.** Keep the tool hooked over the connector and firmly pull the tool straight out (towards you) in order to release the clamping mechanism in the connector and disconnect the cable. Avoid pulling the tool up and out because the hook may slip off the connector.



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

Managing Cable Connections to Adapter Cards

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.



Notes:

- 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.
- Ensure cables are dressed such that they do not impede viewing the LEDs on the Fan module.
- Typically, cables are routed between the rack uprights.
- 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.



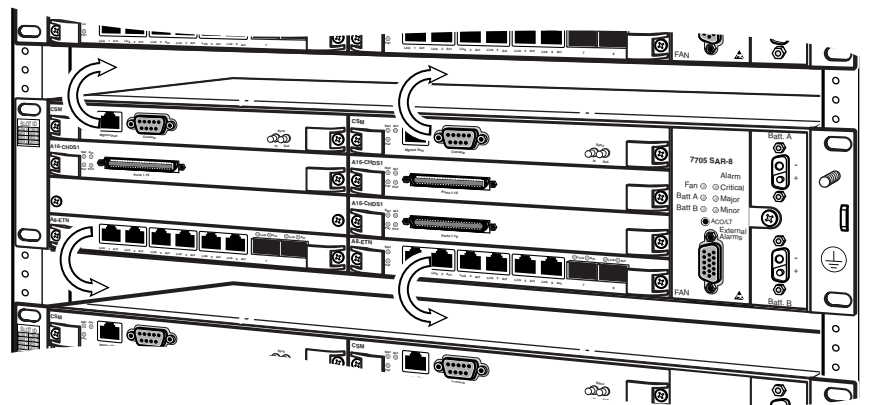
Warnings:

- 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 a 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 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly and that the fan module and all cards in the chassis have the same voltage type.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card ports.

Ethernet and Copper Cables

Figure 32 illustrates how Ethernet and copper wire cables are routed on the 7705 SAR-8. Cables can be routed under or over the chassis. The T1/E1 cables with 68-pin Amp connectors at both ends have their connectors attached such that when connected to a card or distribution panel, the cable can run to the left or the right side depending on which connector is used.

Figure 32: Managing Cable Connections



19668

Hardware required:

- cable ties

To attach Ethernet and copper wire cables:

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

Step 2. Route the cables under or over the chassis. Typically, the cables for cards installed in the lower half of the chassis are routed through the RU space left below the 7705 SAR; cables for the cards in the upper half of the chassis are routed above the unit. If desired, loosely bundle the cables from each slot together using a cable tie. Do not over-tighten the cable tie.



Note: Arrange the cables such that they do not impede the insertion or removal of field-replaceable units, including the Fan module, or obscure viewing the LEDs on the Fan module.

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

T3/E3 SFP Connections

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

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

Step 2. Route the cables to the left or the right of the chassis. If desired, loosely bundle the cables together using a cable tie. Do not over-tighten the cable tie.



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

Step 3. Connect the BNC end of the cable to the attached equipment.

Fiber Cables



Warnings:

- Fiber cables are sensitive to bending, twisting and general over-exertion. Extreme caution is recommended when handling fiber cable.
- In order to ensure that the minimum fiber bend radius of 1.2 in. (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 32](#)). 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 port connector or SFP 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: Arrange the cables such that they do not impede the insertion or removal of field-replaceable units, including the Fan module, or obscure viewing the LEDs on 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 electrical interfaces.

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

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) from the cable such that the exposed grounding wire can reach the chassis ground point. Ensure that there is enough stripped insulation to provide strain relief for the ground connection.



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

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

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

Wire Identification by Color

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

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

- Step 1.** Identify the Transmit (Tx) and Receive (Rx) cables. The Transmit cable is labeled “TX”, and the Receive cable is labeled “RX”.
- Step 2.** For each Tx and Rx cable, strip the end of the outer jacket of the cable. Note that the wires are twisted in groups of four (quads), each quad containing one white wire, one turquoise wire, one violet wire, and one uniquely colored wire. The uniquely colored wire identifies the quad number, and the same color is used for both the Tx and the Rx cables. See [Table 26](#) for quad identification wire colors.
- Step 3.** For each Tx and Rx cable, after identifying the quads by color, label the quads as Transmit 1 to 8 and Receive 1 to 8. Perform this step before untwisting the wires.



Note:

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

Table 26: Quad Identification Wire Color

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

Making External Synchronization Connections

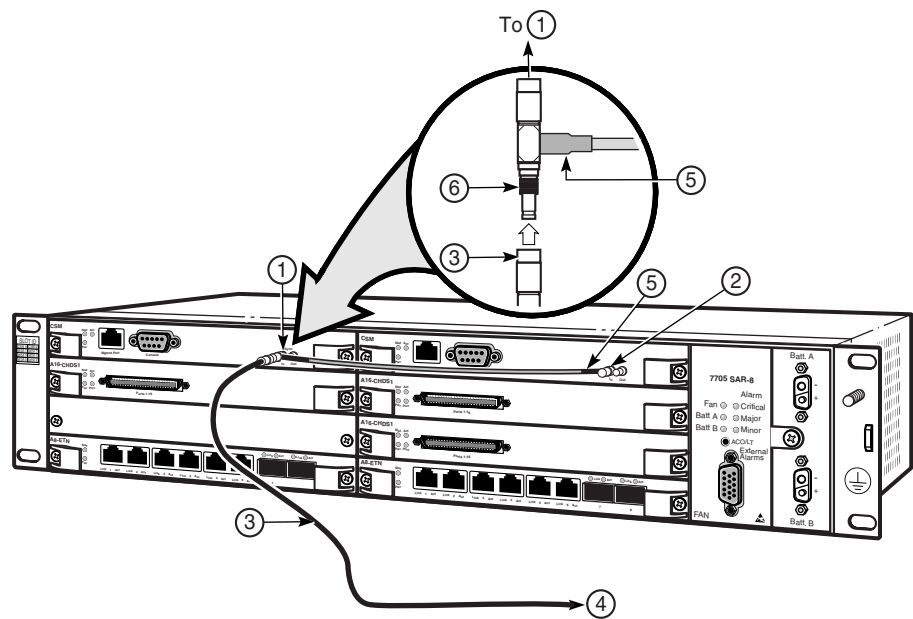
The CSM provides 1.0/2.3 coaxial connectors for external synchronization input and output.

For redundant CSM configurations where both CSMs use the same synchronization signal, a Sync Y-cable (available from Alcatel-Lucent) connects the Sync In connectors on both CSMs to each other. The external synchronization source cable connects to the piggyback connector on the CSM A Sync In side.

For redundant CSM configurations where both Sync Out signals are used, separate synchronization output cables are needed, one for each CSM. Do not use a Sync Y-cable to connect the Sync Out connectors to each other.

Figure 33 illustrates the use of a Sync Y-cable for redundant Sync In connections.

Figure 33: Installing Redundant External Synchronization Inputs



19602

Table 27: Redundant External Synchronization Input Features

Key	Description
1	Sync In – CSM A
2	Sync In – CSM B

Table 27: Redundant External Synchronization Input Features (Continued)

Key	Description
3	External synchronization source cable
4	To external synchronization source
5	Sync Y-cable
6	Piggyback connector

Hardware required:

- coaxial cable with 1.0/2.3 coaxial connector (for connection to external synchronization source)
- Sync Y-cable available from Alcatel-Lucent (for redundant CSM systems) (part number 3HE03401AA)

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. Continue at Step 3.
- Step 2.** For redundant CSM systems, attach the Sync Y-cable to the Sync In connectors on the CSMs, with the piggyback connector attached to CSM A. Attach the synchronization cable to the piggyback connector on CSM A.
- Step 3.** 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. For redundant CSM systems, attach a separate synchronization cable to the Sync Out connector on each CSM. Do not use a Sync Y-cable on the Sync Out connectors.
- Step 2.** Attach the other end of the synchronization cable(s) to the device(s) 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 118](#)
 - [Power-Up and Initialization on page 118](#)
 - [Troubleshooting Initial Startup on page 119](#)
- [Establishing Router Management Connections on page 121](#)
 - [Console Connection on page 121](#)
 - [Telnet Connection on page 122](#)
 - [Running Telnet on page 123](#)
- [Provisioning CSM and Adapter Card Parameters on page 124](#)
 - [Card and Card-Type Commands on page 124](#)
 - [MDA and MDA-Type Commands for Adapter Cards on page 125](#)

Powering Up the Router

Complete the steps in [Wiring the DC Inputs on page 91](#) and [Installing the Components on page 95](#) 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.



Warning: For proper thermal operation, ensure that filler plates are installed on all empty slots before powering up the router.



Notes:

- 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 software can be stored on the compact flash memory device or at an FTP file location.
- You must have a console or Telnet connection to communicate with and provision the 7705 SAR-8. See [Establishing Router Management Connections](#).

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](#).

- 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](#))
 - CSM (refer to [CSM Connectors and LEDs](#))
 - 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](#).
- Step 5.** (Optional at this time) Assign an IP address to the CSM. Refer to [Telnet Connection](#) 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](#) 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. If this happens, the CSM should be replaced and the faulty CSM returned to Alcatel-Lucent. The example below displays the output when the `boot.ldr` file cannot be found.

Example: Rebooting display

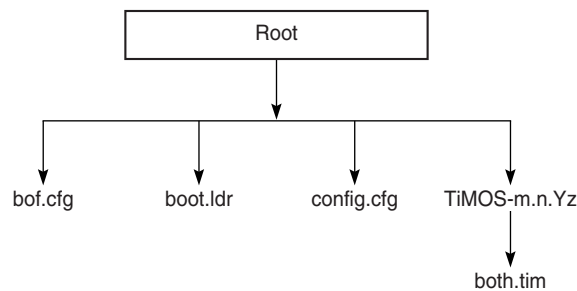
```
Rebooting...
Alcatel 7705 Boot ROM. Copyright 2007 Alcatel-Lucent.
All rights reserved. All use is subject to applicable license agreements.
Build: X-0.0.1166 on Wed Aug 8 23:22:35 EDT 2007 by csabuild
Version: 0x1C
Processor core is xxxxxX
COLD boot on processor #1
?Preparing for jump to RAM...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

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

Figure 34 displays the compact flash directory structure and file names.

Figure 34: Files on the Compact Flash



19644

Files on the compact flash are:

- `bof.cfg` — Boot option file
- `boot.ldr` — Bootstrap software
- `config.cfg` — Default configuration file
- `TiMOS-m.n.Yz`:
 - m — Major release number
 - n — minor release number
 - Y: A — Alpha release
 - B — Beta release
 - M — Maintenance release
 - R — Released software
 - z — Version number
- `both.tim` — Application software file

Establishing Router Management Connections

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

- Console connection
- Telnet connection

Console Connection

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

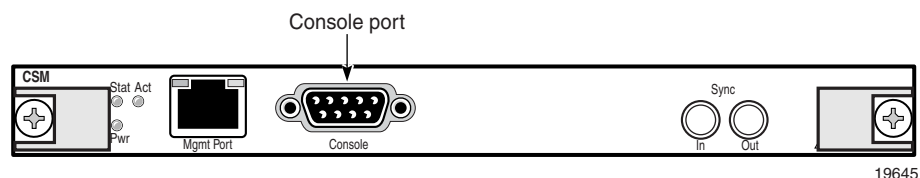
- an ASCII terminal or a PC running terminal emulation software set to the parameters shown in [Table 28](#)
- a standard serial cable with a female DB9 connector

For pinout information, refer to [Console Port Pinouts on page 152](#).

Table 28: Console Port Default Settings

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

Figure 35: Console Port Connection



To establish a console connection:

- Step 1.** Connect the terminal to the Console port on the front panel ([Figure 35](#)) 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 36](#)) has been configured using the `bof >address` command (see **CLI Syntax**)

CLI Syntax: `bof`

```
address ip-prefix/ip-prefix-length [primary |  
secondary]
```

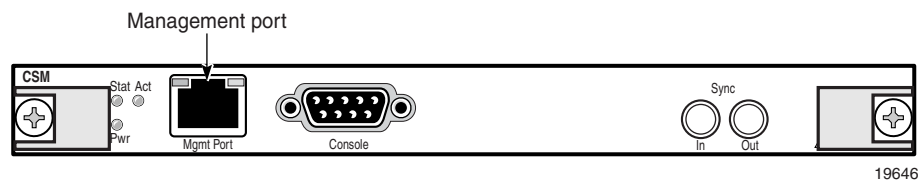
where:

ip-prefix is in the a.b.c.d format

ip-prefix-length is a value in the range [0..32]

For more information about configuring router parameters, refer to the 7705 SAR OS Router Configuration Guide. For pinout information, refer to [Management Port Pinouts on page 151](#).

Figure 36: 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



Notes:

- 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 45](#), 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

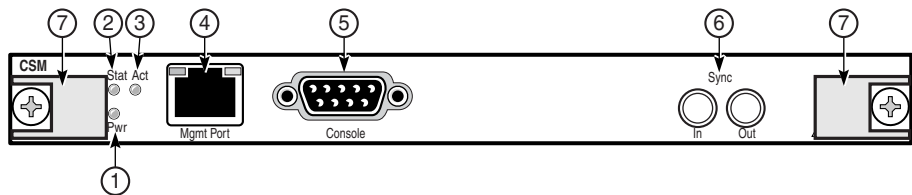
This chapter provides information on the connectors and LEDs seen on the front of the 7705 SAR-8. There are no connectors or LEDs on the back of the unit:

- [CSM Connectors and LEDs on page 128](#)
- [Fan Module Connectors and LEDs on page 130](#)
- [Adapter Card Connectors and LEDs on page 133](#)

CSM Connectors and LEDs

Figure 37 identifies the connectors and LEDs on the CSM.

Figure 37: CSM Connectors and LEDs



19647

Table 29 describes the connectors and LEDs on the CSM.

Table 29: 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

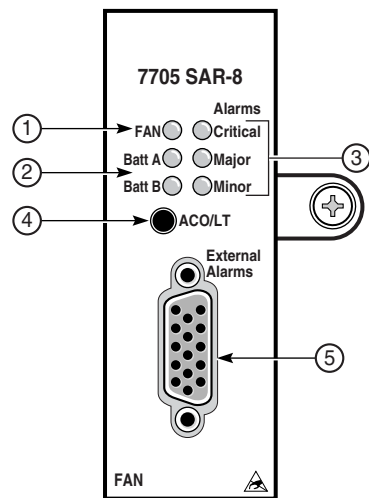
Table 29: 7705 SAR-8 CSM Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
4	Mgmt Port	Connector	The Ethernet Management port has an RJ-45 connector and is 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 on page 150 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 a DTE port 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 on page 151 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 115.2 KBaud, and can be reconfigured for 9.6, 19.2, 38.4, or 57.6 KBaud.
		—	
6	Sync	In	The “In” synchronization port has a 1.0/2.3 coaxial connector that can be used to receive an external synchronization input signal.
		Out	The “Out” synchronization port has 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 38 identifies the connectors and LEDs on the Fan module.

Figure 38: Fan Module Connectors and LEDs



19648



Note: The +24 VDC variant of the fan module is identified as such on the fan module faceplate.

Table 30 describes the connectors and LEDs on the Fan module.

Table 30: 7705 SAR-8 Fan Module Connector and LED Descriptions

Key	Label/Part	Sub category	Description
1	FAN	—	Green: Indicates that the fans are operational Amber: Indicates that the fans have turned off due to a low temperature or that a fan has failed (the 7705 SAR software can detect which situation has occurred and will raise an alarm if a fan failure exists) Unlit: Indicates that the fan has power failure Note: The FAN LED is not affected by a Lamp Test.

Table 30: 7705 SAR-8 Fan Module Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
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>
3	Alarms	Critical	<p>Red: Indicates that a critical condition exists, such as a fan failure, a power feed failure, or a critical external alarm input detected</p> <p>Unlit: Indicates that there are no critical alarm conditions</p>
		Major	<p>Red: Indicates that a serious condition exists, such as an over-temperature condition, a full compact flash device, or a major external alarm input detected</p> <p>Unlit: Indicates that there are no major alarm conditions</p>
		Minor	<p>Amber: Indicates that a minor condition exists, such as a card removal, synchronization reference failure, or a minor external alarm input detected</p> <p>Unlit: Indicates that there are no minor alarm conditions</p>
4	ACO/LT		<p>The Audible Alarm Cutoff/Lamp Test button verifies LED operation and turns off the external alarm control bits.</p> <p>When pressed: The Lamp Test is enabled and the following LED activity occurs (exceptions are noted):</p> <ul style="list-style-type: none"> • all status LEDs on the chassis glow green • all activity LEDs on the chassis glow green • the port LED on the T1/E1 ASAP Adapter card glows green • the four port LEDs on the OC3/STM1 Clear Channel Adapter card glow green • the critical and major Alarm LEDs glow red, and the minor Alarm LED glows amber <p>Exceptions: The following LEDs are not affected by the Lamp Test:</p> <ul style="list-style-type: none"> • Management port LEDs on the CSM • Fan and Battery A/B LEDs on the Fan module • all port LEDs on the Ethernet Adapter card <p>When released: All LEDs on CSM(s) and adapter cards return to their pre-Lamp Test state. The Alarm LEDs turn off and stay unlit until the next new alarm condition.</p>

Table 30: 7705 SAR-8 Fan Module Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
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 on page 153 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 136](#)
- [Replacing a CSM on page 137](#)
- [Replacing Adapter Cards on page 140](#)
- [Replacing the Fan Module on page 145](#)
- [Installing a Filler Plate on page 148](#)

Warnings and Notes



Dangers:

- Only trained and qualified personnel should install or replace this equipment.
- Use of procedures other than those specified in this 7705 SAR-8 Installation Guide can result in hazardous radiation exposure.



Warnings:

- 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 a 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.
- Filler plates are required on all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



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

Replacing a CSM

This section contains:

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

Warnings and Notes



Warnings:

- 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 a 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.
- Filler plates are required on all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



Notes:

- 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 filler plate 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 filler plate to cover the empty slot. Refer to [Installing a Filler Plate on page 148](#) for instructions.

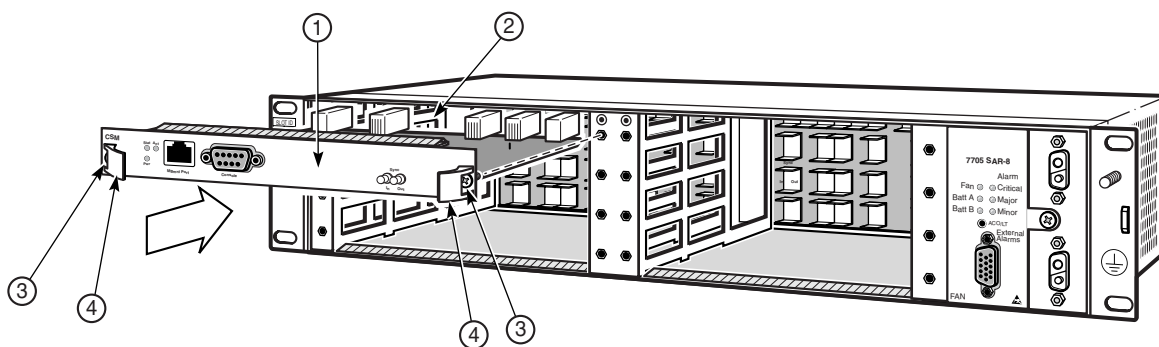
Replacing a CSM



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 39 illustrates replacing a CSM.

Figure 39: Replacing a CSM



19603

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



Dangers:

- 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 a 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.



Warnings:

- Always place components on an anti-static surface.
- Do not power up a 7705 SAR-8 before verifying that all common equipment (chassis, power, cooling, and grounding) is connected properly and that the fan module and all cards in the chassis have the same voltage type.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in adapter card SFP ports.
- Filler plates are required on all empty slots to prevent excess dust accumulation and to help control airflow and electromagnetic interference.



Notes:

- 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.

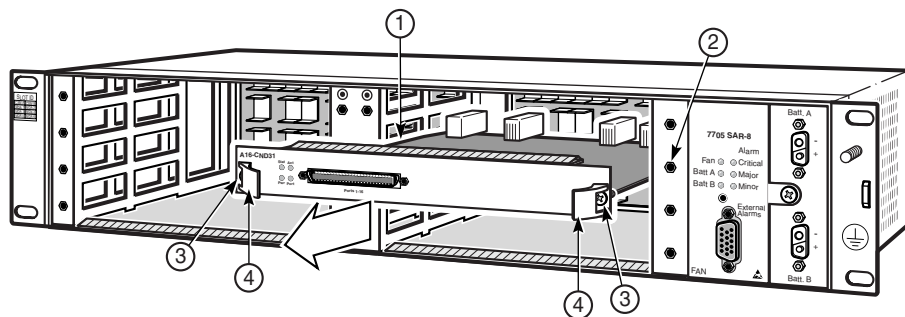
Issue the following commands in the `config` context to shut down ports, remove the adapter card from the configuration, and change to an 8-port Ethernet Adapter card:

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 40 illustrates removing an adapter card.

Figure 40: Removing an Adapter Card



19649

Table 31: 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 141](#).

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.

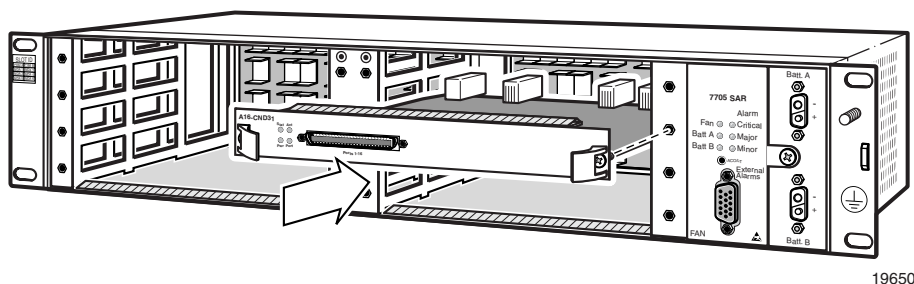
Step 5. Grip the adapter card by the ejector levers and slide the card out of the slot. Place the adapter card on an anti-static surface.

Step 6. If you are not replacing the adapter card immediately, cover the adapter card slot with a filler plate. See [Installing a Filler Plate on page 148](#) for instructions on installing a filler plate.

Replacing an Adapter Card

Figure 41 illustrates the replacement of an adapter card. Table 31 on page 142 identifies the installation features.

Figure 41: Replacing an Adapter Card



Tools required:

- torque driver for Phillips screws

To replace an adapter card:

- Step 1.** Remove the replacement adapter card from the packaging and place on an 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



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



Warning: The Fan module is hot-swappable. The 7750 SAR chassis operates safely for up to 4 minutes while you replace the Fan module. If a longer maintenance time is required, power off the system to prevent over-temperature conditions.

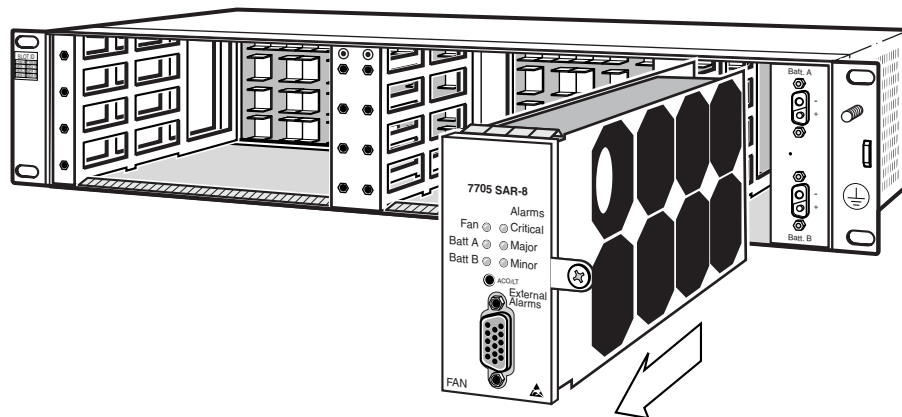


Note: In the event of a single fan failure, the remaining fans continue to run. This is sufficient to continue to provide adequate cooling for the system, but the Fan module needs to be replaced as soon as possible. The individual fans are not field-replaceable.

Removing the Fan Module

Figure 42 illustrates removing the Fan module.

Figure 42: 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.



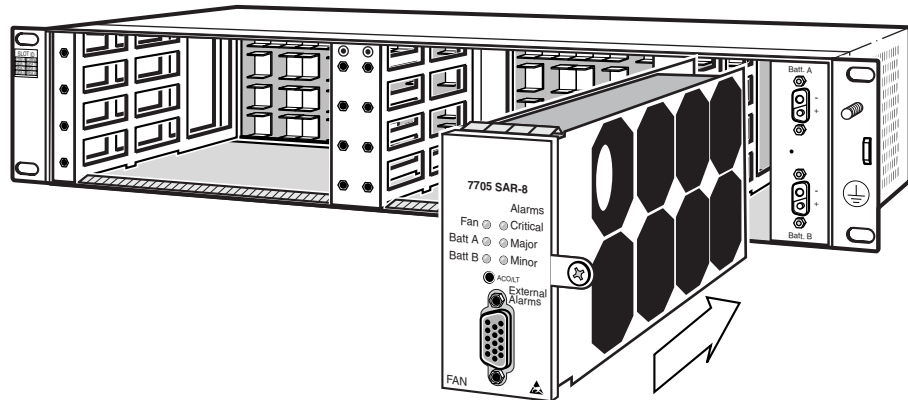
Danger: DO NOT put your fingers or any tool in the Fan module if the fans are still spinning. Wait until the fans stop spinning (about 20 seconds) before completely removing the Fan module from its slot.

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

Replacing the Fan Module

Figure 43 illustrates replacing the Fan module.

Figure 43: 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 130](#) for more information on Fan module LEDs.

Installing a Filler Plate

A filler plate must be installed on all empty chassis slots.

Tools required:

- slot screwdriver

To install a filler plate:

Step 1. Align the filler plate and insert the plate into the chassis slot.

Step 2. Tighten the two captive screws that fasten the filler plate to the chassis. Do not over-tighten. Filler plates do not have backplane connectors.

Appendix C: Pinout Assignments

In This Chapter

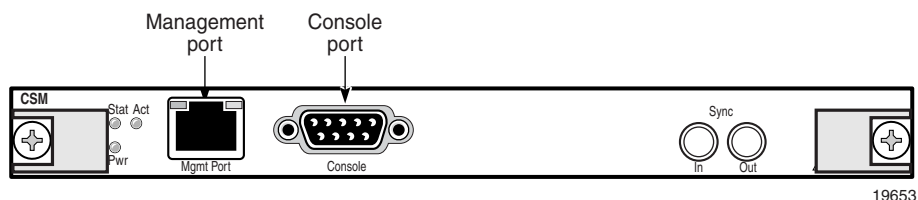
This chapter provides information about the pinout assignments for the port connectors on the 7705 SAR-8:

- [CSM Ports on page 150](#)
 - [Management Port on page 150](#)
 - [Console Port on page 151](#)
- [Fan Module Port on page 153](#)
 - [External Alarms Port on page 153](#)
- [RJ-45 Distribution Panel on page 156](#)
 - [RJ-45 Distribution Panel Pinouts on page 156](#)
- [Adapter Card Ports on page 157](#)

CSM Ports

The CSM has two ports: the (Ethernet) Management port and the Console port. [Figure 44](#) identifies these ports.

Figure 44: CSM Ports

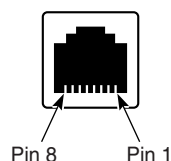


Management Port

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 files and manage the system. This port has an RJ-45 connector on the front panel. You must provide a CAT5 Ethernet cable to connect to the port.

[Figure 45](#) shows the Management port pin numbers.

Figure 45: Management Port Pin Numbers



19593

Management Port Pinouts

Table 32 displays the Management port pin assignments.

Table 32: Ethernet Management Port Pinouts – RJ-45 Female

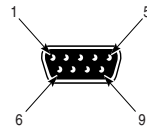
Pin	Signal	Direction	Description
1	TX+	Output	Differential transmit data – positive
2	TX-	Output	Differential transmit data – negative
3	RX+	Input	Differential receive data – positive
4	NC	—	Not connected
5	NC	—	Not connected
6	RX-	Input	Differential receive data – negative
7	NC	—	Not connected
8	NC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

Console Port

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.

Figure 46 shows the Console port pin numbers.

Figure 46: Console Port Pin Numbers



19862

Console Port Pinouts

Table 33 displays the Console port pin assignments. The Console port is configured for DTE mode.

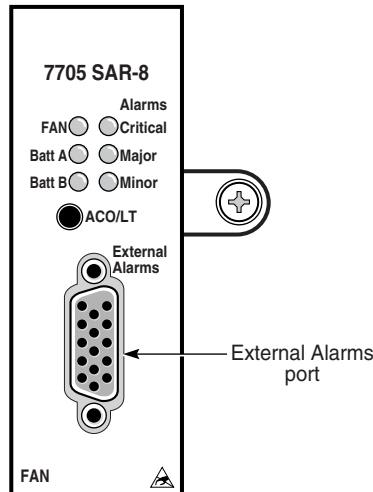
Table 33: Console Port Pinouts – DB9 Male

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 47 identifies the connector for the External Alarms port on the Fan module.

Figure 47: Fan Module Port



19654

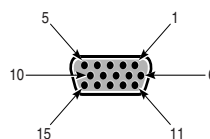
External Alarms Port

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 configurable severity associated with it—the default is one Critical alarm input, two Major alarm inputs, and one Minor alarm input (see Table 34). State transitions on the inputs are debounced for 2 seconds. Refer to the 7705 SAR OS System Management Guide for information on customizing reporting of external alarm conditions.

You can display the status of the alarm inputs using the `show>chassis>environment` CLI command. Refer to the 7705 SAR OS Basic System Configuration Guide for an example of the alarm inputs display.

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

Figure 48 shows the External Alarms port pin numbers.

Figure 48: External Alarms Port Pin Numbers

19857

External Alarms Port Pinouts

Table 34 specifies the External Alarms port connector pinouts.

Table 34: External Alarms Port Pinouts

Pin	Signal	Direction	Description
1	Alarm 1	Input	Critical alarm severity (default)
2	Alarm 2	Input	Major alarm severity (default)
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 (default)
12	Alarm 4	Input	Minor alarm severity (default)
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 35](#) lists critical, major, and minor alarm examples.

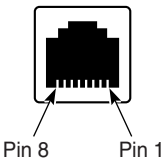
Table 35: Alarm Examples

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

RJ-45 Distribution Panel

Use standard RJ-45 cables to attach customer equipment to the RJ-45 Distribution Panel. [Figure 49](#) shows the pin numbering.

Figure 49: RJ-45 Distribution Panel Connector Pin Numbers



19593

RJ-45 Distribution Panel Pinouts

[Table 36](#) indicates the pinout assignments.

Table 36: RJ-45 Distribution Panel Pinout Assignments

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

Adapter Card 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 802.1ag	Service Layer OAM
IEEE 802.1p/q	VLAN Tagging
IEEE 802.3	10BaseT
IEEE 802.3ah	Ethernet OAM
IEEE 802.3u	100BaseTX
IEEE 802.3x	Flow Control
IEEE 802.3z	1000BaseSX/LX
IEEE 802.3-2008	Revised base standard

Protocol Support

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
RFC 2684	Multiprotocol Encapsulation over ATM Adaptation Layer 5
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
GR-253-CORE	- SONET Transport Systems: Common Generic Criteria. Issue 3, September 2000
AF-PHY-0086.001	Inverse Multiplexing for ATM (IMA)

DIFFERENTIATED SERVICES

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

DIGITAL DATA NETWORK MANAGEMENT

V.35	
RS-232	(also known as EIA/TIA-232)

LDP

RFC 5036	LDP Specification
----------	-------------------

IS-IS

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

MPLS

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

NETWORK MANAGEMENT

- ITU-T X.721: Information technology- OSI-Structure of Management Information
- ITU-T X.734: Information technology- OSI-Systems Management: Event Report Management Function
- M.3100/3120 Equipment and Connection Models
- TMF 509/613 Network Connectivity Model
- RFC 1157 SNMPv1
- RFC 1305 Network Time Protocol (Version 3) Specification, Implementation and Analysis
- RFC 1850 OSPF-MIB
- RFC 1907 SNMPv2-MIB
- RFC 2011 IP-MIB
- RFC 2012 TCP-MIB
- RFC 2013 UDP-MIB
- RFC 2030 Simple Network Time Protocol (SNTP) Version 4 for IPv4, IPv6 and OSI
- RFC 2096 IP-FORWARD-MIB
- RFC 2138 RADIUS
- RFC 2206 RSVP-MIB
- RFC 2571 SNMP-FRAMEWORKMIB
- RFC 2572 SNMP-MPD-MIB
- RFC 2573 SNMP-TARGET-&-NOTIFICATION-MIB
- RFC 2574 SNMP-USER-BASED-SMMIB
- RFC 2575 SNMP-VIEW-BASED ACM-MIB
- RFC 2576 SNMP-COMMUNITY-MIB
- RFC 2588 SONET-MIB
- RFC 2665 EtherLike-MIB
- RFC 2819 RMON-MIB
- RFC 2863 IF-MIB
- RFC 2864 INVERTED-STACK-MIB
- RFC 3014 NOTIFICATION-LOG MIB
- RFC 3164 The BSD Syslog Protocol
- RFC 3273 HCRMON-MIB
- RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks
- RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)

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

OSPF

- RFC 1765 OSPF Database Overflow
- RFC 2328 OSPF Version 2
- RFC 2370 Opaque LSA Support
- RFC 3101 OSPF NSSA Option
- RFC 3630 Traffic Engineering (TE) Extensions to OSPF

PPP

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

PSEUDOWIRES

- RFC 3550 RTP: A Transport Protocol for Real-Time Applications
- RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
- RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
- RFC 4446 IANA Allocation for PWE3
- RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)
- RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
- RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
- RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks

RFC 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
draft-ietf-pwe3-redundancy-01 Pseudowire (PW)
Redundancy

RADIUS

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

RSVP-TE and FRR

RFC 2430 A Provider Architecture for DiffServ &
TE
RFC 2961 RSVP Refresh Overhead Reduction
Extensions
RFC 3209 Extensions to RSVP for LSP Tunnels
RFC 3210 Applicability Statement for Extensions
to RSVP for LSP Tunnels
RFC 4090 Fast Reroute Extensions to RSVP-TE for
LSP Tunnels

SONET/SDH

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

SSH

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

SYNCHRONIZATION

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

TACACS+

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

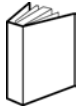
TCP/IP

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

Proprietary MIBs

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

Customer documentation and product support



Customer documentation

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

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



Technical Support

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



Documentation feedback

documentation.feedback@alcatel-lucent.com

