

Alcatel-Lucent 7705

SERVICE AGGREGATION ROUTER | RELEASE 2.1

SAR-F CHASSIS INSTALLATION GUIDE

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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-F Overview **43**
- 7705 SAR-F Components 44
  - Control and Switching 46
  - T1/E1 and Ethernet Ports 47
  - Power Supply Inputs 47
  - Fan Operation 48
- Notes on 7705 SAR-F and 7705 SAR-8 49
- SAR System Installation Process 52

Site Preparation **53**
- Warnings and Notes 54
- System Specifications 56
  - Chassis Specifications 56
  - Environmental Specifications 56
  - 7705 SAR-F Power Consumption 57
- Installation Locations 58
  - Chassis Location Requirements 58
- Safety Considerations 60
  - Placement 60
  - Grounding 60
  - Cabling 61
  - Power 62
  - Fans 62
  - Storage 63
  - Compliance 63

Installing the Chassis **65**
- Unpacking the Chassis 66
  - Unpacking Precautions 66
- Installing the Chassis in a Rack 68
  - Rack-Mounting the Chassis 68
- Chassis Ground Wiring 71
  - Making the Ground Connection 71

DC Power Connections 75
Wiring and Connecting DC Power 76
Warnings and Notes 76
DC-Input Power Connections 77
Wiring the DC Inputs 77

SFPs 83
Installing and Removing SFPs 84
Warnings and Notes 84
SFPs 85
Fiber Cable Preparation 86
Locking and Release Mechanisms 87
SFP Support 88
Installing SFPs 92
Removing and Replacing SFPs 92

Connecting Cables 95
Warnings and Notes 96
Making Cable Connections to Ports 97
Warnings and Notes 97
Cable Connections 98
Ethernet and Copper Cables 98
Fiber Cables 99
Shield Ground Connections 101
Making External Synchronization Connections 102
Connecting an External Synchronization Input 102
Providing an External Synchronization Output 102
Making External Alarm Connections 103
Connecting an External Alarm 104
Making Router Management Connections 105

Initializing and Provisioning 107
Powering Up the Router 108
Power-Up and Initialization 108
Troubleshooting Initial Startup 109
Establishing Router Management Connections 111
Console Connection 111
Telnet Connection 112
Running Telnet 113
Provisioning the 7705 SAR-F 114
T1/E1 and Ethernet Port Identifiers 115

Appendix A: 7705 SAR-F Connectors and LEDs 117
7705 SAR-F Connectors and LEDs 118

Appendix B: Pinout Assignments 123
7705 SAR-F Ports 124
Management Port 124

Console Port 125
External Alarms Port 126
Ethernet Port 128
T1/E1 Port 129

Standards and Protocol Support 131

List of Tables

Preface 23
Table 1: Information Symbols 24

Mandatory Regulations 27
Table 2: List of Terms 28

7705 SAR-F Overview 43
Table 3: 7705 SAR-8 and 7705 SAR-F Comparison 50

Site Preparation 53
Table 4: 7705 SAR-F Chassis Specifications 56
Table 5: Environmental Specifications 56
Table 6: Component Power Consumption 57
Table 7: Chassis Clearance Specifications 59
Table 8: Storage Specifications 63

Installing the Chassis 65
Table 9: Unpacking the 7705 SAR-F Chassis 67
Table 10: Rack-Mounting the 7705 SAR-F Chassis 69
Table 11: Ground Wire Descriptions 72
Table 12: Chassis Ground Connection 72

DC Power Connections 75
Table 13: Ring Lug to Power Cable Descriptions 77
Table 14: Wiring the DC Power Supplies Descriptions 78

SFPs 83
Table 15: SFP Installation Features 86
Table 16: SFPs for the 7705 SAR-F 88
Table 17: T3/E3 Configured Settings 91

Connecting Cables 95
Table 18: External Synchronization Input and Output Features 102

Initializing and Provisioning 107
Table 19: Console Port Default Settings 111
Table 20: CLI Port Identifiers 115

Appendix A: 7705 SAR-F Connectors and LEDs 117

Table 21: 7705 SAR-F Connector and LED Descriptions 118

Appendix B: Pinout Assignments 123

Table 22: Ethernet Management Port Pinouts—RJ-45 Female 125
Table 23: Console Port Pinouts—DB9 Male 126
Table 24: External Alarms Port Pinouts—DB15 Female 127
Table 25: Alarm Examples 128
Table 26: Ethernet Port RJ-45 Port Pinouts—RJ-45 Female 129
Table 27: T1/E1 Port RJ-45 Connector Pinout Assignments 130

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-F Overview 43
Figure 4: 7705 SAR-F Exploded View 44
Figure 5: 7705 SAR-F Faceplate 45
Figure 6: 7705 SAR-F Control and Switching Features 46
Figure 7: T1/E1 and Ethernet Ports 47
Figure 8: DC Power LEDs 48

Site Preparation 53
Figure 9: Chassis Clearance Requirements (View from Top) 59

Installing the Chassis 65
Figure 10: Unpacking the 7705 SAR-F Chassis 67
Figure 11: Installing the 7705 SAR-F Chassis in a Rack 69
Figure 12: Preparing the Ground Wire 71
Figure 13: Attaching the Chassis Ground Connector 72

DC Power Connections 75
Figure 14: Attaching a Ring Lug to a Power Cable 77
Figure 15: Wiring the -48 VDC Power Supplies 78
Figure 16: Wiring the +24 VDC Power Supplies 80

SFPs 83
Figure 17: Installing an SFP 86

Connecting Cables 95
Figure 18: Managing Cable Connections 98
Figure 19: External Synchronization Input and Output Connectors 102
Figure 20: External Alarms Connector 103
Figure 21: External Alarms Connector Pin Numbers 103

Initializing and Provisioning 107
Figure 22: Files on the Compact Flash 110
Figure 23: Console Port Connection 111
Figure 24: Management Port Connection 112

Appendix A: 7705 SAR-F Connectors and LEDs 117
Figure 25: 7705 SAR-F Connectors and LEDs 118

Appendix B: Pinout Assignments 123
Figure 26: 7705 SAR-F Port Connectors 124
Figure 27: Management Port Pin Numbers 124
Figure 28: Console Port Pin Numbers 125
Figure 29: External Alarms Port Pin Numbers 127
Figure 30: Ethernet Port RJ-45 Connector Pin Numbers 129
Figure 31: T1/E1 Port RJ-45 Connector Pin Numbers 130

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
Apipe	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

Preface

About This Guide

This guide provides an overview of the Alcatel-Lucent 7705 Service Aggregation Router (SAR-F chassis), recommendations for preparing the site, procedures for installing and grounding the router in a standard 19-inch utility rack, and instructions for connecting and provisioning the router.

After the hardware installation process is completed, refer to the 7705 SAR OS documentation set (listed below) 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.

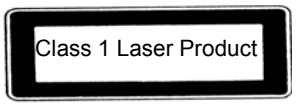
Information Symbols

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-F 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-F:

- 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-F. You must adhere to these instructions so that your system meets regulatory requirements.



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

Warning: The unit should be connected to a DC branch circuit with a minimum 5 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-F 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-F 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-F 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 71 for specific instructions on connecting the chassis ground).

EMC Compliance

EMC compliance may require the use of 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 interfaces and ports:

- Management (Ethernet) and DB9 console ports
- DB15 Alarm port
- Synchronization interfaces
- Ethernet interfaces
  - → Fast Ethernet (CAT5 shielded cable)
  - → Gigabit Ethernet (CAT5E shielded cable)
- T1 and E1 interfaces

Regulatory Symbols

The 7705 SAR-F 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-F 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-0011

EMC Compliance

EMC compliance may require the use of 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-F 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-F 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-F

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 71 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-F in Australia and New Zealand.

ACMA Regulations

The 7705 SAR-F 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-F 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-F 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-F Overview

In This Chapter

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

- 7705 SAR-F Components on page 44
  - → Control and Switching on page 46
  - → T1/E1 and Ethernet Ports on page 47
  - → Power Supply Inputs on page 47
  - → Fan Operation on page 48
- Notes on 7705 SAR-F and 7705 SAR-8 on page 49
- SAR System Installation Process on page 52

7705 SAR-F Components

The 7705 SAR-F is a service access router that has a fixed hardware configuration. The 7705 SAR-F has one circuit board that supports all functions of the router, including control and switching, T1/E1 interfaces, Ethernet interfaces, as well as indicator LEDs and connectors for node management, external synchronization, and external alarms.

Figure 4 shows an exploded view of the 7705 SAR-F, and Figure 5 shows a closeup view of the faceplate. All physical connections are made at the front of the chassis, including the chassis ground connection. There are no back panel connections.

There are two variants of the 7705 SAR-F: a –48 VDC variant and a +24 VDC variant. They are functionally identical—only the power supply ratings differ. The variant type is printed on the front of the router, below the DC terminal strip.

Figure 4: 7705 SAR-F Exploded View

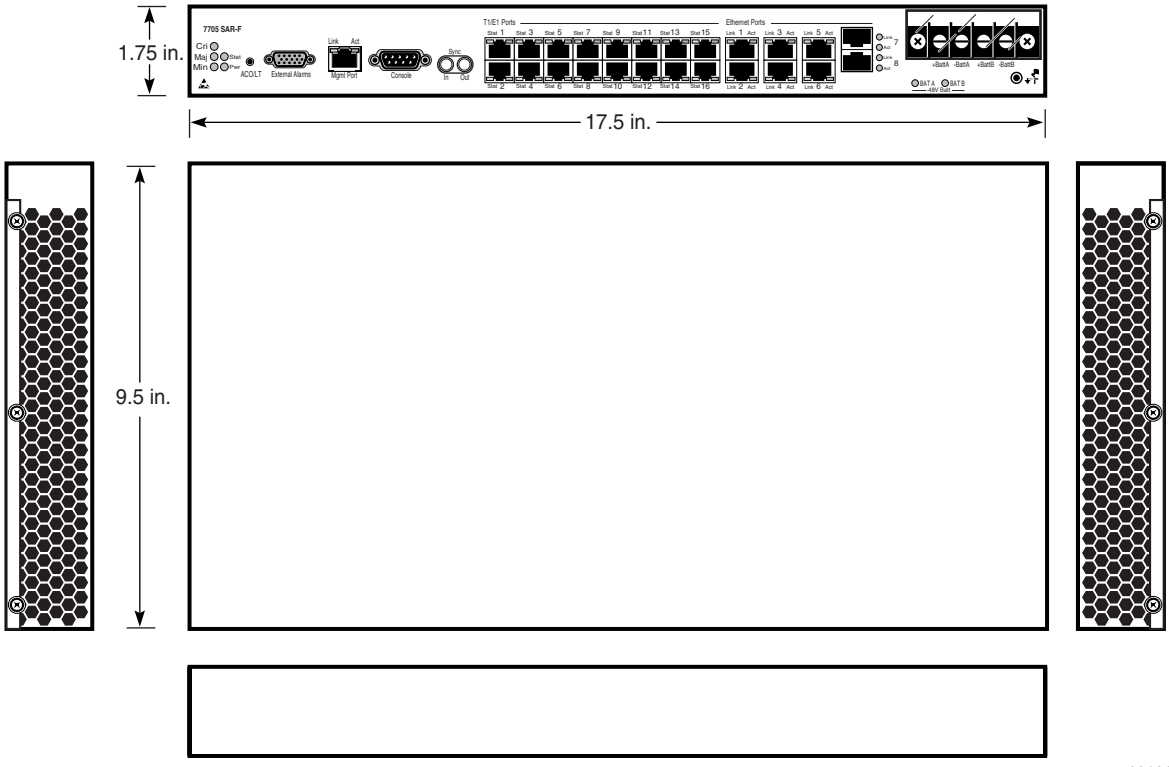
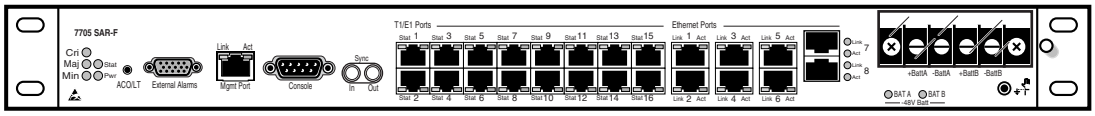


Figure 5: 7705 SAR-F Faceplate



19837

In addition to containing the circuit board, the chassis includes fans for cooling the router and a dual terminal block for redundant DC power inputs.

Mounting brackets for the 7705 SAR-F chassis are factory-installed and are used to mount the unit in a recommended 19-inch rack. The chassis grounding stud is on the right-hand side bracket.

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-F and 7705 SAR-8 on page 49 for more information.

Control and Switching

Control and switching on the 7705 SAR-F provide the following main functions:

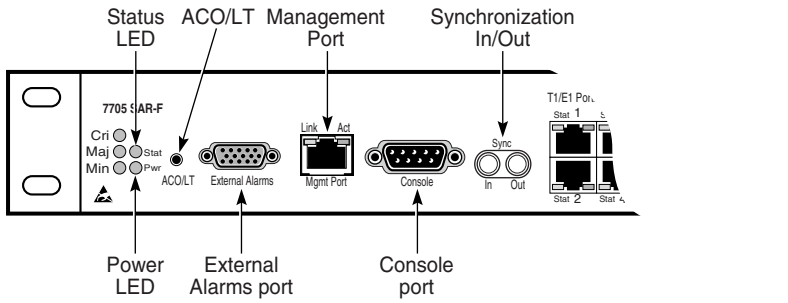
- node management interfaces to the 7705 SAR-F (Management (Ethernet) and Console; see Figure 6)
- system synchronization and alarm interfaces for external inputs and outputs (see Figure 6)
- routing, switching, and services functions for the entire system

The 7705 SAR-F has a compact flash memory device that stores system boot software, OS software, and configuration files and logs. The compact flash device cannot be accessed or removed by an operator or installer.

The switching fabric receives and directs traffic to the appropriate interface ports according to the routing information.

Figure 6 identifies the connectors and LEDs that are part of the control and switching function. Refer to 7705 SAR-F Connectors and LEDs on page 118 for a description of these parts.

Figure 6: 7705 SAR-F Control and Switching Features



T1/E1 and Ethernet Ports

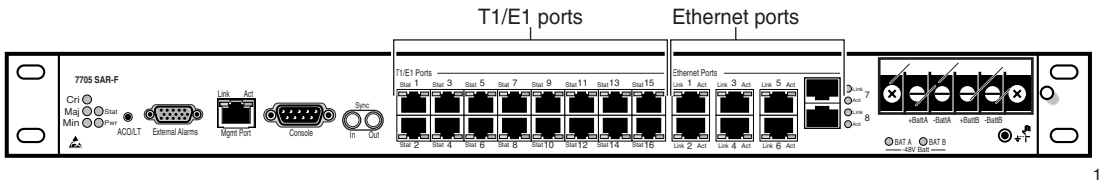
Figure 7 identifies the T1/E1 and Ethernet interface ports. These ports provide access for a wide variety of interface speeds and types, including Ethernet (10/100/1000 Base-T and optical), T1/E1 with ATM and IMA, and TDM (channelized and unchannelized).

There are 16 T1/E1 ports that support T1/E1 connections via connection to RJ-45 connectors. All ports must be configured as either T1 or E1 ports; a mix of T1 and E1 ports is not allowed.

There are 8 Ethernet ports: 6 ports to support 10/100 Base-T Ethernet interfaces via Ethernet connectors, and two SFP ports for 10/100/Gigabit Ethernet SFPs (optical or electrical) and T3 SFPs.

The SFP modules are hot-swappable and field-replaceable by qualified personnel. Refer to Table 16 on page 88 for a list of supported SFP modules.

Figure 7: T1/E1 and Ethernet Ports



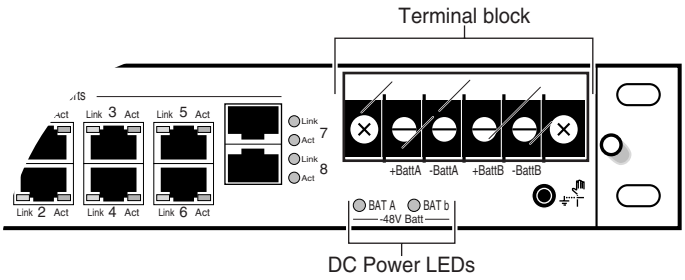
Power Supply Inputs

The 7705 SAR-F has a standard, dual terminal block (four terminals) attached to the front of the chassis. The terminals provide access for two independent power feeds, allowing power redundancy for the system. When only one power feed is used, the system does not have power supply redundancy. The power system has no field-replaceable parts.

The DC power LEDs are located on the front of the router (see Figure 8). Refer to 7705 SAR-F Connectors and LEDs on page 118 for a description of the power LED operation.

Refer to DC Power Connections on page 75 for requirements and information regarding preparing DC power cables.

Figure 8: DC Power LEDs



Fan Operation

The 7705 SAR-F has five internal fans that provide cooling for the components. All five fans are either on or off, depending on control signals from sensors monitoring the router's internal temperature. Air enters from the intake vent on the right side of the chassis and exits through the exhaust vent on the left side.

Warning: Individual fans are not user-replaceable; however, there is sufficient cooling even if one of the fans fails. A minor alarm is raised when one fan fails. If two or more fans fail, a critical alarm is raised and the 7705 SAR-F must be serviced.

Monitoring Temperature

By default, all the fans are turned off until they are turned on by system software. The software controls the fans by monitoring temperature sensors.

- Starting early in the system boot-up cycle, the internal temperature is continuously monitored. Fans are turned on when the outside temperature exceeds 104°F (40°C) and off when the temperature drops below 59°F (15°C).
- After boot-up is completed, the internal system temperature is monitored continuously. The fans normally turn on and off depending on outside temperature; however, if any of the sensors indicate that the internal temperature exceeds +131ºF (55ºC), this normal behavior is overridden and the fans are forced on, regardless of the outside temperature. When the temperature is equal to or below +86ºF (30ºC), the override feature is turned off; however, fans may or may not stay on.

The override feature serves as a backup mechanism in cases where the main sensor that controls the fans malfunctions or if the SAR-F experiences an abnormally high temperature when the fans are off.
An overheat alarm is also raised if any sensor temperature exceeds +183ºF (84ºC).

- If the temperature of any adapter functional block in the 7705 SAR-F exceeds 185ºF (85ºC), the functional block is rebooted by software. When the adapter functional block 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 adapter functional block will go into the "booting" state and complete its reboot cycle.

The `show chassis` CLI command displays the fan status as one of the following:

- up – all fans are operating
- minor failure – one fan has failed
- critical failure – two or more fans have failed

The fan speed can be one of the following:

- full speed – all fans are on
- off – all fans are off

An example of the Fan Information portion of the `show chassis` display is shown below:

```
Fan Information
  # of on-board fans          : 5
  Status                      : up
  Speed                       : full speed
```

Notes on 7705 SAR-F and 7705 SAR-8

The 7705 SAR-F and the 7705 SAR-8 run the same operating system software. The main difference between the products is their hardware configuration. 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, replacing 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 3.

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

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

Table 3: 7705 SAR-8 and 7705 SAR-F Comparison

7705 SAR-8	7705 SAR-F	Notes
CSM	Control and switching functions	The control and switching functions include the console and management interfaces, the alarm and fan functions, the synchronization interfaces, system LEDs, and so on.
Fan module	Integrated with the control and switching functions	
16-port T1/E1 ASAP Adapter card	16 individual T1/E1 ports on the faceplate	The T1/E1 ports on the 7705 SAR-F are equivalent to the T1/E1 ports on the 16-port T1/E1 ASAP Adapter card, except that the 16 T1/E1 ports on the 7705 SAR-F support multiple synchronization sources to support two timing references. On the 7705 SAR-8, the CLI indicates the MDA type for the 16-port T1/E1 ASAP Adapter card as `a16-chds1`. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F ports as `a16-chds1v2`.
8-port Ethernet Adapter card	8 individual Ethernet ports on the faceplate	The –48 VDC versions of the 7705 SAR-8 support two versions of the 8-port Ethernet Adapter card, with version 2 having additional support for Synchronous Ethernet. The Ethernet ports on the 7705 SAR-F are equivalent to the Ethernet ports on version 2 of the 8-port Ethernet Adapter card and support multiple synchronization sources to support two timing references. The +24 VDC version of the 7705 SAR-8 only supports version 2 of the 8-port Ethernet Adapter card. On the 7705 SAR-8, the CLI indicates the MDA type for the 8-port Ethernet Adapter card as `a8-eth` or `a8-ethv2`. On the 7705 SAR-F, the CLI indicates the MDA type for the 7705 SAR-F Ethernet ports as `a8-ethv3`, to distinguish it from the actual version 2 of the 8-port Ethernet Adapter card.

Table 3: 7705 SAR-8 and 7705 SAR-F Comparison

7705 SAR-8	7705 SAR-F	Notes
Requires user configuration at card (IOM) and MDA (adapter card) levels	Configuration at card (IOM) and MDA (adapter card) levels is preset and users cannot change these types	

SAR System Installation Process

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

Step 1. Prepare the site.

Step 2. Unpack the chassis.

Step 3. Rack mount and ground the chassis.

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

Step 5. Install the SFPs.

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-F:

- Warnings and Notes on page 54
- System Specifications on page 56
  - → Chassis Specifications on page 56
  - → Environmental Specifications on page 56
  - → 7705 SAR-F Power Consumption on page 57
- Installation Locations on page 58
  - → Chassis Location Requirements on page 58
- Safety Considerations on page 60
  - → Placement on page 60
  - → Grounding on page 60
  - → Cabling on page 61
  - → Power on page 62
  - → Fans on page 62
  - → Storage on page 63
  - → Compliance on page 63

Warnings and Notes



Dangers:

- The 7705 SAR-F needs a disconnect device on each power feed (such as an external circuit breaker, switch, or fuse) to disconnect DC power from the router. 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-F.
- The 7705 SAR-F uses a fiber-optic communications method and is a Class 1 laser product. Only trained service personnel familiar with laser radiation hazards should install or remove fiber-optic cables and cards in this system.



Warnings:

- To properly transport and relocate a 7705 SAR-F chassis, do the following:
  - → disconnect power to the chassis by opening the disconnect devices
  - → detach all cables from the router
  - → if the router is installed in a rack, carefully remove it from the rack
  - → repackage the router in its original shipping container for relocation
- Do not install equipment that appears to be damaged.
- 7705 SAR-F systems should be installed in restricted access areas, such as a dedicated equipment room or an equipment closet, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code ANSI/ NFPA 70.
- This product complies with, and has been CE marked in accordance with, the European Directive 99/05/EC (R&TTE) and 2004/108/EC (EMC).
- Failure to comply with the equipment rack and chassis instructions as outlined in Installation Locations on page 58 and Chassis Location Requirements on page 58 will cause thermal failure.



Notes:

- Prepare the equipment rack and site before installing the router. Plan the router placement near the power sources and network interface connections.
- A 7705 SAR-F chassis weighs approximately 7.25 lbs (3.3 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 the chassis in the equipment rack before installing SFPs.
- 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 of the router 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 58.
- The 7705 SAR-F includes factory-installed, rack-mounting brackets to mount the router in a 19-inch equipment rack.

System Specifications

Chassis Specifications

Table 4: 7705 SAR-F Chassis Specifications

Parameter	Description
Dimensions (without mounting brackets)	(1.75 x 17.5 x 9.5 in.) (H x W x D) (4.45 x 44.5 x 24.1 cm)
Chassis weight	7.25 lbs (3.3 kg)
Mounting	Mount in a recommended 19-inch equipment rack Rack-mount brackets are factory-installed for 19-inch NEBS mounting

Environmental Specifications

Table 5: Environmental Specifications

Parameter	Description
Normal operating temperature	-40 to 149ºF (-40 to +65ºC)
Cold start temperature	-4ºF (-20ºC)
Relative humidity	5 to 85% (non-condensing)
Normal relative humidity	Not to exceed 29 g of water per cubic meter of air
Altitude range	Between 197 ft (60 m) below sea level and 5906 ft (1800 m) above sea level (70kPa to 106kPa)
Shock and vibration	Very low levels for continuous duration disturbance (similar to modern office building, for example) 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)

Table 5: Environmental Specifications (Continued)

Parameter	Description
Pollution degree (1)	2
Rated voltage (DC)	-48/-60 VDC (-60 VDC is for various European countries) +24 VDC
Operating voltage range (DC)	-40 to –75 VDC +20.0 to +28.3 VDC
Heat dissipation (worst case configuration)	60 W

Note:
1. Pollution degree is as defined in IEC 60950.

7705 SAR-F Power Consumption

Table 6: Component Power Consumption

Component	Power (Watts) (conservative estimate)
Chassis (full load)	60 W

Installation Locations

The 7705 SAR-F is intended to be installed in cell site or other facilities that provide weather protection and an extended temperature-controlled environment. The facilities provide protection from mold growth, pest incursion, and precipitation. The 7705 SAR-F is not intended for installation in outdoor facilities.

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

Airflow on the 7705 SAR-F 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, 5 in. (12.7 cm) wide (maximum) (see Figure 9).
- For seismic applications, the rack must be an approved Seismic Frame.
- 7705 SAR-F deployments in closed cabinets are not recommended. If closed cabinets must be used, they must not restrict shelf airflow in any way. Furthermore, they must not cause the shelf inlet bulk air temperatures to rise above those defined in Chassis Location Requirements under worst-case environmental conditions, including any preheating of the cabinet air by other equipment.
- The rail mounting holes in the equipment rack must align with the mounting holes on the chassis mounting brackets. The 7705 SAR-F 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.

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 of the chassis for cable management. See Figure 9.

Warning: Failure to comply with the location requirements outlined in Installation Locations and Chassis Location Requirements 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 104°F (40°C) under full system power loading combined with worst-case environmental deployment conditions.
- Ensure that the 7705 SAR-F system intake is not located immediately adjacent to the exhaust of another chassis such that preheated air above 104°F (40°C) is drawn into the system.
- Ensure that the 7705 SAR-F system intake is not located immediately adjacent to the intake of another chassis such that 7705 SAR-F 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 9.

Figure 9: Chassis Clearance Requirements (View from Top)

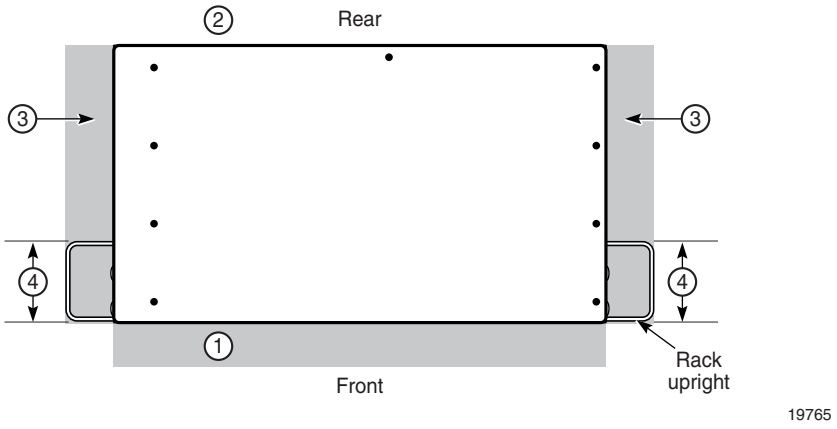


Table 7: Chassis Clearance Specifications

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 (solid metal not touching the chassis)

Safety Considerations

Placement

Warnings:

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

Grounding

Dangers:

- 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.
- Before making the chassis ground connection, ensure that all power is OFF from the DC circuit. To switch the power OFF, locate the circuit breaker on the panel board that services the DC circuit and switch the circuit breaker to the OFF position.

  Tip: For extra safety, tape the handle of the circuit breaker in the OFF position.

Warnings:

- Electrostatic discharge (ESD) damage can occur if the router is mishandled. Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- The 7705 SAR-F 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.
- 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-F supports both Common Bonding Networks (CBN) and Isolated Bonding Networks (IBN). The battery terminals (labeled +Batt A, -Batt A, +Batt B, and -Batt B 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-F 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 71 and Wiring and Connecting DC Power on page 76.

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-F 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.
- Power cable(s) must meet local electric code requirements.
- All power to the equipment rack or cabinet should be disconnected before the installation.
- 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 DC power cables from the system, first disconnect the power from the source and then disconnect the cables from the 7705 SAR-F.

DC Power Requirements

- A means of disconnect must be provided within 10 ft (3 m) of the 7705 SAR-F.
- A circuit breaker or fuse with recommended current rating 5 A (minimum) to 10 A (maximum) must be provided (applies to both –48 VDC and +24 VDC systems).
- 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.
- All power cables used on the 7705 SAR-F chassis must meet local safety codes.

Fans

The 7705 SAR-F has five fans integrated into the chassis. The fans are not field-replaceable.

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

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

Storage

To store an uninstalled 7705 SAR-F, rewrap the router in its original packaging and keep it in a dry, dust-free, temperature-controlled environment.

Table 8: 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 131 for compliance information.

Installing the Chassis

In This Chapter

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

- Unpacking the Chassis on page 66
  → Unpacking Precautions on page 66
- Installing the Chassis in a Rack on page 68
  → Rack-Mounting the Chassis on page 68
- Chassis Ground Wiring on page 71
  → Making the Ground Connection on page 71

Unpacking the Chassis

The 7705 SAR-F chassis has no field-replaceable parts and is the only piece of hardware packed in its shipping container.

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

- To properly transport and relocate a 7705 SAR-F chassis, do the following:
  - → disconnect power to the chassis by opening the disconnect devices
  - → detach all cables from the router
  - → if the router is installed in a rack, carefully remove it from the rack
  - → repackage the router in its original shipping container for relocation

Unpacking Precautions

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

- The shipping weight of the chassis is approximately 7.25 lbs (3.3 kg).
- 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 10 displays the components of a packed 7705 SAR-F chassis.

Figure 10: Unpacking the 7705 SAR-F Chassis

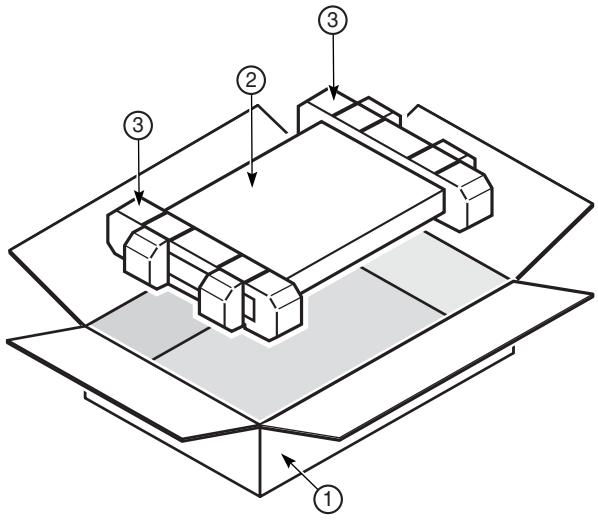


Table 9: Unpacking the 7705 SAR-F Chassis

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

Note: Wear an anti-static wrist strap to prevent damage to the equipment due to ESD.

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

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

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.

Warnings:

- Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- Failure to comply with the location requirements outlined in Installation Locations on page 58 and Chassis Location Requirements on page 58 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.
- When rack-mounting the chassis in an equipment rack, do not stack one 7705 SAR-F chassis or any other equipment directly on top of another 7705 SAR-F chassis, such that the bottom chassis is supporting other devices. Each chassis must be secured in the rack with the appropriate mounting apparatus.

Rack-Mounting the Chassis

The 7705 SAR-F chassis is designed for installation in a 19-inch rack. The rack-mount brackets are factory-installed. Figure 11 illustrates the installation of the chassis in a rack.

Figure 11: Installing the 7705 SAR-F Chassis in a Rack

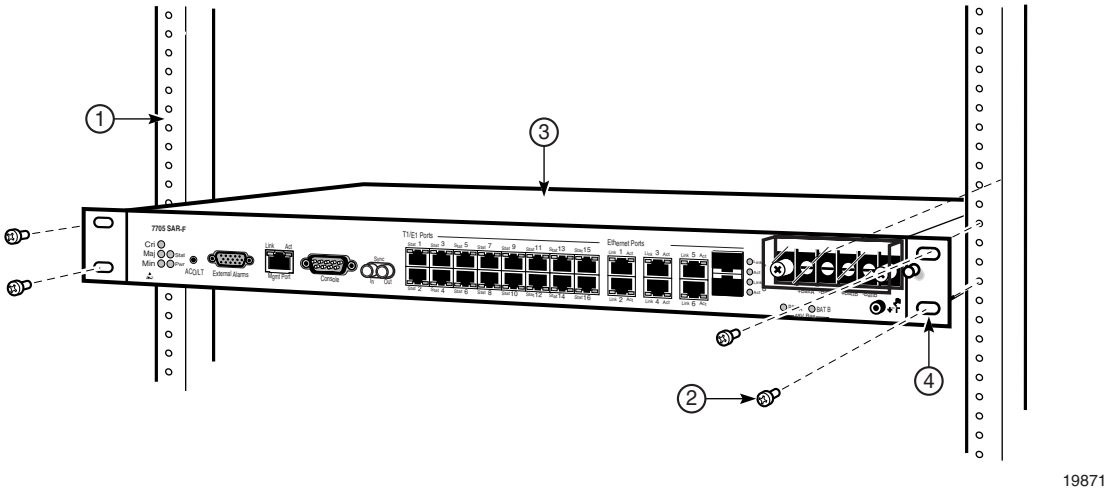


Table 10: Rack-Mounting the 7705 SAR-F Chassis

Key	Description
1	Equipment rack
2	Rack-mounting screws
3	7705 SAR-F chassis
4	Rack-mounting 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**

Required tools:

- a Phillips screwdriver

To install the chassis in the rack:

Step 1. Lift the 7705 SAR-F and position it in the rack.

Step 2. Align the mounting holes on each bracket with the mounting holes on the rack upright.

Insert a screw into each mounting hole and tighten each screw.

Step 3. Ground the chassis to the building ground. See Chassis Ground Wiring on page 71.

Chassis Ground Wiring

To ensure that the equipment is connected to earth ground, use the following instructions to prepare the ground wire and make the connection. The 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-F 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 nut and washer.

Notes:

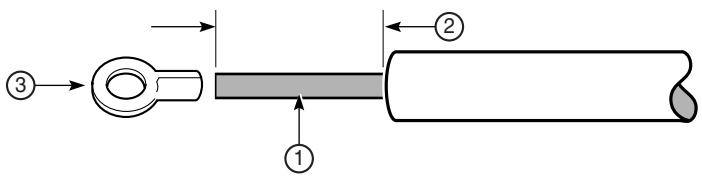
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars must be brought to a bright finish and then coated with an antioxidant before connecting them.
- All surfaces that are used for intentionally grounding the 7705 SAR-F 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 12: Preparing the Ground Wire



19641

Table 11: 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 13: Attaching the Chassis Ground Connector

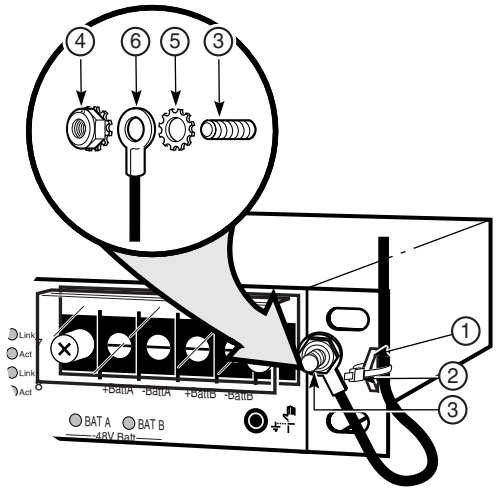


Table 12: Chassis Ground Connection

Key	Description
1	Lance
2	Cable tie
3	Chassis ground stud (4 mm diameter, nominal)
4	Keps nut
5	Star washer
6	Ring lug and chassis ground wire (green/yellow)

To make the chassis ground connection:

Step 1. Run a single length of #18 AWG wire (minimum) 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 12).

Step 3. Remove the Keps nut and star washer from the ground stud on the mounting bracket.

Step 4. Place a star washer and the ring lug on the ground stud such that the wire is angled slightly as it runs down the rack upright (Figure 13). Secure the lug with the Keps nut. 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-F to the DC power source. See DC Power Connections on page 75.

DC Power Connections

In This Chapter

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

- Wiring and Connecting DC Power on page 76
  → Warnings and Notes on page 76
- DC-Input Power Connections on page 77
  → Wiring the DC Inputs on page 77

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 5 A (minimum) and 10 A (maximum) circuit breaker or fuse that meets the requirements for branch circuit protection (applies to both –48 VDC and +24 VDC systems). 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 when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- For IBN installations, the battery return terminal(s) on the SAR-F 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-F requires a minimum of one DC power source to operate, but using two DC power sources is recommended for redundancy.
- The 7705 SAR-F 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 on the panel board that services the DC circuit and switch the circuit breaker to the OFF position. For extra safety, you can tape the handle of the circuit breaker in the OFF position.
- When wiring the unit, the chassis ground connection must always be made first and disconnected last.

Wiring the DC Inputs

The 7705 SAR-F has a standard, dual-feed, terminal block attached to the front of the chassis. The terminals are the DC power feed points for source voltage from the DC circuit.

For redundant power configurations, you must use both DC power feeds (one for each pair of power terminals).

To connect power cables to the terminal block, attach a ring lug to each power cable at the router end, as shown in Figure 14.

Figure 14: Attaching a Ring Lug to a Power Cable

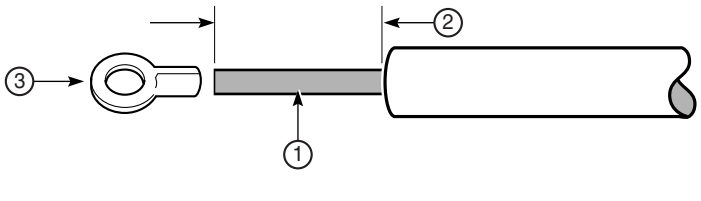


Table 13: Ring Lug to Power Cable Descriptions

Key	Description
1	Copper wire (see required tools and hardware)
2	Insulation stripped according to local safety code
3	Ring lug

Figure 15 and Figure 16 show the terminal connections for -48 VDC and +24 VDC installations. Table 14 identifies the key items in both figures.

Figure 15: Wiring the -48 VDC Power Supplies

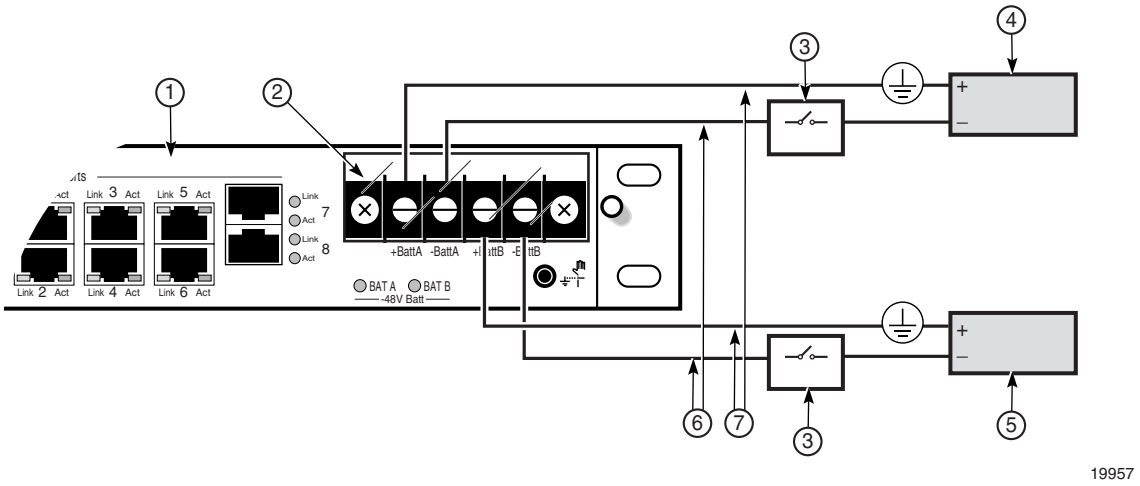


Table 14: Wiring the DC Power Supplies Descriptions

Key	Description
1	7705 SAR-F chassis
2	Terminal strip with protective cover
3	Disconnect device
4	DC source A
5	DC source B
6	Battery wire
7	Battery return wire

Required tools and hardware:

- two or four lengths of wire (two lengths per supply)
- torque driver for slot screws

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.

For -48 VDC Installations

Follow these steps to wire and connect -48 VDC power feeds (see Figure 15):

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 15, key item 7):

a) Run a length of wire from the power source positive terminal to the terminal strip on the router.

b) Prepare the end of the wire at the power source according to local safety practices and attach it to the power source positive terminal.

c) Prepare the end of the wire at the router by attaching a ring lug (see Figure 14).

d) Attach the battery return wire to the correct battery return terminal on the router. For -48 VDC systems, use the **+Batt** terminal. Tighten to a torque of 8-10 lbf-in maximum.

e) For redundant supply configurations, repeat this step for the other battery return wire.

Step 3. Make the battery connection(s) to the disconnect device (Figure 15, key item 3):

a) Run a length of wire from the disconnect device to the router. Prepare the router end of the wire by attaching a ring lug (see Figure 14). Prepare the wire at the disconnect device according to local safety practices.

b) Attach the battery wire to the correct battery terminal on the router. For -48 VDC systems, use the **-Batt** terminal. Tighten to a torque of 8-10 lbf-in maximum.

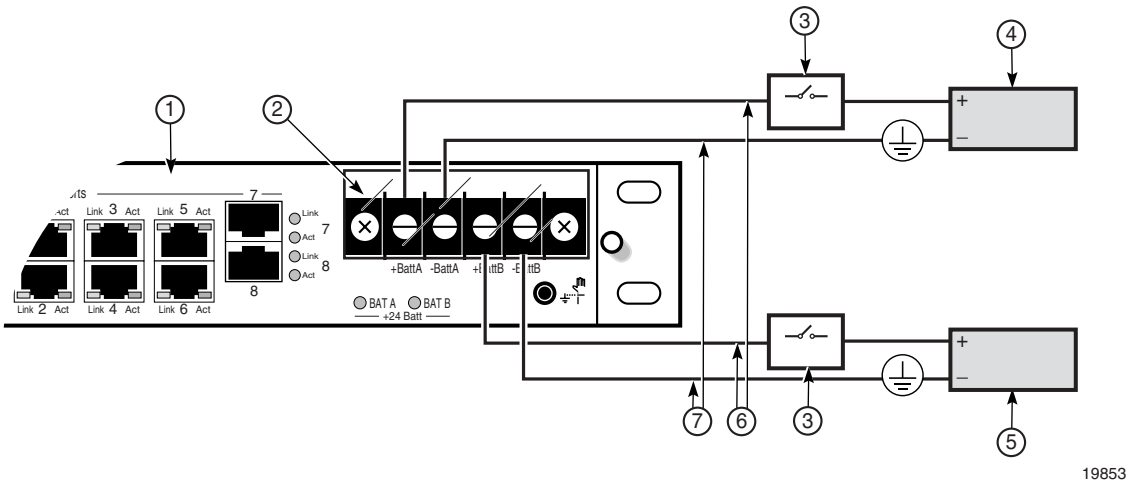
c) Attach the battery wire to the disconnect device.

d) For redundant supply configurations, repeat this step for the other battery wire.

Step 4. Check that the DC supply wiring is correct.

Step 5. Install the SFPs. See SFPs on page 83

Figure 16: Wiring the +24 VDC Power Supplies



For +24 VDC Installations

Follow these steps to wire and connect +24 VDC power feeds (see Figure 16):

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 16, key item 7):

a) Run a length of wire from the power source negative terminal to the terminal strip on the router.

b) Prepare the end of the wire at the power source according to local safety practices and attach it to the power source negative terminal.

c) Prepare the end of the wire at the router by attaching a ring lug (see Figure 14).

d) Attach the battery return wire to the correct battery return terminal on the router. For +24 VDC systems, use the **-Batt** terminal. Tighten to a torque of 8-10 lbf-in maximum.

e) For redundant supply configurations, repeat this step for the other battery return wire.

Step 3. Make the battery connection(s) to the disconnect device (Figure 16, key item 3):

a) Run a length of wire from the disconnect device to the router. Prepare the router end of the wire by attaching a ring lug (see Figure 14). Prepare the wire at the disconnect device according to local safety practices.

b) Attach the battery wire to the correct battery terminal on the router. For +24 VDC systems, use the **+Batt** terminal. Tighten to a torque of 8-10 lb-in maximum.

c) Attach the battery wire to the disconnect device.

d) For redundant supply configurations, repeat this step for the other battery wire.

Step 4. Check that the DC supply wiring is correct.

Step 5. Install the SFPs. See SFPs on page 83.

SFPs

In This Chapter

This chapter provides information about installing and removing SFPs in the 7705 SAR-F:

- Installing and Removing SFPs on page 84
  - → Warnings and Notes on page 84
  - → SFPs on page 85
  - → Fiber Cable Preparation on page 86
  - → Locking and Release Mechanisms on page 87
  - → SFP Support on page 88
  - → Installing SFPs on page 92
  - → Removing and Replacing SFPs on page 92

Installing and Removing SFPs

The 7705 SAR-F supports two small form-factor pluggable (SFP) modules for Ethernet connections.

Warnings and Notes



Dangers:

- Invisible laser radiation can be emitted from the aperture of Ethernet port 7 or 8 or from an installed SFP module when no cable is connected. Avoid exposure and do not stare into open apertures.
- Always assume that fiber-optic cables are connected to a light source.
- Only trained and qualified personnel should install or replace this equipment.



Warnings:

- Electrostatic discharge (ESD) damage can occur if electronic 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 when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- Always place components on an anti-static surface.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in a 7705 SAR-F.
- Before using the optics on the 7705 SAR-F, verify that the optical path is in compliance with the parameters of the optical components. In particular, pay close attention to any minimum attenuation requirements for the optics. If minimum attenuation requirements are not met, the optical receiver components may be permanently damaged. Contact the appropriate technical support center for assistance and further information about your Alcatel-Lucent products.
- Ensure that the ports on an SFP are protected by an SFP protective plug when you install or remove an optical SFP. Only remove the plug when you are ready to install an optical cable.
- Avoid bending fiber-optic cable beyond its minimum bend radius. Do not exceed the recommended 1.2 inches (3.0 cm) for fiber-optic cables.

Cautions:

- Ensure that the connector on the fiber cable is protected by a dust cover until you are ready to attach the cable to an SFP.
- Ensure that protective plugs are installed in the SFPs if they are seated in the ports but are not attached to fiber cables.
- Always replace the dust cover on the connector of a fiber cable when the cable is disconnected from an SFP.

Notes:

- Discard SFPs according to all local laws and regulations.
- SFPs can be installed and replaced without disabling the Ethernet interfaces.
- SFPs are keyed to prevent incorrect insertion. If an SFP is not seated properly, remove it and confirm that the orientation is correct before reinserting it.

SFPs

A small form-factor pluggable (SFP) module can be installed in Ethernet ports 7 and 8. Figure 17 illustrates the installation of an SFP.

Refer to Table 16 for a list of SFPs supported by the router.

Figure 17: Installing an SFP

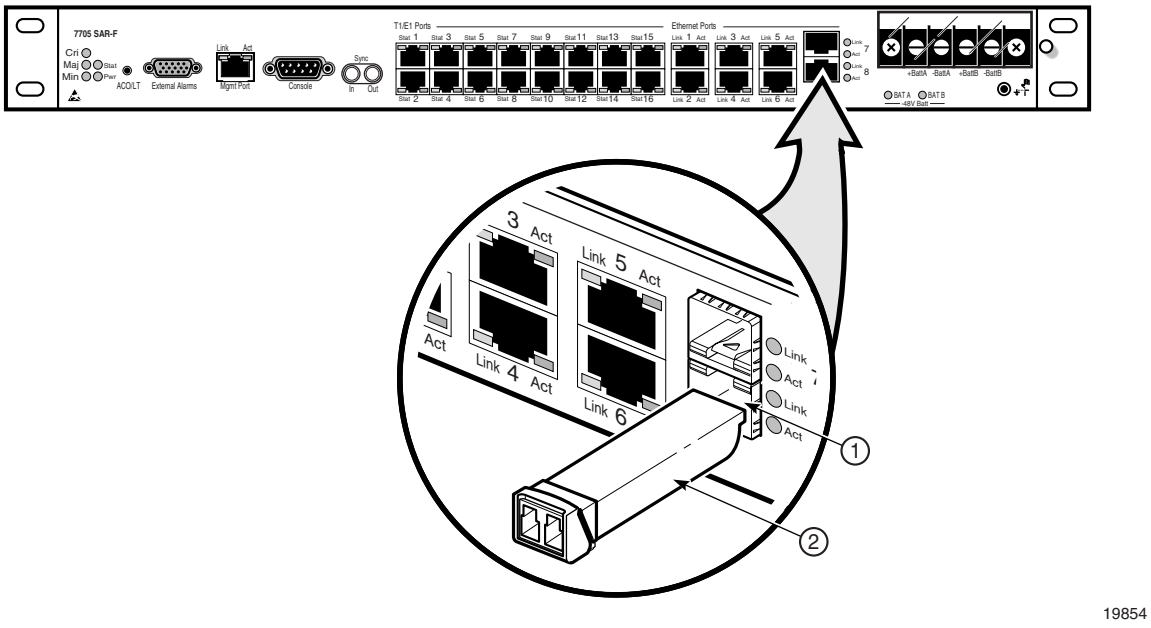


Table 15: SFP Installation Features

Key	Description
1	SFP receptacle
2	SFP

Fiber Cable Preparation

Clean the connector on the fiber cable before inserting it into the SFP to prevent transferring small particles and contaminating the transceiver.

If you switch SFPs from one port to another, ensure that you clean the fiber connectors before reinserting them.

Apply high standards when inspecting and cleaning fiber connectors. Use a “dry” cleaning method to clean fiber connectors.

Caution: Improper handling, cleaning, and inspection techniques can compromise the fiber connection, resulting in data transmission errors. Refer to Alcatel-Lucent Online Customer Support (OLCS) (http://www.alcatel-lucent.com/myaccess), under the 7705 SAR documentation, for the Optical Handling Reference Guide (part number 95-5795-01-00).

Locking and Release Mechanisms

SFPs approved by Alcatel-Lucent can use different lock and release methods. Possible lock and release mechanisms include:

- locking handle—a locking handle or lever on the front of the SFP that you gently raise or lower to insert or remove the SFP from the port
- bail—a bar or latch in the front of the SFP that you pull down and outward to release the module
- tabs—tabs on the sides or bottom of the SFP that you press inward to release the module

SFP Support

Table 16 lists the Alcatel-Lucent approved SFPs for the 7705 SAR-F.

Table 16: SFPs for the 7705 SAR-F

Part Number	Short Description	Media	Wavelength	Connector Type	Distance	Operating Temperatures
3HE00062AA	PBA GigE TX SFP Copper Module 1000BASE-T, Category 5, 10/100/1000 Mbps (1)	Copper	N/A	RJ-45	100 m	0° to 85°C (32° to 185°F)
3HE00027AA	PBA GigE SX SFP Optics Module - LC (1000BASE-SX)	Fiber	850 nm	LC	220 m	-20° to 85°C (-4° to 185°F)
3HE00028AA	PBA GigE LX SFP Optics Module - LC (1000BASE-LX)	Fiber	1310 nm	LC	10 km	-40° to 85°C (-40° to 185°F)
3HE00867AA	KIT GigE EX SFP Optics Module - LC (1000BASE-EX)	Fiber	1310 nm	LC	40 km	-40° to 85°C (-40° to 185°F)
3HE00029AA	PBA GigE ZX SFP Optics Module - LC (1000BASE-ZX)	Fiber	1550 nm	LC	70 km	-5° to 85°C (23° to 185°F)
3HE00024AA	PBA 100FX SFP Optics Module - LC	Fiber	1310 nm	LC	400 m (2) 2 km (3)	-40° to 85°C (-40° to 185°F)
3HE04524AA	100M LX SFP ROHS-6/6 Optics Module - LC - DDM 100BASE-FX Single Mode	Fiber	1310 nm	LC	10 km	-40° to 85°C (-40° to 185°F)
3HE00868AA	GigE BX10-U SFP Optics Module - LC 1000Base-BX-U Bidirectional	Fiber	Tx: 1310 nm Rx: 1490 nm	LC	10 km	-40° to 85°C (-40° to 185°F)
3HE00868AB	GigE BX10-D SFP Optics Module - LC 1000Base-BX-D Bidirectional	Fiber	Tx: 1490 nm Rx: 1310 nm	LC	10 km	-40° to 85°C (-40° to 185°F)

Table 16: SFPs for the 7705 SAR-F (Continued)

Part Number	Short Description	Media	Wavelength	Connector Type	Distance	Operating Temperatures
3HE04324AA	GigE BX40-U SFP ROHS-6/6 Optics Module - LC 1000Base-BX-U Bidirectional	Fiber	Tx: 1310 nm Rx: 1490 nm	LC	40 km	-40° to 85°C (-40° to 185°F)
3HE04324AB	GigE BX40-D SFP ROHS-6/6 Optics Module - LC 1000Base-BX-D Bidirectional	Fiber	Tx: 1490 nm Rx: 1310 nm	LC	40 km	-40° to 85°C (-40° to 185°F)
3HE04685AA	T3/E3 SFP	Copper	N/A	DIN 1.0/2.3	68.5 m	-40° to 65°C (-40° to 149°F)
3HE00070BA	GigE CWDM SFP Optics Module - LC	Fiber	1471 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BB	GigE CWDM SFP Optics Module - LC	Fiber	1491 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BC	GigE CWDM SFP Optics Module - LC	Fiber	1511 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BD	GigE CWDM SFP Optics Module - LC	Fiber	1531 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BE	GigE CWDM SFP Optics Module - LC	Fiber	1551 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BF	GigE CWDM SFP Optics Module - LC	Fiber	1571 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BG	GigE CWDM SFP Optics Module - LC	Fiber	1591 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070BH	GigE CWDM SFP Optics Module - LC	Fiber	1611 nm	LC	120 km	-5° to 85°C (23° to 185°F)
3HE00070CA	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1471 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CB	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1491 nm	LC	120 km	-40° to 85°C (-40° to 185°F)

Table 16: SFPs for the 7705 SAR-F (Continued)

Part Number	Short Description	Media	Wavelength	Connector Type	Distance	Operating Temperatures
3HE00070CC	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1511 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CD	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1531 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CE	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1551 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CF	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1571 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CG	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1591 nm	LC	120 km	-40° to 85°C (-40° to 185°F)
3HE00070CH	GigE CWDM SFP ROHS-6/6 Optics Module - LC DDM	Fiber	1611 nm	LC	120 km	-40° to 85°C (-40° to 185°F)

Notes:
1. This electrical SFP (part number 3HE00062AA) does not support Synchronous Ethernet. For more information, refer to the 7705 SAR OS Basic System Configuration Guide.
2. Half duplex, multimode fiber
3. Full duplex, multimode fiber

Bidirectional SFPs

SFPs 3HE00868AA and 3HE00868AB and SFPs 3HE04324AA and 3HE04324AB are bidirectional SFPs. The optical interface provides single-fiber, bidirectional connectivity operating at 1310 nm and 1490 nm wavelengths. One SFP must be installed at the near end and the other SFP must be installed at the far end of the link. To achieve connectivity, if the far-end SFP transmits at 1310 nm and receives at 1490 nm, the near-end SFP must transmit at 1490 nm and receive at 1310 nm.

T3/E3 SFP

The T3/E3 SFP is used to interconnect two 7705 SAR routers over a T3 physical interface. In Release 2.1, the E3 interface is not supported. The SFP can only operate with 7705 SAR routers at either end.

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. For information on connecting the SFP, refer to the 7705 SAR-8 Installation Guide.

The T3/E3 SFP is preconfigured with the settings listed in Table 17. These are the default settings and they cannot be changed.

Table 17: T3/E3 Configured Settings

Parameter	Configured Setting
Interface type	T3
Flow Control	Enabled
Tx clock source	LBT (line timed)
Line type	Framed C-bit
Protocol	GFP-F
VCAT Overhead	Disabled
FCS	Disabled
Scrambler	Enabled
GFP keepalive	Disabled
Line code	B3ZS

Table 17: T3/E3 Configured Settings (Continued)

Parameter	Configured Setting
FEAC code	Enabled
Line length	Up to 225 ft (68.5 m)

Note: The T3/E3 SFP appears as a DS3 SFP on the CLI and on the 5620 SAM.

Installing SFPs

To install an SFP:

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

Step 2. Hold the SFP by its sides and insert it into the appropriate port until it clicks into place.

Step 3. For optical SFPs, remove the protective plug from the SFP port when you are ready to attach the fiber cable.

Removing and Replacing SFPs

When you are replacing an SFP, have the following parts ready:

- a replacement SFP
- protective plugs for the SFP and a dust cover for the fiber cable connector
- an anti-static mat or electrostatic bag

To replace an SFP:

Step 1. Disconnect the cable from the SFP connector.

Step 2. Place a protective plug in the SFP that is being removed.

Step 3. Release the locking mechanism on the SFP with your thumb and forefinger. See Locking and Release Mechanisms on page 87 for descriptions of the different SFP lock and release methods. Slide the SFP out of the port.

Step 4. Place the SFP on an anti-static mat or in an electrostatic bag.

Step 5. Install a replacement SFP into the Ethernet port.

Step 6. Connect the fiber or copper cable, or if you are not immediately connecting a fiber cable, insert a protective plug into the SFP optical port and place a dust cover on the fiber cable connector.

Note: If you are not immediately replacing the SFP, leave the Ethernet port empty. It is not necessary to install protective plugs in the ports on the 7705 SAR-F.

Connecting Cables

In This Chapter

This chapter provides information about connecting cables to the 7705 SAR-F:

- Warnings and Notes on page 96
- Making Cable Connections to Ports on page 97
  - → Warnings and Notes on page 97
- Cable Connections on page 98
  - → Ethernet and Copper Cables on page 98
  - → Fiber Cables on page 99
  - → Shield Ground Connections on page 101
- Making External Synchronization Connections on page 102
  - → Connecting an External Synchronization Input on page 102
  - → Providing an External Synchronization Output on page 102
- Making External Alarm Connections on page 103
  - → Connecting an External Alarm on page 104
- Making Router Management Connections on page 105

Warnings and Notes



Dangers:

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



Warnings:

- Electrostatic discharge (ESD) damage can occur if electronic 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 when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- Always place components on an anti-static surface.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices in a 7705 SAR-F.



Note: Services cannot be configured until the ports are configured.

Making Cable Connections to Ports

All port cable connections are made from the front of the 7705 SAR-F. Ports can be connected using copper or fiber-optic cables.

Notes:

- Ensure cables are dressed such that they do not impede the insertion or removal of other equipment in the rack.
- To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with interface connectors.
- To meet surge protection requirements, the cable shield for any open-ended cables 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

Dangers:

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

Warnings:

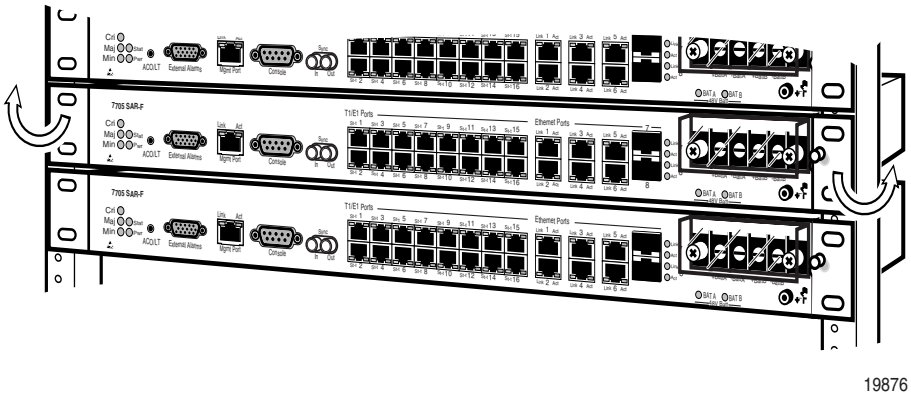
- Electrostatic discharge (ESD) damage can occur if the 7705 SAR-F is mishandled. Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to a nearby ground point that is connected to the site grounding point when working on the 7705 SAR-F. Typical ground points include the ground connection point on the front of the 7705 SAR-F, the grounding stud on the 7705 SAR-F mounting bracket, or a properly grounded rack or work bench.
- Do not power up a 7705 SAR-F until all SFPs are installed and verified as having been installed correctly.
- Use only approved small form-factor pluggable (SFP) fiber-optic devices.

Cable Connections

Ethernet and Copper Cables

Figure 18 illustrates how Ethernet and copper wire cables are routed on the 7705 SAR-F. Cables can be routed to the left or the right of the chassis.

Figure 18: Managing Cable Connections



Hardware required:

- cable ties (optional)

To attach Ethernet and copper wire cables:

Step 1. Attach the cable to the port connector or SFP connector on the front of the 7705 SAR-F.

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. Attach the other end of the cable to the attached equipment.

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. (3.0 cm) is maintained within the allowable space, an open-angled 90º 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 18). Cables are routed to the left or the right of the chassis.

Hardware required:

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

To attach fiber cables:

Step 1. Attach the cable to the SFP port connector on the front of the router. 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 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 in the rack.

Step 3. Attach the other end of the fiber cable to the attached equipment.

Shield Ground Connections

To maintain EMC compliance, cables that are shielded and grounded at both ends must be used with all the electrical interfaces on the router.

To meet surge protection requirements, the shield of 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.

Making External Synchronization Connections

The 7705 SAR-F provides 1.0/2.3 coaxial connectors for external synchronization input and output. Figure 19 shows the location of the Sync In and Sync Out connectors.

Figure 19: External Synchronization Input and Output Connectors

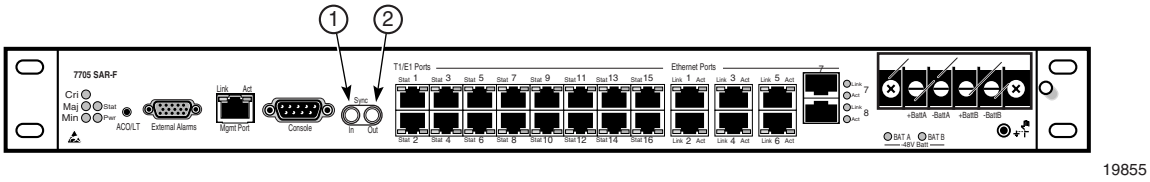


Table 18: External Synchronization Input and Output Features

Key	Description
1	Sync In Connector
2	Sync Out Connector

Hardware required:

- coaxial cable with 1.0/2.3 coaxial connector

Connecting an External Synchronization Input

To connect an external synchronization source input to the router:

Step 1. Attach one end of the synchronization cable to the Sync In connector on the 7705 SAR-F.

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

Providing an External Synchronization Output

To provide an external synchronization source output from the router:

Step 1. Attach one end of the synchronization cable to the Sync Out connector on the 7705 SAR-F.

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

Making External Alarm Connections

The 7705 SAR-F provides a DB15 female connector for external alarm connections. The input and output ratings are 5 VDC and 100 mA (source or sink).

The External Alarms interfaces are equipped with relays that can be used to trigger external alarm indicators. They also provide inputs that can be used to trigger the generation of alarms on the 7705 SAR-F that indicate environmental or external alarm conditions. Refer to External Alarms Port Pinouts on page 127 for pinout definitions.

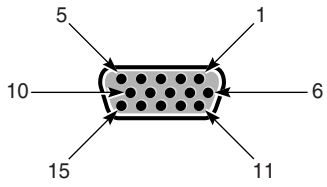
Figure 20 shows the location of the External Alarms connector. Figure 21 shows the pin numbers. See External Alarms Port on page 126 for pinout designations.

Figure 20: External Alarms Connector



19856

Figure 21: External Alarms Connector Pin Numbers



19857

Hardware required:

- appropriate cable with DB15 male connector at the router end and customized connector at external device(s) end

Connecting an External Alarm

To connect an external alarm to the router:

Step 1. Design the external alarm circuitry using the input and output pin assignments provided in External Alarms Port on page 126.

Step 2. Attach each alarm device to the customized end of the external alarm cable (either directly or through a distribution device).

Step 3. Attach the DB15 male connector end of the cable to the router.

Making Router Management Connections

Refer to Establishing Router Management Connections on page 111 for detailed information.

Initializing and Provisioning

In This Chapter

This chapter provides information about initializing and provisioning the router:

- Powering Up the Router on page 108
  - → Power-Up and Initialization on page 108
  - → Troubleshooting Initial Startup on page 109
- Establishing Router Management Connections on page 111
  - → Console Connection on page 111
  - → Telnet Connection on page 112
  - → Running Telnet on page 113
- Provisioning the 7705 SAR-F on page 114
  - → T1/E1 and Ethernet Port Identifiers on page 115

Powering Up the Router

Complete the steps in Wiring the DC Inputs on page 77 and SFPs on page 83 before proceeding with the following instructions. Then power up the system and verify the LED activity of all components.

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

Notes:

- The DC-powered 7705 SAR-F 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-F. See Establishing Router Management Connections on page 111.

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 LED should be blue, and the Bat A and Bat B LEDs should be green. If only one DC power source is used, only one Bat LED should be lit.

Step 2. Verify that the system is initializing.

The system searches the compact flash device for the `boot.ldr` file (also known as the bootstrap or boot loader file). The Status and Activity LEDs blink green during initialization. After initialization (approximately 30 seconds), the Status and Activity LEDs turn solid green.

If the LEDs do not operate as described above, or if they blink and turn off, refer to Troubleshooting Initial Startup on page 109.

Step 3. Verify the operational status of the ports by checking the LEDs on the front of the router. Refer to 7705 SAR-F Connectors and LEDs on page 118.

Step 4. After verifying the LEDs, establish communication with the router via the Console port. Refer to Console Connection on page 111.

Step 5. (Optional at this time) Assign an IP address to the router. Refer to Telnet Connection on page 112 for quick reference information and to the 7705 SAR OS Basic System Configuration Guide for detailed information.

Step 6. (Optional at this time) Configure or modify the primary, secondary, or tertiary BOF file locations. Refer to Telnet Connection on page 112 for quick 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 reboot continuously in an attempt to successfully find and load the `boot.ldr` file. If this happens, the 7705 SAR-F should be replaced and the faulty router returned to Alcatel-Lucent. The example below displays the output when the `boot.ldr` file cannot be found.

Example: Rebooting display

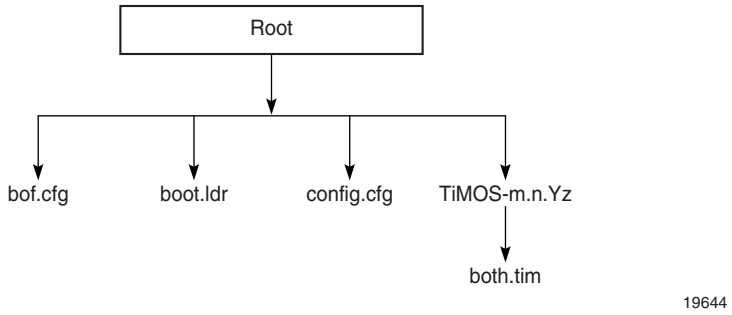
```
Rebooting...
Alcatel-Lucent 7705 Boot ROM. Copyright 2007 Alcatel-Lucent.
All rights reserved. All use is subject to applicable license agreements.
Build: X-1.1.S13 on Wed Aug 27 21:48:25 EDT 2008 by csabuild
Version: 0x20
Performing Data Bus Test... Passed.
Performing Local RAM Test (1st 2MB)... Passed.
COLD boot on processor #1
CPLD revision is 0x0C
?Preparing for jump to RAM...
Starting bootrom RAM code...
Bootrom version is v32 (0x20)
CPU BIST check passed.
Validating SDRAM from 0x41f00000 to 0x42000000
Testing SDRAM from 0x02200000 to 0x41f00000
Testing Compact Flash ... OK (SMART CF)
CPLD revision is v12 (0x0c)
Board Serial Number is 'NS083140278'
Chassis Serial Number is 'NS083140278'
Searching for boot.ldr on local drives:
Searching cf3 for boot.ldr...
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 software is successfully loaded, control is passed from the boot loader file to the software. The runtime software attempts to locate the configuration file as configured in the BOF. The file includes configurations for the chassis, control and switching functions, and ports, as well as system, routing, and service configurations.

Figure 22 displays the compact flash directory structure and file names.

Figure 22: Files on the Compact Flash



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-F:

- Console connection
- Telnet connection

Console Connection

The console port on the front of the 7705 SAR-F is a male DB9 connector (see Figure 23). To establish a console connection, you need the following:

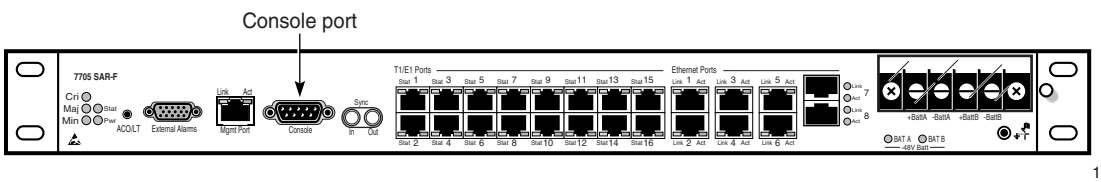
- an ASCII terminal or a PC running terminal emulation software set to the parameters shown in Table 19
- a standard serial cable with a female DB9 connector

For pinout information, refer to Console Port Pinouts on page 126.

Table 19: Console Port Default Settings

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

Figure 23: Console Port Connection



19858

To establish a console connection:

Step 1. Connect the terminal to the Console port on the front panel (Figure 23) using a 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 via a connection to the Management port 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 (see Figure 24) has been configured using the `bof>address` command (see **CLI Syntax** below)

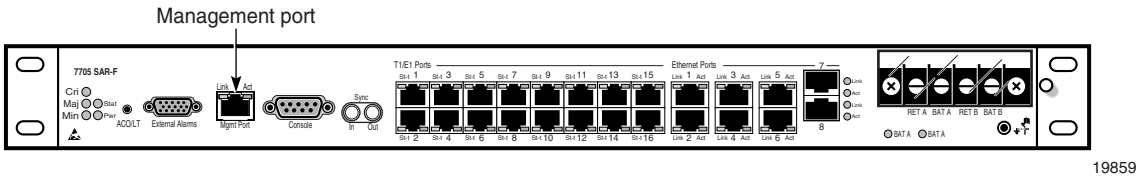
CLI Syntax:

```
bof
    address ip-prefix/ip-prefix-length

    where:
    ip-prefix is of the form a.b.c.d
    ip-prefix-length is 0 to 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 125.

Figure 24: Management Port Connection



19859

Running Telnet

After the Ethernet Management port IP address is configured, the 7705 SAR-F 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 Management port 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 the 7705 SAR-F

The 7705 SAR-F does not require provisioning at the card or MDA levels because it is provisioned at the factory with the following permanent configuration:

- card type in slot 1 is `csm-1g` with `iom-1g`
- mda type in slot 1/1 is `a16-chds1v2` (for T1/E1 ports)
- mda type in slot 1/2 is `a8-ethv3` (for Ethernet ports)

The following CLI display shows the factory-provisioned settings when the `show card` command is issued.

```
ALA-12#show card
===============================================================================
Card State
===============================================================================
Slot/  Provisioned     Equipped      Admin    Operational   Num     Num Comments
Id     Type            Type          State    State         Ports   MDA
-------------------------------------------------------------------------------
1      iom-1g          iom-1g        up       up            2
1/1    a16-chds1v2     a16-chds1v2   up       up            16
1/2    a8-ethv3        a8-ethv3      up       up            8
A      csm-1g          csm-1g        up       up            Active
 ===============================================================================
ALA-12#
```

Example

The CLI display for the example above when the `info` command is issued looks similar to the following:

```
ALU-1>config# info
. . .
#------------------------------------------
echo "Card Configuration"
#------------------------------------------
     card 1
          card-type iom-1g
          mda 1
               mda-type a16-chds1v2
          exit
          mda 2
               mda-type a8-ethv3
          exit
     exit
#------------------------------------------
ALU-1>config#
```

T1/E1 and Ethernet Port Identifiers

Table 20 shows the CLI identifiers for the interface ports.

Table 20: CLI Port Identifiers

Port Type	CLI Identifier	Variable Definition
T1/E1	`1/1/`*`port_id`*	*`port_id`* is the port number, from 1 to 16
Ethernet	`1/2/`*`port_id`*	*`port_id`* is the port number, from 1 to 8

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

Appendix A: 7705 SAR-F Connectors and LEDs

In This Chapter

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

- 7705 SAR-F Connectors and LEDs on page 118

7705 SAR-F Connectors and LEDs

Figure 25 identifies the connectors and LEDs on the front of the router.

Figure 25: 7705 SAR-F Connectors and LEDs

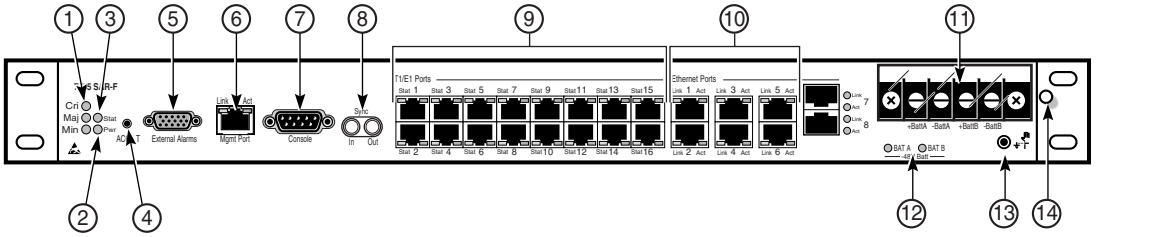


Table 21 describes the connectors and LEDs on the 7705 SAR-F.

Table 21: 7705 SAR-F Connector and LED Descriptions

Key	Label/Part	Sub category	Description
1	Alarm LEDs	Critical	**Red:** Indicates that a critical condition exists, such as the failure of two or more fans or a power feed **Unlit:** Indicates that there are no critical alarm conditions
		Major	**Red:** Indicates that a serious condition exists, such as an over-temperature condition or a full compact flash device **Unlit:** Indicates that there are no major alarm conditions
		Minor	**Amber:** Indicates that a minor condition exists, such as the failure of a single fan **Unlit:** Indicates that there are no minor alarm conditions
2	Pwr LED	—	**Blue:** Indicates that power to the router is on and the system is receiving the DC power feed from source A or source B, and the power rails are at their proper levels **Unlit:** Indicates that there is no power to the router, or the power is faulty

Table 21: 7705 SAR-F Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
3	Stat (Status) LED	—	The system status LED indicates the combined status of the router's three main functional blocks (the control and switching functional block, the T1/E1 ports functional block, and the Ethernet ports functional block). Blocks that are administratively shut down are not included in the combined status indicated by this LED. **Green (solid):** Indicates that the system is operationally up, which means that all functional blocks configured to be administratively up are operationally up **Green (blinking):** Indicates that one or more functional blocks is initializing **Amber:** Indicates that one or more functional blocks is operationally down but administratively up, or that hardware is booting up **Unlit:** Indicates that there is no power getting to the system
4	ACO/LT Push Button	—	The Audible Alarm Cutoff/Lamp Test button verifies LED operation and turns off the external alarm control bits. **When pressed**: The Lamp Test is enabled and the following LED activity occurs: • the status LED on the chassis glows green • all T1/E1 port LEDs glow green • critical and major Alarm LEDs glow red and the minor Alarm LED glows amber Note: The following LEDS are not affected by the Lamp Test: Management port LEDs, Battery A/B LEDs, and all Ethernet port LEDs. **When released:** All LEDs except the Alarm LEDs return to their pre-Lamp Test state. The Alarm LEDs turn off and stay unlit until the next new alarm condition.
5	External Alarms	Connector	The External Alarms port is a serial port that uses a DB15 female connector. 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 126 for pinout assignments.

Table 21: 7705 SAR-F Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
6	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 124 for pinout assignments.
		LEDs	The Link LED is located in the top left corner of the port and the Activity 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
		Act(ivity)	**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 Activity LED is not affected by a Lamp Test
7	Console	Connector	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 125 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.
8	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.
9	T1/E1 Ports	RJ-45 connectors	Each T1/E1 port has an RJ-45 connector for attaching user devices. Note: the yellow LED in the top right corner of the connector is not used and is always off.
		Stat LED	**Green:** Indicates that a valid communication link has been established **Amber (blinking):** Indicates that a loopback is in progress **Amber (solid):** Indicates that there is no link present (administratively up but there is an alarm) **Unlit:** Indicates that the port is disabled or shut down

Table 21: 7705 SAR-F Connector and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
10	Ethernet Ports	RJ-45 connectors	Six Ethernet ports have an RJ-45 connector for attaching user devices. The RJ-45 port number (1 through 6) is displayed below the port, between the Link and the Act(ivity) silkscreen labels.
		Link LED	**Green:** Indicates that the link is up **Unlit:** Indicates that there is no link, or that the link is operationally down, disabled or shut down
		Act LED	**Amber (blinking):** Indicates that the port is active (receiving or transmitting) **Unlit:** Indicates that the port is down or disabled
		SFP connectors	Two Ethernet ports have receptacles for SFP modules. The SFP port number (7 or 8) is displayed below the port. The associated Link and Act(ivity) LEDs are located above the port.
		Link LED	**Green:** Indicates that a valid communication link has been established **Unlit:** Indicates that the link is disabled or shut down, or that the SFP optics are installed but no link is present, or that there is no SFP installed
		Act LED	**Amber (blinking):** Indicates that the port is active (receiving or transmitting) **Unlit:** Indicates that there is no port activity
11	+BattA/-BattA +BattB/-BattB	Connector	The power connector is a standard terminal block with dual power feeds for redundant DC supplies.
12	Batt A Batt B	LEDs	**Green:** Indicates that DC input power is present and operational. **Unlit:** Indicates that the DC power supply is not installed or the DC power feed is not connected Note: The Batt A and Batt B LEDs are not affected by a Lamp Test
13	Anti-static Wrist Strap Connector	Connector	The wrist-strap connector is a banana jack that provides a grounding point for personnel working on the 7705 SAR-F.
14	Chassis Ground Stud	Threaded stud	The chassis ground stud allows a direct connection to the building ground for the chassis ground point.

Appendix B: Pinout Assignments

In This Chapter

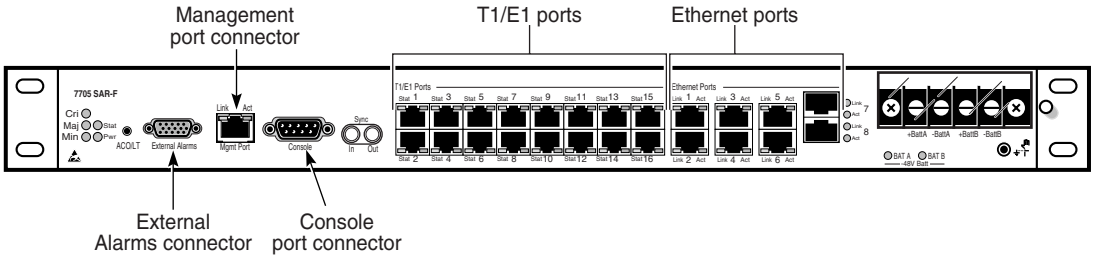
This chapter provides information about the pinout assignments for the port connectors on the 7705 SAR-F:

- 7705 SAR-F Ports on page 124
  - → Management Port on page 124
  - → Console Port on page 125
  - → External Alarms Port on page 126
  - → Ethernet Port on page 128
  - → T1/E1 Port on page 129

7705 SAR-F Ports

Figure 26 identifies the port connectors that are accessible on the 7705 SAR-F.

Figure 26: 7705 SAR-F Port Connectors

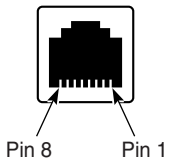


Management Port

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 to 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 27 shows the Management port pin numbers.

Figure 27: Management Port Pin Numbers



Management Port Pinouts

Table 22 displays the Management port pin assignments

Table 22: Ethernet Management Port Pinouts – RJ-45 Female

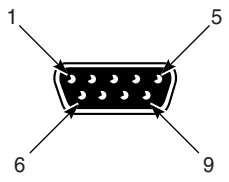
Pin	Signal	Direction	Description
1	TX+	Output	Differential transmit data – positive
2	TX-	Output	Differential transmit data – negative
3	RX+	Input	Differential receive data – positive
4	NC	—	Not connected
5	NC	—	Not connected
6	RX-	Input	Differential receive data – negative
7	NC	—	Not connected
8	NC	—	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 28 shows the Console port pin numbers.

Figure 28: Console Port Pin Numbers



19862

Console Port Pinouts

Table 23 displays the Console port pin assignments. The Console port is configured for DTE mode.

Table 23: 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

External Alarms Port

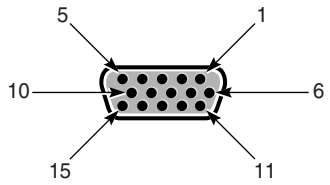
The External Alarms port provides access to three pairs of alarm output contacts and four alarm inputs. All alarm interfaces are rated for 5 VDC and 100 mA (source or sink). Each alarm input has a configurable severity associated with it – the default is one Critical alarm input, two Major alarm inputs, and one Minor alarm input (see Table 24). 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.

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

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.

Figure 29 shows the External Alarms port pin numbers.

Figure 29: External Alarms Port Pin Numbers



External Alarms Port Pinouts

Table 24 specifies the External Alarms port connector pinouts.

Table 24: External Alarms Port Pinouts – DB15 Female

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

Table 24: External Alarms Port Pinouts – DB15 Female (Continued)

Pin	Signal	Direction	Description
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 25 lists critical, major, and minor alarm examples.

Table 25: Alarm Examples

Alarm Severity	Examples
Critical	• two or more fans have failed • a power feed has failed • a critical external alarm has been detected
Major	• an over-temperature condition has been detected • a major external alarm has been detected
Minor	• one fan has failed • a minor external alarm has been detected

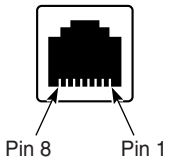
Ethernet Port

There are 6 RJ-45 and 2 SFP connectors on the front of the 7705 SAR-F that provide Ethernet access to 8 Ethernet ports.

Use CAT5 (Fast Ethernet) or CAT5E (Gigabit Ethernet) shielded cables to attach customer equipment to the 7705 SAR-F Ethernet ports.

Figure 30 shows the pin numbering.

Figure 30: Ethernet Port RJ-45 Connector Pin Numbers



19593

Ethernet Port Pinouts

Table 26 indicates the pinout assignments.

Table 26: Ethernet Port RJ-45 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

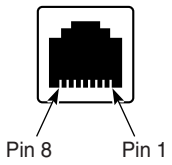
T1/E1 Port

There are 16 RJ-45 connectors on the front of the 7705 SAR-F that provide 100-ohm T1 or 120-ohm E1 access to 16 ASAP ports.

Use standard RJ-45 cables to attach customer equipment to the 7705 SAR-F T1/E1 ports.

Figure 31 shows the pin numbering.

Figure 31: T1/E1 Port RJ-45 Connector Pin Numbers



T1/E1 Port Pinouts

Table 27 indicates the pinout assignments.

Table 27: T1/E1 Port RJ-45 Connector 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

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

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af-tm-0121.000 Traffic Management Specification Version 4.1, March 1999

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RFC 2597 Assured Forwarding PHB Group

RFC 2598 An Expedited Forwarding PHB

RFC 3140 Per-Hop Behavior Identification Codes

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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

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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

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RFC 1157 SNMPv1
RFC 1305 Network Time Protocol (Version 3) Specification, Implementation and Analysis
RFC 1850 OSPF-MIB
RFC 1907 SNMPv2-MIB
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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
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draft-ietf-mpls-lsr-mib-06.txt
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RFC 2328 OSPF Version 2
RFC 2370 Opaque LSA Support
RFC 3101 OSPF NSSA Option
RFC 3630 Traffic Engineering (TE) Extensions to OSPF

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RFC 1332 PPP IPCP
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RFC 1662 PPP in HDLC-like Framing
RFC 1989 PPP Link Quality Monitoring
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RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks

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RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires
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RFC 2961 RSVP Refresh Overhead Reduction Extensions
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RFC 3210 Applicability Statement for Extensions to RSVP for LSP Tunnels
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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

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RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 Telnet
RFC 1350 The TFTP Protocol (Rev. 2)
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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
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TIMETRA-SECURITY-MIB.mib
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Customer documentation and product support



Customer documentation

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