Alcatel·Lucent

7450 ESS-1
INSTALLATION GUIDE

USA Requirements Only

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice
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 his own expense.

Canadian Requirements Only

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la classe A respecte toutes les exigences du Réglement sur le matériel brouilleur du Canada.

Japan/Nippon Requirements Only

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　　　　　　VCCI-A

Caution:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

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Preface

About This Manual

This guide provides site preparation recommendations, step-by-step procedures to install Alcatel's 7450 Ethernet Service Switch (ESS)® Model 1 in a standard 19" utility rack or on a flat surface, as well as instructions to install and remove Media Dependent Adapters (MDAs).

After the hardware installation process is completed, refer to the following documents for details on the boot process, software configuration, and Command Line Interface (CLI) information to configure system and network parameters:

- 7450 ESS OS Basic System Configuration Guide

    This guide describes basic system configurations and operations.

- 7450 ESS OS System Management Guide

    This guide describes system security and access configurations as well as event logging and accounting logs.

- 7450 ESS OS Interface Configuration Guide

    This guide describes card, Media Dependent Adapter (MDA), and port provisioning.

- 7450 ESS OS Router Configuration Guide

    This guide describes logical IP routing interfaces and associated attributes such as an IP address, port, link aggregation group (LAG), systems with IP interfaces as well as IP and MAC-based filtering, VRRP, and Cflowd.

- 7450 ESS OS Routing Protocols Guide

    This guide provides an overview of routing concepts and provides configuration examples for RIP, OSPF, IS-IS, and route policies.

- 7450 ESS OS MPLS Guide

    This guide describes how to configure Multiprotocol Label Switching (MPLS) and Label Distribution Protocol (LDP).

- 7450 ESS OS Services Guide

  This guide describes how to configure service parameters such as service distribution points (SDPs), customer information, user services, service mirroring and Operations, Administration and Management (OAM) tools.

- 7450 ESS OS Triple Play Guide

  This guide describes Triple Play services and support provided by the 7450 ESS OS and presents examples to configure and implement various protocols and services.

- 7450 ESS OS QoS Configuration Guide

  This guide describes how to configure Quality of Service (QoS) policy management.

Warnings and Notes

Observe the warnings and notes to avoid injury or component 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.
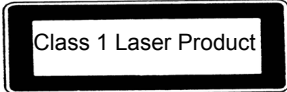
Audience

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, networking environments, and instigate accident prevention procedures.
	Caution	This symbol warns that improper handling and installation could result in equipment damage or loss of data.
	Warning	This symbol warns that improper handling may reduce your component or system performance.
	Note	This symbol provides additional operational information.
Class 1 Laser Product		Class 1 laser products are listed in the Media Dependent Adapter (MDA) 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 7450 ESS-1 chassis 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 service agreement, contact technical assistance at:

Web: http://www.alcatel.com/comps/pages/carrier_support.jhtml

7450 ESS-1 Overview

In This Chapter

This chapter introduces the Alcatel-Lucent 7450 ESS-1 switch and provides an overview of the following topics:

Chassis Features

The 7450 ESS-1 features integral SF/CPM, IOM, power supply module, and fans. These components are factory installed and are not field replaceable.

Mounting brackets for the 7450 ESS-1 chassis are installed to front-mount the unit in a standard 19-inch wide rack. Adhesive-backed rubber footpads are included in the accessory kit to install the stackable ESS-1 switch on a flat surface. Refer to Table 2 and Table 3 for feature descriptions.

SF/CPM

The integrated SF/CPM controls the routing and switching functions for the entire 7450 ESS-1 system. The switch fabric (SF) portion of the SF/CPM receives and directs traffic to the appropriate destinations according to the routing information. The SF/CPM connects directly to the backplane.

The front panel can accommodate up to 3 compact flash memory cards that can be used to copy and store system boot, software images, and configuration files and logs.

IOM

The integrated 20 Gigabit IOM supports a wide variety of interfaces, including Ethernet, SONET/SDH (channelized and concatenated) and ATM. Each I/O module is a baseboard that can carry up to two hot-swappable MDAs.

MDAs

Alcatel's Ethernet MDAs for the Ethernet Service Switch (ESS) family provide the critical high-speed interfaces. An MDA is a plug-in module allowing selection among fiber-optic, twisted pair, and coaxial cable. A maximum of 2 MDAs can be attached to each IOM. MDAs are field replaceable by qualified personnel.

Power System

The 7450 ESS-1 chassis is designed with a load-sharing power system (Figure 2). AC and DC *or* DC/DC input systems can support the full system current requirements.

For redundancy, the systems must be cabled and powered on at all times.

An AC power cable is shipped with each power supply. If the cable does not meet your local safety codes, then replace with a compliant cable. DC power cables are not provided.

The LEDs located on the front panel of the chassis indicates normal online (green), fault (amber), or offline (not lit) AC and DC power conditions.

Always operate an energized chassis with the safety cover installed to prevent contact with hazardous voltages and currents and prevent accidental removal.

Fans

The 7450 ESS-1 system is cooled by six integrated variable speed fans. Air flows through the system from the side filtered-intake vent through the chassis to the opposite side vent. The fan rate is reduced at normal temperatures and increases to high speed when the operating temperature rises above 68° C (154° F). When the temperature drops to 50° C (122° F) the fans return to the half speed rate.

The fan LED located on the front panel of the chassis indicates normal online (green), fault (amber), or offline (not lit) if there is no power to the fans. The fans are not field replaceable.

If the fan LED is lit amber (which indicates a fan problem), use the show card 1 detail CLI command to monitor the current **temperature** and **temperature threshold** fields. If the temperature rises and remains above the temperature threshold, an alarm is generated. Repair or replace the unit immediately.

Call your technical support representatives for replacement instructions as soon as a failure is detected or replace the 7450 ESS-1 immediately.

The following example displays the `show card` command output.

```
ALA-1# show card 1 detail
===============================================================================
Card 1
===============================================================================
slot card            card            card            admin     operational
     allowed         provisioned     equipped        state     state
-------------------------------------------------------------------------------
1    iom-20g         iom-20g         iom-20g         up        up


IOM Card Specific Data
    Clock source                : none
    Available MDA slots         : 2
    Installed MDAs              : 1

Hardware Data
    Part number                 :
    CLEI code                   :
    Serial number               : Alcatel-xxxx
    Manufacture date            :
    Manufacturing string        :
    Administrative state        : up
    Operational state           : up
    Status                      : software running
    Temperature                 : 42C
    Temperature threshold       : 68C
    Software boot version       : TiMOS-B-1.1.I1 both/hops/T2.02  Copyright *
    Time of last boot           : 2003/04/08 08:58:58
    Current alarm state         : alarm cleared
===============================================================================
ALA-1#
```

MDA Slot Cover

The 7450 ESS-1 chassis is shipped with one MDA slot cover installed in MDA slot #2. If this slot is not immediately populated with an MDA, then the slot cover must remain in the empty slot to prevent excess dust accumulation and to help control airflow and electromagnetic interference, and for safety reasons.

MDA slot #1 is shipped uncovered. Install and configure the first MDA in this slot.

MDA slot covers do not have board components or connector pins.

Front Panel Features

Figure 1 displays the 7450 ESS-1 front panel features. Refer to Table 2 for key descriptions.
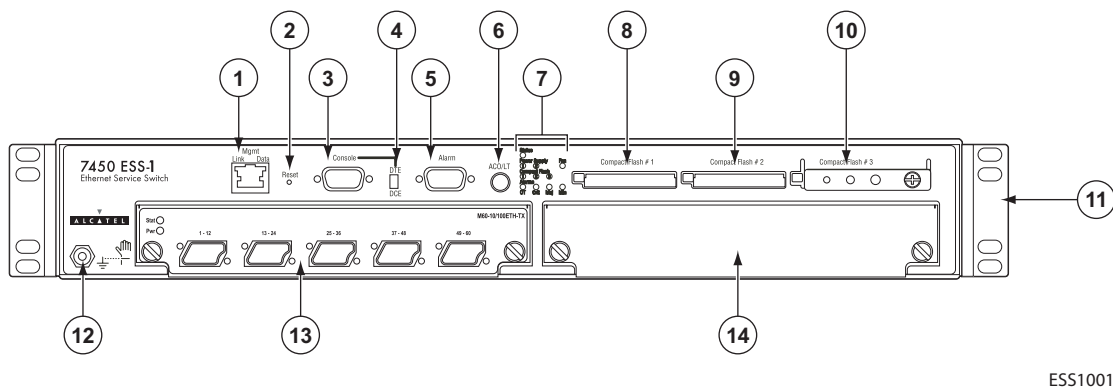
Figure 1: 7450 ESS-1 Front Panel Features

Table 2 displays the 7450 ESS-1 front panel and LED descriptions.

Table 2: 7450 ESS-1 Front Panel and LED Descriptions

Key	Label/Part	Sub category	Description
1	Mgmt	Link	• Amber: 10 M/bps • Green: 100 M/bps • Unlit: Operationally down.
		Data	• Green (blinking): RX/TX activity. • Amber (blinking): Error condition.
2	Reset		A recessed button used to restart the SF/CPM. Insert a small object such as a pen tip to depress the button.
3	Console		The console port is provisioned with a DB-9 jack and used for the initial system startup as well as system configuration and monitoring. The console port, a Universal Asynchronous Receiver/Transmitter (UART) port, is used for system configuration and monitoring. Use a EIA/TIA-232 DCE console cable to connect a terminal to the console port. The factory default baud rate is typically 115.2KBaud.
4	DTE		Flip the switch to DTE when connecting to the serial port of a PC with a null modem cable. When the switch is flipped to DTE, the console port is acting as a data terminal equipment (DTE) serial port.

Table 2: 7450 ESS-1 Front Panel and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
	DCE		Flip the switch to DCE when connecting to the serial port of a PC with a straight-through cable. When the switch is flipped to DCE, the console port is acting as a data communications equipment (DCE) serial port.
5	Alarm		The Alarm port is provisioned as a DB-9 serial port and is used to connect to external alarm devices that report conditions that trigger red or amber alarms.
6	ACO/LT		The Audible Alarm Cutoff/Lamp Test button verifies the operability of LEDs. When pressed, the LEDs should temporarily illuminate. This button also turns off all external alarm relay control bits until the next new alarm condition. The LEDs blink when the button is depressed.
7	Status		• Green: Operationally up and administratively up. • Amber: Operationally down but administratively up. • Amber (blinking): Qualified, but previously failed. • Unlit: Not operational, shutdown, or administratively down.
	Power Supply	1	• Green: Indicates that AC input power is present and operational. • Amber: Indicates an error condition with the AC input power. • Unlit: Indicates that the AC power supply is not installed or not recognized.
		2	• Green: Indicates that DC input power is present and operational. • Amber: Indicates an error condition with the DC input power. • Unlit: Indicates that the DC power supply is not installed or not recognized.
	Fan		• Green: Indicates that the fans are operational. • Amber: Indicates a fan failure. • Unlit: Indicates that the fans are not operational.
	Compact Flash	1,2,3	• Green: Indicates that the flash card is operational and in a read or write process. **Note:** *Do not* physically remove or attempt to remove the flash card when the LED is lit green. • Amber (blinking): Error condition exists. • Amber (solid): Indicates that the slot is in an operationally down mode. This is the only mode to safely remove the flash card. • Unlit: A flash card is not installed in the slot.
	Alarms	OT	• Red: An overtemperature condition exists. If there are no OT conditions, this LED should remain off.
		Crit	• Red: Indicates that a critical condition exists, such as a power supply overtemperature condition, a fan tray failure, or an AC or DC power supply failure. If there are no critical conditions, this LED should remain off.

Table 2: 7450 ESS-1 Front Panel and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
	Alarms (cont)	Maj	• Red: Indicates that a serious condition exists, such the removal of a power supply. If there are no major conditions, this LED should remain off.
		Min	• Amber: There are no conditions defined for a minor alarm. This LED should remain off.
8	Compact Flash #1 (Slot)		• Default filename: cf1: • See the Compact Flash LED description for the status of a compact flash slot. • To remove a flash card, gently depress the ejector button until the flash card releases.
9	Compact Flash #2 (Slot)		• Default filename: cf2: • See the Compact Flash LED description for the status of a compact flash slot. • To remove a flash card, gently depress the ejector button until the flash card releases.
10	Compact Flash #3 (Slot)		• Default filename: cf3: • The compact flash card with the boot image and configuration files should be installed and remain in this slot. • This slot should be used to download the boot and configuration images. • See the Compact Flash LED description for the status of a compact flash slot. • The ejector button for Compact Flash Slot #3 is slightly recessed. Insert a small object such as a pen tip to depress the button.
	Compact flash locking mechanism		When engaged, the locking mechanism prevents the accidental jostling or removal of the flash card inserted in Compact Flash slot #3.
11	Rack mounting brackets		Brackets are factory installed to front-mount the unit in a standard 19-inch wide rack
12	ESD plug		Receptacle to connect an ESD wrist or ankle strap (with banana jack) to the ESD connection socket (grounding plug) on the front of the chassis.
13	MDA (installed)		Captive screws secure the MDA in place. For configuration purposes, the left MDA slot is referred to as MDA slot 1. The right MDA slot is referred to as MDA slot 2.
14	MDA slot cover		Captive screws secure the cover in place.

Back Panel Features

Figure 2 displays the 7450 ESS-1 AC/DC model back panel. Refer to Table 3 for key descriptions.
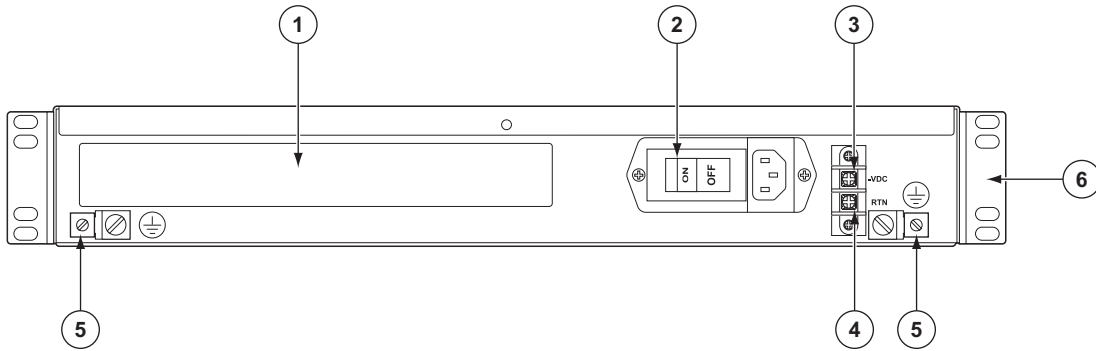
Figure 2: 7450 ESS-1 AC/DC Back Panel Features

Table 3: 7450 ESS-1 AC/AC Back Panel Features

Key	Description
1	Label
2	AC ON/OFF switch / AC power receptacle
3	DC -VDC plug
4	DC RTN plug
5	Grounding block
6	Mounting brackets

Figure 3 displays the 7450 ESS-1 DC/DC model back panel. Refer to Table 4 for key descriptions.
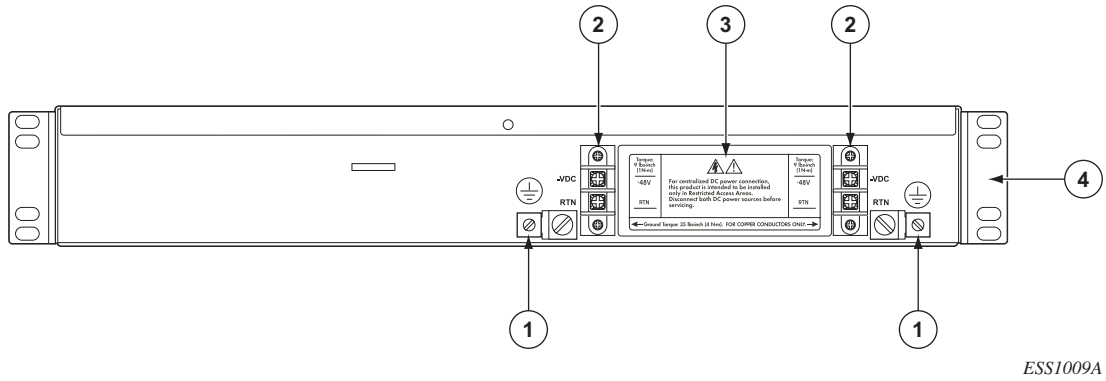
ESS1009A

Figure 3: 7450 ESS-1 DC/DC Back Panel Features

Table 4: 7450 ESS-1 DC/DC Back Panel Features

Key	Description
1	Grounding block
2	DC terminal block (DC -VDC plug and DC RTN plug)
3	Label
4	Mounting brackets

Component Operating Requirements

Table 5 displays the 7450 ESS-1 hardware component operating requirements. All components, except the cables and MDAs, are factory installed. Cables and MDAs are the only field replaceable parts in the chassis.

Table 5: 7450 ESS-1 Hardware Component Operating Requirements Summary

Component	Minimum	Maximum	Field-Replaceable
Backplane	1	1	N
Power supplies:			
AC/DC model	1 AC or 1 DC	1 AC and 1 DC	N
DC/DC model	1	2 DC	N
Power cables:			
AC/DC model	1 AC or 1 DC	1 AC and 1 DC	Y
DC/DC model	1 DC	2 DC	Y
Fans	6	6	N
SF/CPM	1	1	N
IOM	1	1	N
MDAs (field replaceable)	1	2	Y

ESS-1 System Installation Process

To install the 7450 ESS-1 system, perform the installation procedures in the following order:

Step 1   Prepare the site.

Step 2   Unpack the chassis, MDA(s), and AC cable.

Step 3   Mount the chassis.

Step 4   Prepare DC input power cable.

Step 5   Connect AC and/or DC input power cables.

Step 6   Power up the system.

Step 7   Preconfigure card slot, card-type, MDA, and ports.

Step 8   Install MDA(s).

Step 9   Connect network cables.

Site Preparation

In This Chapter

This chapter provides information about preparing your site to install a 7450 ESS-1 router.

This chapter provides an overview of the following topics:

Warnings and Notes

Warning:

- 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 7450 ESS-1 chassis.
- Do not install equipment that appears to be damaged.
- 7450 ESS-1 systems equipped with DC-input power supplies should be installed in restricted access areas, such as a dedicated equipment room or an equipment closet, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code ANSI/ NFPA 70.

Notes:

- Prepare the equipment rack and site before installing the chassis. Plan the placement near the power sources and network interface connections.
- An empty 7450 ESS-1 chassis weighs approximately 27 lbs. (12.25 kg).
- For personal safety, use at least two people or a hand cart to install the chassis.
- Always install the heaviest equipment on the bottom of the rack to keep the center of gravity of the equipment rack as low as possible.
- To provide necessary stability, ensure that the equipment rack is bolted to the floor. Ceiling brackets are useful to provide additional stability.
- The equipment rack must be properly grounded.
- Install components after the chassis is installed in a rack.
- Maintain a clearance of at least 20-inches (50.8 cm) at the front and back of the switch.
- Maintain a clearance of at least 3-inches (7.6 cm) on each side to ensure adequate air intake and exhaust.
- The 7450 ESS-1 chassis includes factory installed rack mounting brackets to front mount in a 19-inch equipment rack.

System Specifications

Chassis Specifications

Table 6: Chassis Specifications

Parameter	Description
Dimensions	2.625"H x 17.5"W x 22.25"D
Chassis weight	27 lbs. (12.25 kg)
MDA slots	2
Mounting	Mount in 19-inch equipment rack or on a flat surface. Bracket ears are factory installed for 19-inch front mounting. Adhesive-backed rubber footpads are included with each unit for tabletop installation.

Environmental Specifications

Table 7: Environmental Specifications

Parameter	Description	
Operating:		
Temperature	32 to 104 ºF (0 to 40ºC)	
Maximum altitude	10,000 ft./3,048 m	
Relative humidity	5 to 90% (non-condensing)	
Heat dissipation (worst case configuration)	500 watts (joules/sec) 1,707 BTU/hour	
Acoustic noise level	57.0 dBA	
Voltage	AC: • 100 - 240V~ • 6A • 50/60 Hz	DC • -40VDC to -72VDC • 10A to 6A
Power consumption (max)	330 watts	

MDA Specifications

Table 8: MDA Specifications

Parameter	Description
Dimensions	1.4" H x 7.5" W x 7" D
Weight	1.5 lb.

Component Power Consumption

Table 9: Component Power Consumption

Component	Maximum Power Consumption (Watts)
Chassis (low RPMs/no MDA)	179
Chassis (high RPMs/no MDA)	200
MDAs	
10/100ETH-TX (60-port)	29
100BASE-FX (20-port)	36
GigE + 1-port 10GBASE (10-port)	55
1GB-SFP-B (5-port)	26
1GB-SFP (10-port)	26
1GB-SFP-B (10-port)	31
1GB-SFP (20-port)	58
1GB-TX (20-port)	60
10GB-LW/LR (1-port)	27
10GB-EW/ER (1-port)	27
10GB-ZW/ZR (1-port)	28
10GB-XFP (1-port)	20
10GB-XFP (2-port)	40
OC-3-SFP (16-port)	48
OC-12-SFP (8-port)	32
OC-12-SFP (16-port)	50
OC-48/STM-16 (2-port)	20
OC-48/STM-16 (4-port)	24
Versatile Service Module (VSM) (No ports)	10

Installation Locations

The 7450 ESS-1 switch can be installed in either of the following:

- An equipment rack.

  Rack mounted units can be front or center mounted in many types of racks, including the following:

  → Standard 19-inch (48.26 cm) equipment rack

  → Standard telco rack (four-post)

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

  The equipment rack rail mounting holes must align with the mounting holes on the chassis mounting brackets. The 7450 ESS-1 mounting brackets are factory installed for a front mount in a 19-inch rack.

  Required tools:

  → #2 Phillips screwdriver

  → Flathead screwdriver

  → Anti-static bags, mats, and packaging

  → ESD wrist strap

- A stable flat surface.

  Tabletop or shelves must be able to support the weight of the switch, or a stack of 7450 ESS-1 switches (up to 8 units high), and attached cables.

  Required tools:

  → Anti-static bags, mats, and packaging

  → ESD wrist strap

Chassis Clearance Requirements

Allow at least 3-inch clearance on the sides of the chassis for proper airflow and at least 20-inches in the front and rear for installation and maintenance access.

```
                    ↑                         ↑
              20" REAR
              REQUIRED FOR INSTALLATION
              AND MAINTENANCE
                    ↓                         ↓
    ←→  ┌──────────────────────────────┐  ←→
        │              REAR             │
  3" SIDE                                    3" SIDE
  REQUIRED FOR AIR FLOW AND                  REQUIRED FOR AIR FLOW AND
  MAINTENANCE                                MAINTENANCE
        │                              │
    ←→  └──────────────────────────────┘  ←→
                    ↑     FRONT             ↑
              20" FRONT
              REQUIRED FOR INSTALLATION
              AND MAINTENANCE
                    ↓                         ↓
```
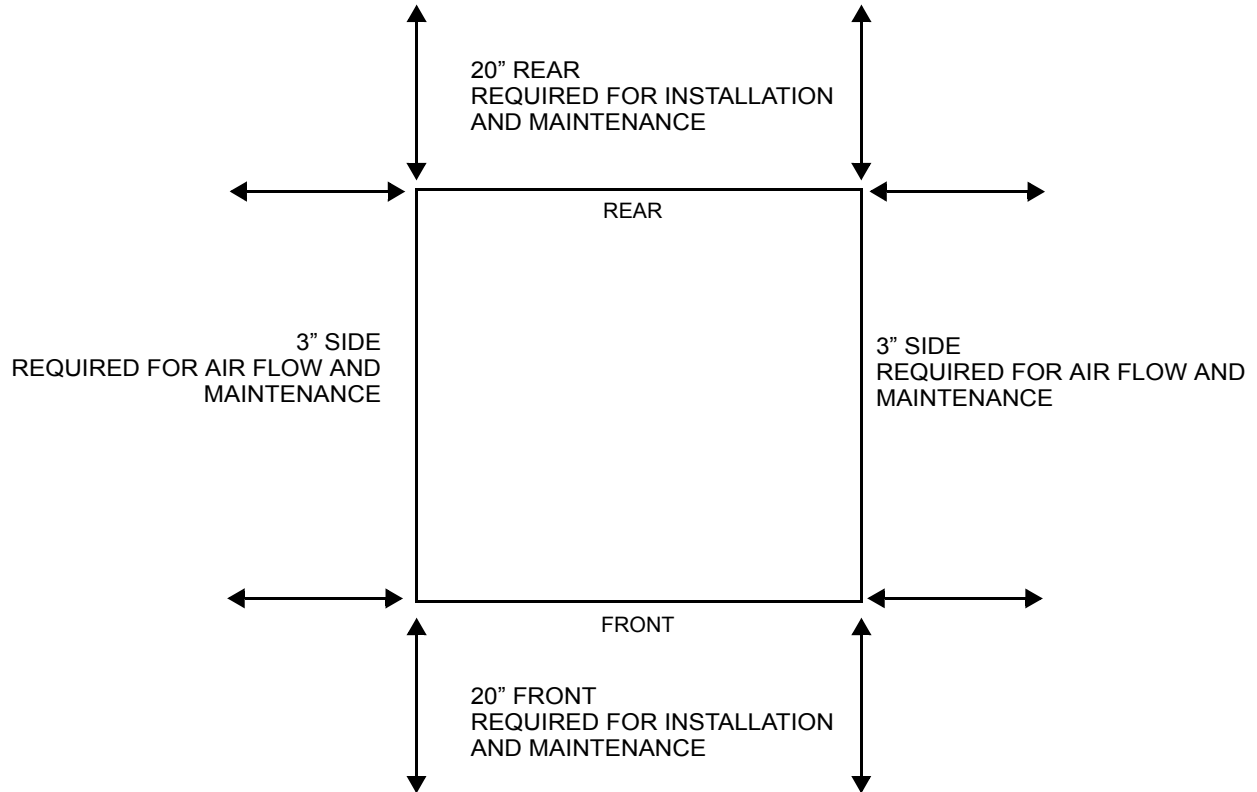
Figure 4: Chassis Clearance Requirements

Safety Considerations

⚠

- Install the 7450 ESS-1 in standard sized equipment racks or a stable flat surface.
- 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 into the equipment rack before installing components.
- Table-stacked units must not be taller than 8 units high.

Grounding

The chassis 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 (with banana plug) to the ESD connection socket (grounding jack) on the front of the chassis.

The ESS-1 includes an additional grounding jack on the rear panel of the chassis. If DC power is used, then the ground terminal must be connected. See DC-Input Power Supply Guidelines on page 55.

⚠

Warning: Use only power cords that have a grounding (earthing) path. Main grounding (earthing) connection points are through the IEC60320 appliance inlets. Grounding (earthing) points on the rear of the equipment are for equipotential bonding only and are not the safety grounding (earthing) points for the equipment. Lack of proper grounding (earthing) of the equipment may result in a safety hazard and excessive electromagnetic emissions. Refer to Table 11 on page 34 for descriptions of common grounding-type (earthing) power supply cords.

If you ground the equipment by a method other than those provided in this manual, those means should be in compliance with all local wiring regulations and practices.

Power

- Only service electrical personnel should perform wiring and cabling to the system.
- All power to the equipment rack or cabinet should be disconnected before the installation.
- The power cable(s) must meet your local electric code requirements.
- The circuit breaker is not intended to be used as the chassis ON/OFF switch. Unplug the power cord from the power source and disconnect the cord from the receptacle on the power supply module to remove power.

Power Cord Requirements

The power cord set used with this 7450 ESS-1 must meet the local safety codes and requirements.

The requirements listed below are applicable to all countries:

- The length of the power cord must be at least 6 feet (1.8 m) and a maximum of 9.75 feet (3.0 m).
- All power cords must be approved by an acceptable accredited agency responsible for evaluation in the country where the power cord set is used.
- The power cord must have a minimum current capacity of 10A and a nominal voltage rating of 125V or 250V AC, as required by each country's power system.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with appliance inlet on the unit.
- The power cord set used with this 7450 ESS-1 must meet the local safety codes and requirements.

Country-Specific Requirements

Table 10: Power Cord Set Requirements -- By Country

Country	Accredited Agency	See Applicable Note Below
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	SETI	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	JIS	3
Norway	NEMKO	1
Sweden	SEMKO	1
Switzerland	SEV	1
United Kingdom	BSI	1
United States	UL	2

Notes:

1. The flexible cord must be a harmonized (HAR) Type HO5VV-F, 3-conductor cord with a minimum 0.75 mm^2 conductor size. The power cord fittings (the appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country where it is used.
2. The flexible cord must be min Type SVT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole (3-pin) grounding type with a NEMA 5-15P (15A, 125V) or NEMA 6-15P (15A 250V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a "T" mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 0.75 mm^2 conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (15A, 125V) configuration.

Table 11: Common Grounding-Type (Earthing) Power Cord Descriptions

Country/Plug Description	Specifications
Continental Europe: • CEE7 standard VII male plug • Harmonized cord (HAR marking on the outside of the cord jacket to comply with the CENELEC Harmonized Document HD-21)	220 or 230 VAC 50 Hz Single phase
USA/Canada • NEMA5-15P male plug • UL recognized (UL stamped on cord jacket) • CSA certified (CSA label secured to the cord)	100 or 120 VAC 50-60 Hz Single phase
Japan • JIS 8303 male plug • Carry Japan T-mark approval	100 VAC 50-60 Hz Single Phase
United Kingdom • BS1363 male plug with fuse • Harmonized cord	240 VAC 50 Hz Single phase
Australia • AS3112-1981 male plug	240 VAC 50 Hz Single phase

Fans

There are six non-replaceable factory-installed fans.

The 7450 ESS-1 cooling system requires a minimum of 3-inches of unrestricted unobstructed air flow to function properly.

An MDA faceplate is required in an empty MDA slot to prevent excess dust accumulation and to help control airflow and electromagnetic interference.

Storage

To store uninstalled 7450 ESS-1 switches and extra field-replaceable parts (if applicable), re-wrap the components in the original packaging and keep them in a dry, dust-free temperature controlled environment.

Table 12: Storage Specifications

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

Safety Standards/Compliance Agency Certifications

Table 13: Safety Standards and Compliance Agency Certifications

Type	Publication
Safety	CAN/CSA-C22.2 No 60950-1-03
	ANSI/UL 60950-1-2002
	IEC 60950: 1999 3rd edition
	EN 60825-1 Safety of laser products
	CB test certificate
EMC	EN300 386 V1.3.1.2001 - For equipment operating in telecommunications centers
	VCCI Class A
	FCC Part 15 Class A
	EN55022 Class A
	EN55024:1998 For information technology equipment
	ICES-003 Class A
	CE Declaration
Environmental	ETSI 300 132-2 DC Power Requirements ETSI 300 753 Acoustic Noise ETSI 300 253 Earthing/Bonding Configuration ETSI 300 119 Floor Loading BS 4198 Acoustic Noise

Installing the 7450 ESS-1

IN THIS CHAPTER

This chapter provides information about installing a 7450 ESS-1 switch.

This chapter provides information on the following topics:

Unpacking the Chassis

There are no field replaceable parts in the 7450 ESS-1 chassis. The IOM, power supply, and fans are integral to the chassis and are factory installed. AC and DC power cables and MDAs are the only field-installable and field-replaceable components.

Unpacking Precautions

Review this section to avoid injury or damage to the 7450 ESS-1:

- The shipping weight of the chassis is approximately 27 lbs. (12.25 kg). To prevent injury or damage to the router, two people should remove the router from the shipping crate and mount it into a rack.
- The chassis is shipped in a heavy corrugated cardboard container protected by a foam end caps. Do not discard the packaging container and materials used in shipping. The packing materials should be re-used if it is necessary to reship the router.
- Keep the chassis wrapped in the anti-static packaging until you are ready to install the router.
- Keep the arrows on the shipping container pointing up.
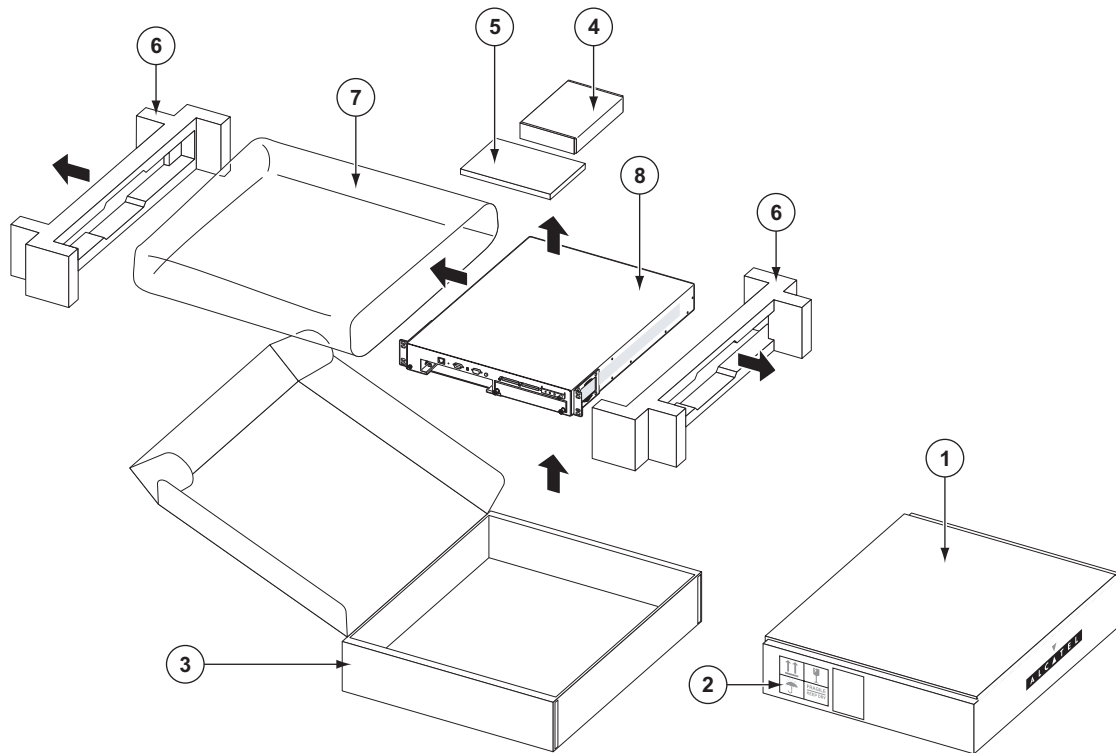
Figure 5: Unpacking the 7450 ESS-1 Chassis

Table 14: Unpacking the 7450 ESS-1 Chassis

Key	Description
1	Label
2	Label
3	Shipping container
4/5	Accessory boxes
6	Foam end caps
7	Anti-static bag
8	7450 ESS-1 router

Open the carton and follow these steps to unpack the chassis:

Step 1   Remove accessory kit.

Step 2   Lift contents to remove the foam end caps on the sides of the router.

Step 3   The chassis shipping weight is approximately 27 lbs. (12.25 kg). Carefully remove the router from the box.

Caution: There are no handles or hand grips on the 7450 ESS-1. Lift the chassis by the bottom of the chassis. Do not put your hands inside an MDA slot to lift.

Step 4   Remove the protective anti-static wrapping.

Rack Mounting the Chassis

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

Caution:
• There are no handles or hand grips on the 7450 ESS-1. Lift the router from underneath. Do not lift the router by the MDA slots.
• When rack mounting the chassis in an equipment rack, do not stack other ESS-1 units or any other equipment directly on top (where the bottom unit is supporting other devices). Each unit must be secured into the rack with the appropriate mounting apparatus.

The 7450 ESS-1 router chassis is designed for front and middle-mount installation into a 19-inch rack. The rack mounting hardware (including rack bolts) is factory installed to front-mount the chassis in a 19-inch rack.

It is easier to install the ESS-1 chassis in the rack with two people, one person to hold the router and one person to secure it into the rack.
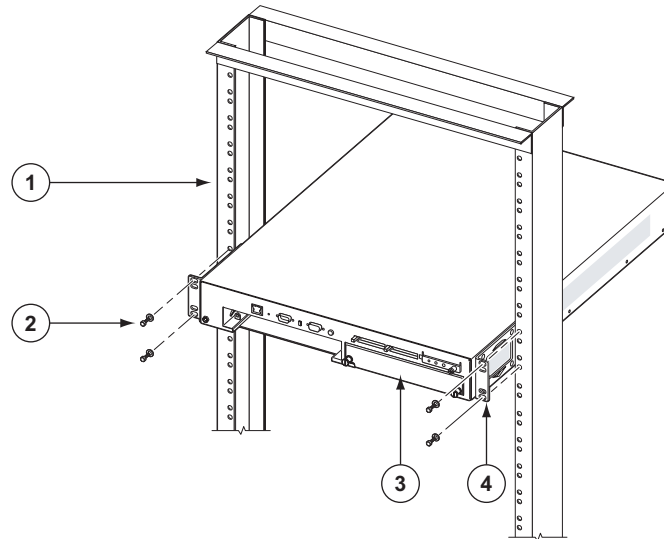
Required tools:

• Use a screwdriver to loosen and tighten the mounting bracket bolts.

Before you begin, verify:

• 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**.

Figure 6: Installing the 7450 ESS-1 Chassis

Table 15: Rack Mounting the 7450 ESS-1 Chassis

Key	Description
1	Equipment rack
2	Rack mounting screws
3	ESS-1 chassis
4	Rack mounting bracket

To install the chassis into the rack:

Step 1   With one person in front of the rack and one behind the rack, lift the 7450 ESS-1 from the bottom and position it in the rack.

Step 2   (Optional) Slide the chassis on top of the shelf/bar.

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

Step 4   Proceed to AC and DC Power Connections on page 49.

Table-Mounting the Chassis

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

Caution:
- There are no handles or hand grips on the 7450 ESS-1. Lift the router from underneath. Do not lift the router by the MDA slots.
- The router should be installed on an elevated flat surface, off the floor.
- 7450 ESS-1 routers must not be stacked taller than 8 units high.
- The ventilation and maintenance clearance dimensions are the same for table-mounted units as for rack-mounted units. See Chassis Clearance Requirements on page 30.

The 7450 ESS-1 chassis can be installed on a flat surface, such as a tabletop or shelf. Rubber footpads are included in with each accessory kit. It is optional to remove the factory installed rack mounting brackets.

Before you begin, verify:

- The surface is sturdy and can support the weight of the router, or a stack of routers (up to 8 units high) and attached cables.

- Ventilation and maintenance requirements are met.

Figure 7 displays the locations to attach the footpads on the bottom side of the chassis.
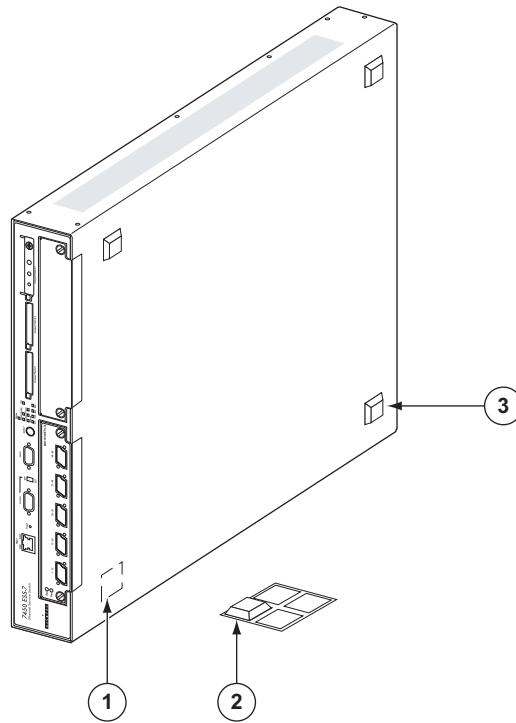
Figure 7: Chassis Footpad Locations

To attach the footpads:

Step 1   Locate the footpad locations on the bottom side of the 7450 ESS-1 chassis.

Step 2   Locate the footpads in the accessory kit.

Step 3   The footpads have an adhesive backing. Remove the footpads from the protective backing and attach the pads to the bottom of the chassis placing one foot in each corner.
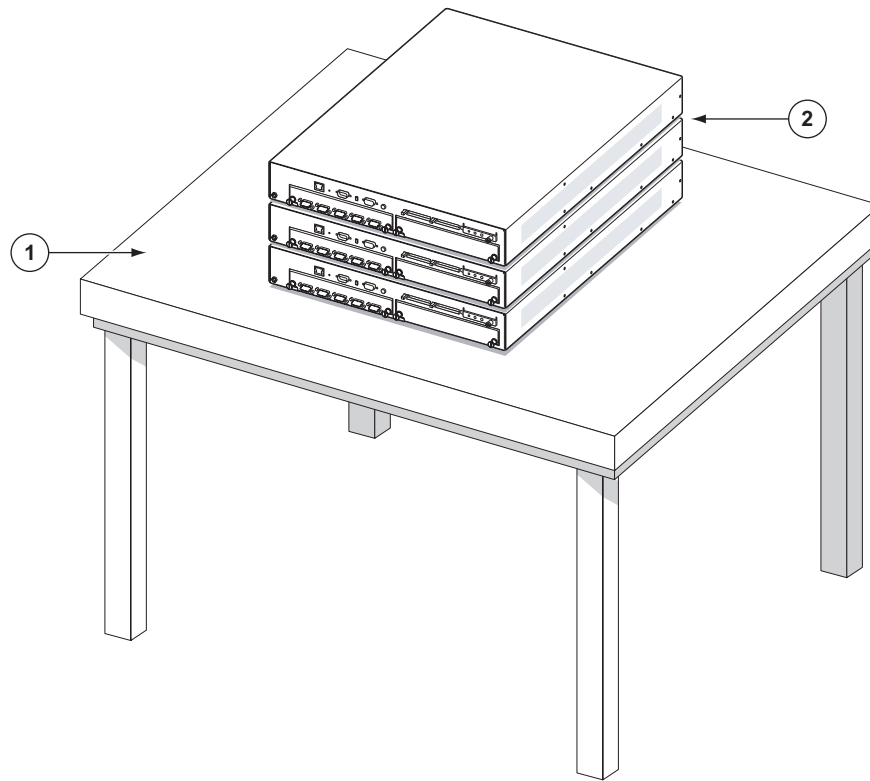
Figure 8: Installing the 7450 ESS-1 Chassis on a Tabletop

To install the 7450 ESS-1 on a tabletop

Step 1   Set the unit on the flat surface (Key 1 in Figure 8). Check for proper ventilation and maintenance clearance.

Step 2   To create a stack, align another 7450 ESS-1 unit on top of the lower unit. Make sure the stack is stable.

Step 3   Proceed to AC and DC Power Connections on page 49.

Chassis Ground Wiring

To make sure that the equipment is connected to earth ground, follow the instructions to prepare the ground wire. Grounding cables are not provided. The length of the grounding wire depends on the location of the chassis and proximity to the proper grounding facilities.

Preparing the Ground Wire
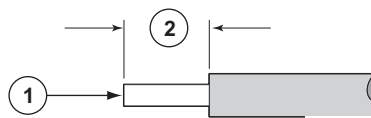
Figure 9: Preparing the Ground Wire

Table 16:   Ground Wire Descriptions

Key	Description
1	Copper wire (#14 AWG)
2	Insulation stripped 7/16"

To prepare the ground wire:

Step 1   Using a wire-stripping tool, strip each the insulation from the wire to 7/16" inches.

Making the Ground Connection

NOTE: When wiring the unit, the ground connection must always be made first and disconnected last.
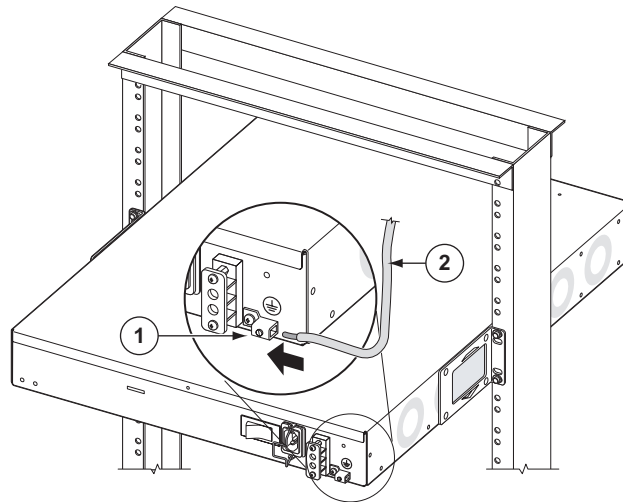
Figure 10: Connecting the Grounding Lug

Step 1   Insert the stripped ground wire end into the lug opening (Figure 10).

Step 2   Tighten the top screw to secure the ground wire into the grounding block and tighten with a standard flat blade screwdriver. The recommended torque is 35 pounds force-inch (lbf-in). Do not overtighten.

Step 3   Connect the opposite end of the grounding cable to the appropriate grounding point at your site to ensure adequate chassis ground according to local safety codes.

AC and DC Power Connections

IN THIS CHAPTER

This chapter provides information about AC and DC wiring and connections.

This chapter provides information on the following topics:

Wiring and Connecting AC and DC Power

Warnings and Notes

Danger:

- Make your ground connections first.
- Only a 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 cords.
- 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 which meet local electrical code requirements.
- AC power cord set supplied with this product is strictly restricted for use with this product only. The AC power cord set must not be used for any other purposes or any other products. When applying power to the chassis, be sure to use the supplied AC power cord set, and make sure that you do not use any other product's AC power cord set.
  Japanese note:

  「本製品に同梱いたしております電源コードセットは、本製品専用です。
  本電源コードセットは、本製品以外の製品ならびに他の用途でご使用いた
  だくことは出来ません。製品本体には同梱された電源コードセットを使用
  し、他製品の電源コードセットを使用しないで下さい。」

- The unit should be connected to a DC branch circuit with a maximum 20A circuit breaker or fuse which meets the requirements for branch circuit protection. A suitable disconnect device must be provided in the DC branch, either a circuit breaker or switch that can be employed to disconnect power to the system during servicing.

Caution:

- This product relies on the building's installation for short-circuit (over current) protection. Ensure that a circuit breaker, or other equivalent means, rated 20A, is used in the building's AC branch circuit for the current carrying conductors.

Warning:

- Do not install equipment that appears to be damaged.
- The chassis 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 (with banana jack) to the ESD connection socket (grounding plug) on the front of the chassis.
- If your disconnect device is not permanently incorporated, a readily accessible disconnect device to shut off power during servicing must be incorporated in your building's branch circuit.

Notes:

- The 7450 ESS-1 requires a minimum of one power connection to operate, but using both connections in the AC/DC or dual DC models are recommended for redundancy.
- A 20A (max.) circuit breaker is recommended for AC power.
- In the event of a power supply failure, the entire 7450 ESS-1 chassis must be repaired or replaced. There are no field serviceable parts.
- The equipment under test (EUT) is specified for DC-I power configurations. The battery returns must remain isolated until they reach the main power buss.
- All bare conductors must be coated with an appropriate antioxidant compound before crimp connections are made. All unplated connectors, braided strap, and bus bars are to be brought to a bright finish and then coated with an antioxidant before connecting them.
- All surfaces that are used for intentionally grounding the EUT shall be brought to a bright finish and an anti oxidant solution must be applied to the surfaces being joined.
- Non-conductive coatings (such as lacquer and enamel) must be removed from threads and other contact surfaces to assure electrical conductivity. (Thread forming screws with paint piercing washers may be used for this purpose during installation)
- To comply with the GR-1089-CORE, Issue 03, requirement R4-9 [31] standard for electromagnetic compatibility and safety, all intra-building ports are specified for use with shielded and grounded cables at both ends.
- The intra-building port(s) of the equipment or sub-assembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly 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 or Type 4 ports as described in GR-1089-CORE, Issue 4) 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.
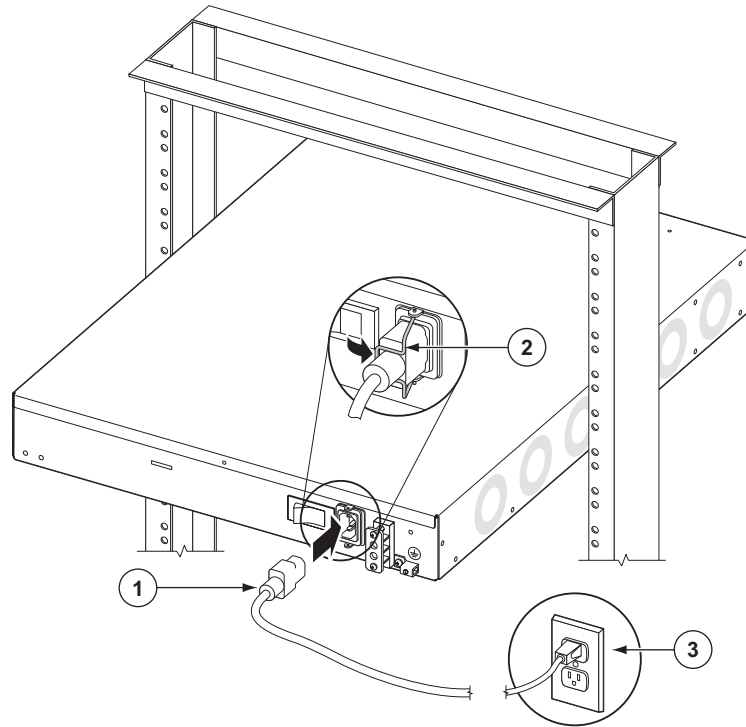
AC-Input Power Supply Guidelines

If you intend to use AC-input power in the 7450 ESS-1, observe the following:

- There is one AC power cord receptacle located at the rear of the 7450 ESS-1AC/DC model chassis.

- The power supply operates with a nominal utility system voltage of 100V to 240V, but will operate with input voltages ranging from 85 to 264 VAC.

- A fully redundant system operates with two power systems. AC and DC power types are available in the 7450 ESS-1 chassis.

    → AC/DC model — Plug an AC power cord into the AC receptacle at the rear of the chassis. Wire the single DC terminal block on the AC/DC model.

    → DC/DC model — Wire both DC terminal blocks on the DC/DC model.

- An AC power cord is shipped with each 7450 ESS-1 AC/DC model unit.

    The chassis has a AC plug receptacle to accept an AC power cord. The other end of the AC power cord must have a plug that fits into the power source receptacle that is standard for your geographic region.

Connecting AC Power

Figure 11: Connecting AC Power

Table 17: AC Power Field Descriptions

Key	Description
1	Power cord
2	Power cord retainer
3	Remote power source (example)

To connect the AC power:

Step 1 Locate the AC power cord that was shipped with the AC/DC unit. Verify that the cord meets your regional requirements. Do not use power cords that do not meet these standards.

Step 2 Plug the AC power cord into the receptacle at the rear of the chassis.

Step 3 Engage the power cord retainer by lowering the retainer bracket toward from the power cord and snap the bracket in place.

Step 4 Plug the other end of the power cord into a 3-terminal, single-phase power source that provides power within the acceptable range (100-240 VAC, 50/60 Hz, 12.0 ~ 6.0 A).

Step 5 Turn the power switch on the rear panel to the **ON** position.

Step 6 Check the front panel Status and Power Supply # 1 LED.

DC-Input Power Supply Guidelines

⚠ **Danger:**
- The 7450 ESS-1 can be powered by the external UL Listed, DC 48V output power supply optionally provided with the system, outside of a restricted area. When powering with the external power supply optionally provided with the product, the product and power supply connection should be left such that the DC 48V is not accessible after installation, with wire insulation stripped to proper lengths and the safety cover secured in place (Figure 12).
- 7450 ESS-1 systems equipped with DC-input power supplies should be installed in restricted access areas, such as a dedicated equipment room or an equipment closet, in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code ANSI/ NFPA 70.

If you intend to use DC-input power in the 7450 ESS-1, observe the following:

- A fully redundant system operates with two power systems. AC and DC power types are available in the 7450 ESS-1 chassis.
    - → DC/DC model — Wire both DC terminal blocks on the DC/DC model.
    - → AC/DC model — Plug an AC power cord into the AC receptacle at the rear of the chassis. Wire the single DC terminal block on the AC/DC model.
- The unit is shipped with a safety cover installed on the DC terminal blocks. The safety covers should always be installed during normal operation.
- DC power cords are not shipped with 7450 ESS-1 routers.

    DC-input power connections require copper wire cables (see Figure 13).

- For DC power connections, a ground connection on the chassis is required. Copper wire must be used. Grounding cables are not provided.

Wiring for DC-Input Power

⚠️ **Warning:**
- Ensure that all power is OFF from the DC circuit. Locate the circuit breaker on the panel board that services the DC circuit. 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 ground connection must always be made first and disconnected last.
- The proper wiring sequence is ground/negative to ground/negative and positive/return to positive/return.
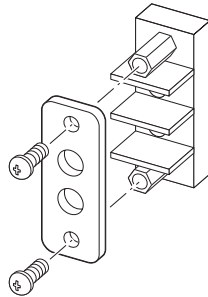
Use the following American wire gauge (AWG) specifications for power connections:

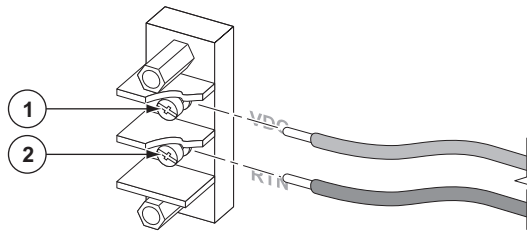- Not less than #14 AWG and not more than #12 AWG for the -48 and RTN
- #14 AWG for the ground wire

DC Input Terminal Block Wiring

The DC power supply cables attach to the power supply terminal studs. Figure 12, Figure 13, and Figure 14 display DC-input terminal block safety cover and wiring views.

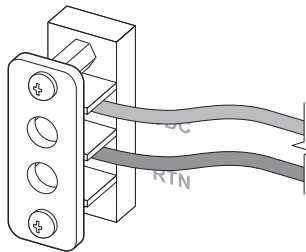**Figure 12: Removing the DC Terminal Block Safety Cover**

Figure 13: Wiring the DC-Input Power Terminal Block

Table 18: DC-Input Terminal Block Descriptions

Key	Description
1	-VDC
2	RTN

Figure 14: DC-Input Power Terminal Block Wiring with Safety Cover

NOTE: In order to facilitate a fully redundant system you must wire both DC terminal blocks on the DC/DC model.

Follow these steps to wire a DC-input power terminal block(s):

Step 1 Prepare the DC cables. Strip the wire insulation to the length according to your local safety codes.

Step 2 Remove the safety cover from the DC terminal block.

Step 3 Loosen the -VDC and RTN terminal screws.

Step 4 Connect the RTN positive/return (+) cable to the bottom (RTN) terminal according to local safety codes.

Step 5 Tighten with a torque screwdriver or a ratcheting torque screwdriver with a Phillips or flat head. The recommended torque is 9 pounds force-inch (lbf-in).

Step 6 Connect the VDC (-) cable to the top (-48V) terminal according to local safety codes.

Step 7 Tighten with a torque screwdriver with a Phillips or flat head. The recommended torque is 9 pounds force-inch (lbf-in).

Step 8 If the safety cover was removed in Step 2, then replace the safety cover.

Powering Up the Switch

To power up the ESS-1 follow these steps:

If you use the AC-power system:

Step 1   Turn ON the system power switch. The Status LED on the front panel should be lit green.

Step 2   Check the #1 Power Supply LED on the 7450 ESS-1 front panel. It should be lit green.

If you use the DC-powered system:

Step 1   Turn on the power at the remote power source(s).

Step 2   Check the #2 Power Supply LED on the 7450 ESS-1 front panel. It should be lit green.

Connections and Configurations

IN THIS CHAPTER

This chapter provides information about configuring and installing MDAs and ports.

This chapter provides information on the following topics:

Initializing the System

The primary copy of 7450 ESS OS software is located on a compact flash card. The removable media shipped with each software license and contains a copy of the 7450 ESS OS software.

Notes:

- The SF/CPM modules contain three slots for removable compact flash cards. The drives are named Compact Flash Slot #1 (*cf1*), Compact Flash Slot #2 (*cf2*), and Compact Flash Slot #3 (*cf3*). Configurations and executable images can be stored on flash cards or an FTP file location.
- The flash card containing the bootstrap and boot option files *must* be installed in Compact Flash Slot #3 (*cf3*) on the front panel.
- You must have a console connection. See .

Using the Compact Flash Slot #3 Locking Mechanism

Note: Compact Flash #3 slot has a slot locking mechanism (Figure 15) to prevent accidental jostling or removal of the flash card.
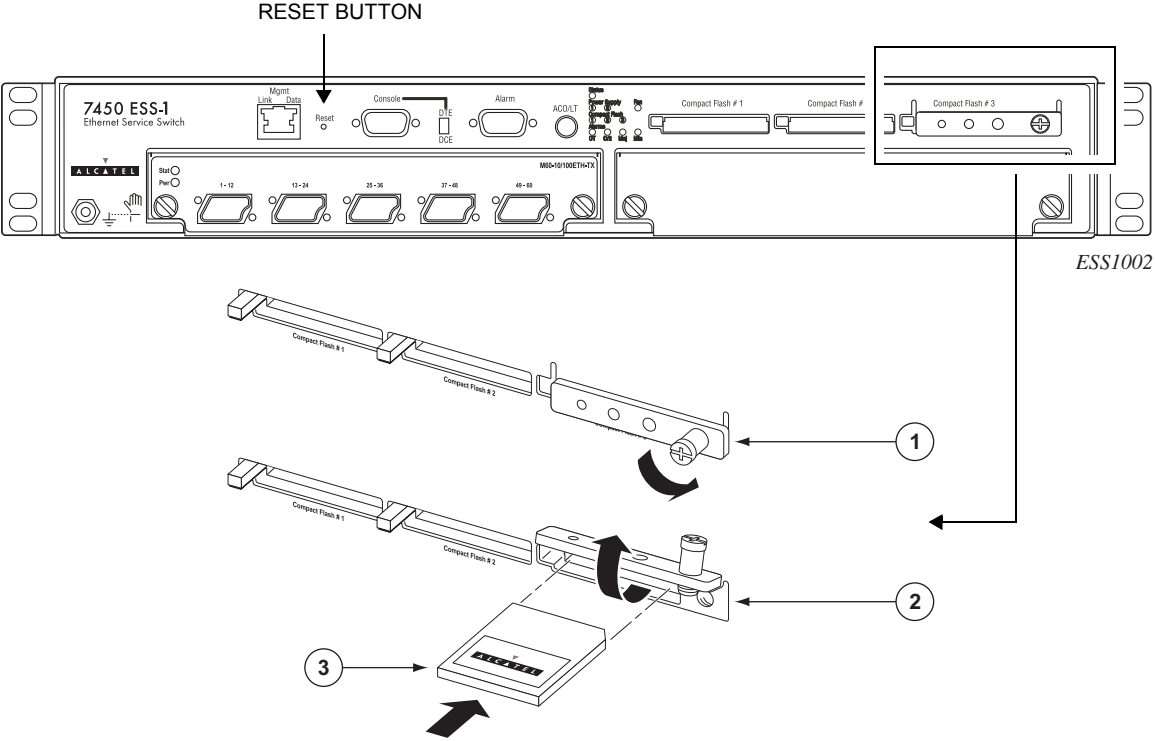
Figure 15: Compact Flash Slot #3 on the ESS-1 Front Panel

To secure a compact flash card into slot #3, follow these steps:

Step 1   Loosen the compact flash slot locking screw.

Step 2   Lift the slot cover.

Step 3   Align the compact flash card with the slot guides. Insert the card until it is completely seated in the slot. Do not force the card into the slot.

Step 4   Lower the slot cover and tighten the locking screw.

Initial System Startup

To initialize the system, follow these steps:

Step 1   When the compact flash card is installed in the slot, the Compact Flash 3 LED (located on the front panel) should light green within approximately 30 seconds. If it does not light or if it turns off again, refer to Troubleshooting.

Step 2   Depress the Reset button *or* power cycle the switch to initiate the boot process.

Step 3   The system searches Compact Flash Slot #3 (*cf3*) for the `boot.ldr` file (also known as the bootstrap file).

Step 4   Verify the operational status by checking the Power and Status LEDs on the SF/CPM faceplate. If the LEDs on the front panel blink continuously, refer to Troubleshooting.

Step 5   After verifying the LEDs, proceed with the MDA installation and configurations.

Troubleshooting

If the system cannot load or cannot find the `boot.ldr` file on *cf3*, the system checks for a manual boot sequence interruption. Unless an unsuccessful system initialization is manually interrupted, the system will continuously reboot in an attempt to successfully find and load the `boot.ldr` file.

When the system finds the `boot.ldr` file, the system processes the initialization parameters from the BOF. The BOF should be on the same drive as the boot loader file. If the BOF cannot be found or loaded, then the system prompts for a different image and configuration location.

When the image is successfully loaded, control is passed from the boot loader file to the image. The runtime image attempts to locate the configuration file as configured in the BOF. The configuration file include chassis, IOM, MDA, and port configurations, as well as system, routing, and service configurations.

The following example displays the output when either no flash is present or the boot.ldr file cannot be found.

```
...

Alcatel
Build: X-0.0.x.x on Thu Jul 10 21:04:50 2003 by builder
Starting CPU/Switch card
COLD boot on processor #1
CPU Control FPGA version is 0x17
Testing mainboard FPGA chain...
Validating SDRAM from 0x7ff00000 to 0x80000000
Testing SDRAM from 0x02200000 to 0x7ff00000
Testing Compact Flash 1... Slot Empty
Testing Compact Flash 2... Slot Empty
Testing Compact Flash 3... Slot Empty
Peripheral FPGA version is 0x13
Board Serial Number is 'rus4-07'
Chassis Serial Number is '0103010009'
Searching for boot.ldr on local drives:
No disk in cf3
No disk in cf3
No disk in cf3
Error - file boot.ldr not found on any drive
Please insert CF containing boot.ldr. Rebooting in 5 seconds.

Rebooting...

Alcatel
Build: X-0.0.x.x on Thu Jul 10 21:04:50 2003 by builder
Starting CPU/Switch card
```

Figure 16 displays the compact flash directory structure and file names.
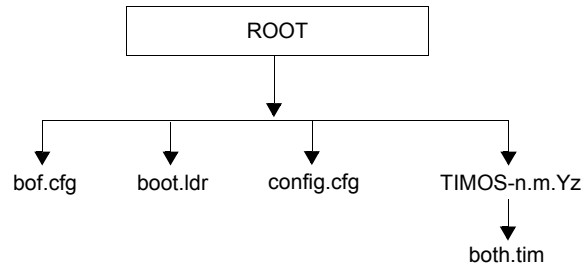
Figure 16: Files on the Compact Flash

Files on the compact flash are:

- bof.cfg — Boot option file
- boot.ldr — Bootstrap image
- config.cfg — Default configuration file
- TIMOS-m.n.Yz:

    m — Major release number

    n — minor release number

    Y: A — Alpha release

        B — Beta release

        M — Maintenance release

        R — Released software

    z — Version number

    → both.tim — CPM and IOM image file

Establishing Connections

Access the newly installed 7450 ESS two ways:

Console Connection

To establish a console connection, you will need the following:

- An ASCII terminal or a PC running terminal emulation software set to the parameters shown in the table below.
- A standard serial cable with a female DB9 connector.

For pinout information, refer to .

Table 19: Console Configuration Parameter Values

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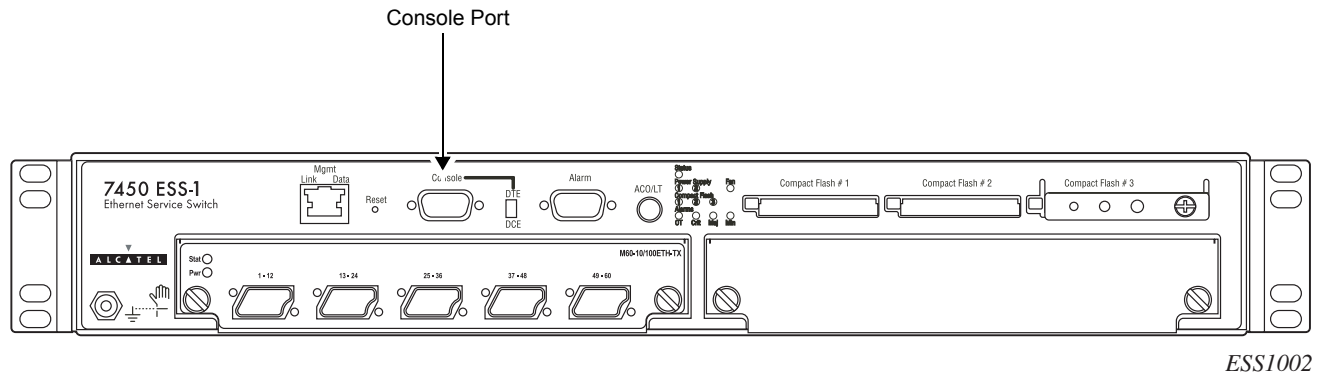
Console Port

ESS1002

Figure 17: Console Port Connection

To establish a console connection:

Step 1   Connect the terminal to the Console port on the front panel (Figure 17) using the serial cable.

If you use a null modem cable, make sure that the switch beside the console port is flipped to DTE when connecting to the serial port of a PC.

If you use a straight-through cable, make sure that the switch is flipped to DCE when connecting to the serial port of a PC.

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 prompt, enter the login and password.

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

Telnet Connection

Access the switch after a successful initialization with a Telnet connection from a PC or workstation connected to the network after the management port (Figure 18) has been configured using the `bof>address` command (see below). Telnet access provides the same options for user and administrator access as those available through the console port.

To configure the 7450 ESS-1 for Telnet access, you need to have a device with Telnet software located on the same network. The 7450 ESS-1 must have a management IP address. The IP address is manually configured. Each 7450 ESS-1 switch is limited to a total of 7 Telnet or SSH sessions. For information about configuring switch parameters, refer to the 7450 ESS OS System Guide. For pinout information, refer to Appendix B: Pinout Assignments on page 87.

MAC addresses are listed on a small label on the chassis and on the MDAs. The MAC address also displays in the `show router arp` command output.

ESS1002
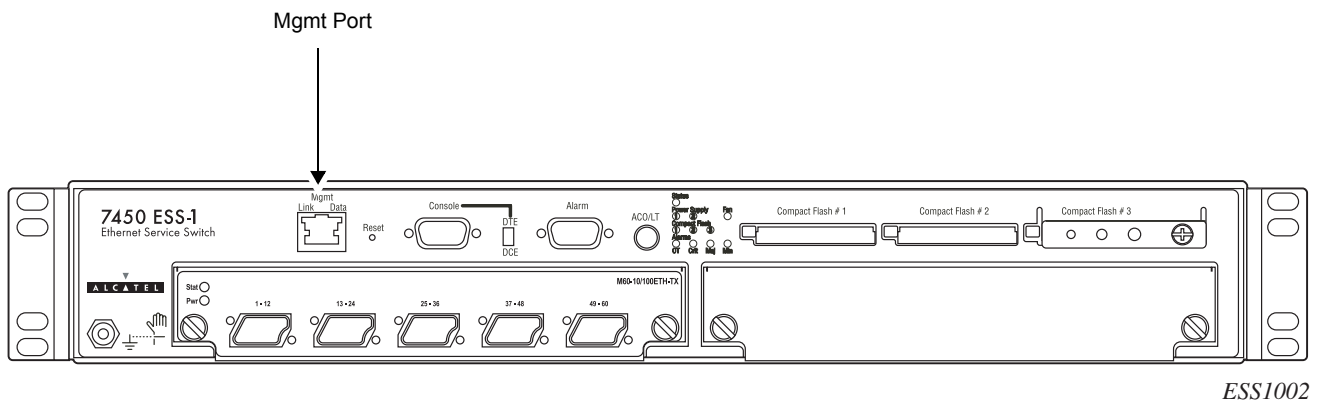
Figure 18: Management Port Connection

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

The ESS-1 must have a management IP address. The IP address is manually configured.

Running Telnet

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

The following displays an example of a Telnet login:

```
C:\>telnet 192.168.1.111
Login: admin
Password: ########

ALA-1#
```

Ejecting Flash Cards

To eject the slot #3 flash card:

Step 1   The `shutdown` command MUST be issued prior to removing a flash card.

Command	**Example**
`file shutdown` *`cflash-id`*	`ALA-1# file shutdown cf3:`

Step 2   Loosen the compact flash slot locking screw.

Step 3   Lift the slot cover.

Step 4   The ejector button for Compact Flash Slot #3 is slightly recessed. Insert a small object such as a pen tip to depress the button. The card will partially pop out of the slot.

Step 5   Remove the card and place it in an anti-static bag.

The flash card containing the boot and configuration files *must* be installed in Compact Flash Slot #3 (`cf3:`) on the SF/CPM card.

Step 6   Lower the slot cover and tighten the locking screw.

To eject the slot #1 or slot #2 flash cards:

Step 1   The `shutdown` command MUST be issued to prior to removing a flash card.

Command	**Example**
`file>shutdown` *`cflash-id`*	`ALA-1# file shutdown cf1:`
`file>shutdown` *`cflash-id`*	`ALA-1# file shutdown cf2:`

Step 2   Press the ejector button on compact flash slot #1 or compact flash slot #2. The card will partially pop out of the slot.

Step 3   Remove the card and place it in an anti-static bag.

Configuring Slot, IOM, and MDA Parameters

After the 7450 ESS-1 is initialized, the MDA and port parameters can be configured. Even though the IOM is an integral part of the unit, the slot and card type must be manually specified. The MDA slot and MDA type must be configured in order to configure ports. Ports cannot be configured until the MDA is configured.

Configure components in the following order:

1. Card slot number

2. Card type

3. MDA slot number

4. MDA type

5. Ports

Card and Card-Type Commands

NOTE: When configuring the chassis slot (Step 1), the slot number value is always 1 for ESS-1 models.

In the `config>card` context, use the following CLI commands and syntax examples to provision the chassis slot and IOM:

	Command	Example
Step 1	card *slot-number*	card 1
Step 2	card-type *card-type*	card-type iom-20g
Step 3	no shutdown	no shutdown

MDA and MDA-Type Commands

For configuration purposes, the left MDA slot is referred to as MDA slot 1. The right MDA slot is referred to as MDA slot 2. MDA information must be must be configured before ports can be configured.

After the IOM is configured, use the following CLI commands to provision the MDA(s). A maximum of two MDAs can be configured on an IOM.

	Command	Example
Step 1	mda *mda-number*	mda 1
Step 2	mda-type *mda-type*	mda-type **ess-m10-1gb-sfp**
Step 3	no shutdown	no shutdown
Step 4	exit	exit

To provision an additional MDA, continue the configuration process with Step 5:

	Command	Example
Step 5	mda *mda-number*	mda 2
Step 6	mda-type *mda-type*	mda-type **ess-m20-100eth-sfp**
Step 7	no shutdown	no shutdown
Step 8	exit	exit

Example

The following example displays card slot, card type, MDA slot, and MDA type command usage:

```
ALA-1>config# card 1
ALA-1>config>card# card-type iom-20g
ALA-1>config>card# mda 1
ALA-1>config>card>mda# mda-type ess-m10-1gb-sfp
ALA-1>config>card>mda# no shutdown
ALA-1>config>card>mda# exit
ALA-1>config>card# mda 2
ALA-1>config>card>mda# mda-type ess-m20-100eth-sfp
ALA-1>config>card>mda# no shutdown
ALA-1>config>card>mda# exit
```

The following example displays the configuration:

```
ALA-1>config# info
. . .
----------------------------------------------
echo "Card Configuration "
#---------------------------------------------
    card 1
        card-type iom-20g
        mda 1
            mda-type ess-m10-1gb-sfp
        exit
        mda 2
            mda-type ess-m20-100eth-sfp
        exit
    exit
----------------------------------------------
ALA-1>config#
```

To configure ports, refer to the Card and Port Configuration section of the *7450 ESS OS System Guide.*

Specifying the Power Type

If you connect DC power in either the DC/DC or AC/DC models, you must change the default for the power supply configuration to reflect the DC unit(s) in the CLI in order to facilitate proper operation for the LEDs, show command, and logging output.Refer to the *7450 ESS OS System Guide* for command syntax and usage information.

CLI Syntax:
```
config>system
    power-supply {1|2} {dc|ac {single|multiple}|none}
```

Example:
```
ALA-1>config>system# power-supply 1 dc
ALA-1>config>system# power-supply 2 dc
```

The following example displays the `power-supply` command configuration:

```
ALA-1>config>system# info
----------------------------------------------------------------
..
        name "ALA-1"
        contact "Fred Information Technology"
        location "Bldg.1-floor 2-Room 201"
        clli-code "abcdefg1234"
        coordinates "N 45 58 23, W 34 56 12"
        power-supply 1 dc
        power-supply 2 dc
        exit
..
----------------------------------------------------------------
ALA-1>config>system#
```

Installing MDAs

Warnings and Notes

Danger:
- Only trained and qualified personnel should install or replace this equipment.
- Use of controls or adjustments of performance or procedures other than those specified herein can result in hazardous radiation exposure.

Warning:
- Electrostatic discharge (ESD) damage can occur if MDAs are mishandled. Always wear an ESD-preventive wrist or ankle strap and always connect an ESD strap to the grounding plug on the front of the chassis.
- Invisible laser radiation can be emitted from the aperture ports of an MDA when no cable is connected. *Avoid exposure and do not stare into open apertures.*
- Always place components on an anti-static surface.
- Do not power up a 7450 ESS-1 switch until all components are installed and verified.
- Use only approved small form factor pluggable fiber optic devices in MDA ports.

Notes:

General:
- Ports cannot be provisioned until the MDA is provisioned.
- Services cannot be provisioned until the ports are configured.

Installing an MDA

A maximum of two MDAs can be installed in a 7450 ESS-1 (Figure 19). MDA slots are number 1 (the left MDA slot) and 2 (the right MDA slot). Captive screws secure the MDA in place. Table 20 lists MDA installation features on the front panel.
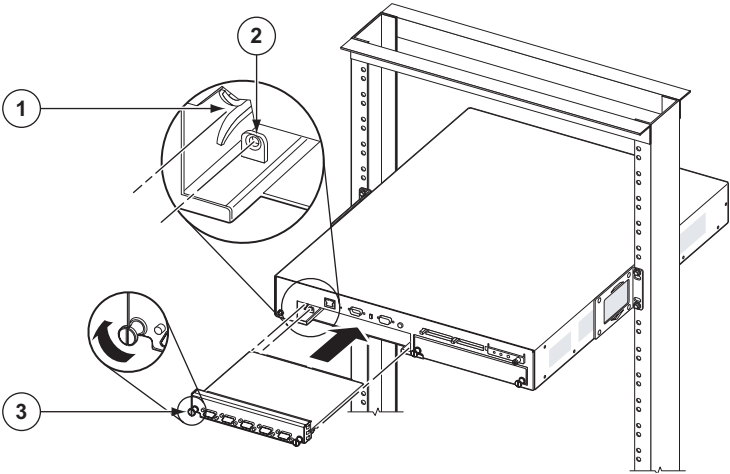

Figure 19: Installing an MDA

Table 20: MDA Installation Features

Key	Description
1	Slot guide
2	Threaded receptacle
3	Captive screws

To install an MDA:

Step 1 Remove the MDA from the packaging and place on a flat anti-static work surface. Avoid touching board components and connector pins.

Step 2 If an MDA slot cover is installed in the slot, loosen the cover's captive screws and remove cover.

Step 3 Insert the MDA into MDA slot 1 (left) or 2 (right). Align the MDA with the slot guides and the captive screw with the threaded receptacle (see Key 2 in Figure 19).

Step 4 Tighten the captive screws to secure the MDA. Do not over-tighten. The maximum recommended torque is 10 lbf.in.

Step 5 Check the Power LED.

Step 6 Attach cables to the MDA ports.

Each MDA has a Power and Status LED. For a description of the LEDs for each MDA model, refer to Appendix A: LEDs and Optics on page 81.
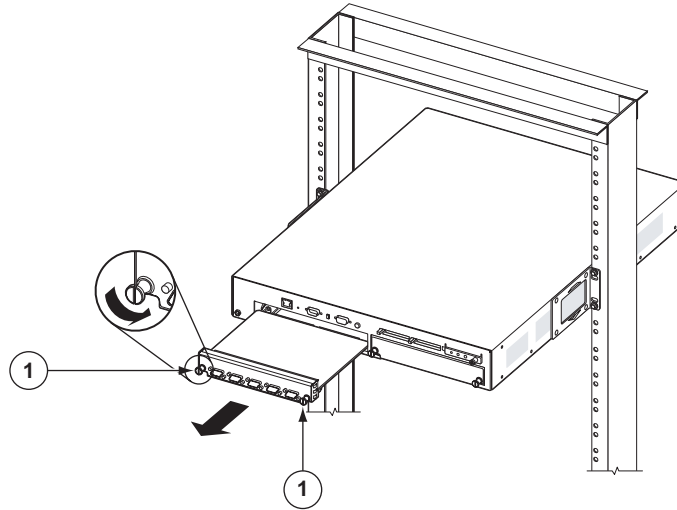
Removing an MDA

Changing the MDA Configuration

If you replace an MDA with a different type, you must change the configuration to reflect the new MDA type prior to the installation. Each active port must be shut down in order to shut down and remove an MDA configuration. Refer to the *7450 ESS OS System Guide* for details on configuring cards, MDAs, and ports.

Issue the following commands in the `config` context to shut down ports and remove the MDA from the configuration:

	Command	**Example**
Step 1	port *port-id**	port 1/1/1
Step 2	shutdown	shutdown

*NOTE: The `port>no shutdown` command must be entered on all enabled ports on the MDA.

Step 3	exit	exit
Step 4	card *slot-number*	card 1
Step 5	mda *mda-slot*	mda 1
Step 6	shutdown	shutdown
Step 7	exit	exit
Step 8	no mda *mda-slot*	no mda 1
Step 9	card *slot-number*	card 1
Step 10	card-type *card-type*	card-type iom-20g
Step 11	no shutdown	no shutdown
Step 12	mda *mda-slot*	mda 1
Step 13	mda-type *mda-type*	mda m10-1gb-sfp
Step 14	no shutdown	no shutdown
Step 15	exit	exit

Replacing an MDA

Figure 20: Removing an MDA

To remove an MDA:

Step 1   Disconnect all cables from the MDA ports.

Step 2   Loosen the MDA captive screws. Grasp the screws and pull the MDA out of the slot.

                NOTE: The MDA cannot be removed if the captive screws are tightened.

Step 3   Place the MDA on an anti-static surface.

Step 4   You must either immediately install another MDA into the slot or replace the MDA slot with blank cover.
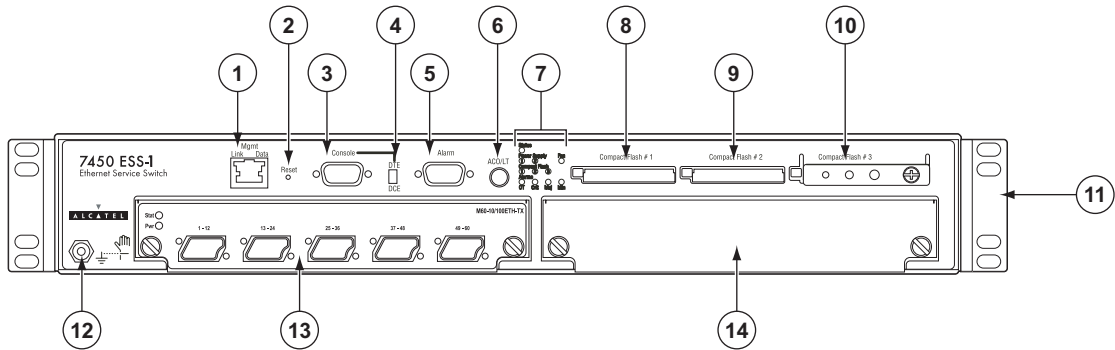
Appendix A: LEDs and Optics

IN THIS CHAPTER

This section describes the front panel LEDs. MDA LEDs are described in the MDA documentation.

The following LED descriptions are included:

- Front Panel LEDs on page 82

Front Panel LEDs

Figure 21 displays the 7450 ESS-1 front panel LEDs.

ESS1001

Figure 21: 7450 ESS-1 Front Panel LEDs

Table 21 describes the 7450 ESS-1 LED states.

Table 21: 7450 ESS-1 Front Panel and LED Descriptions

Key	Label/Part	Sub category	Description
1	Mgmt	Link	• Amber: 10 M/bps • Green: 100 M/bps • Unlit: Operationally down.
		Data	• Green (blinking): RX/TX activity. • Amber (blinking): Error condition.
2	Reset		A recessed button used to restart the SF/CPM. Insert a small object such as a pen tip to depress the button.
3	Console		The console port is provisioned with a DB-9 jack and used for the initial system startup as well as system configuration and monitoring. The console port, a Universal Asynchronous Receiver/Transmitter (UART) port, is used for system configuration and monitoring. Use a EIA/TIA-232 DCE console cable to connect a terminal to the console port.
4	DTE		Flip the switch to DTE when connecting to the serial port of a PC with a null modem cable. When the switch is flipped to DTE, the console port is acting as a data terminal equipment (DTE) serial port.

Table 21: 7450 ESS-1 Front Panel and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
4 (cont)	DCE		Flip the switch to DCE when connecting to the serial port of a PC with a straight-through cable. When the switch is flipped to DCE, the console port is acting as a data communications equipment (DCE) serial port.
5	Alarm		The Alarm port is provisioned as a DB-9 serial port and is used to connect to external alarm devices that report conditions that trigger red or amber alarms.
6	ACO/LT		The Audible Alarm Cutoff/Lamp Test button verifies the operability of LEDs. When pressed, the LEDs should temporarily illuminate. This button also turns off all external alarm relay control bits until the next new alarm condition. The LEDs blink when the button is depressed.
7	Status		• Green: Operationally up and administratively up. • Amber: Operationally down but administratively up. • Amber (blinking): Qualified, but previously failed. • Unlit: Not operational, shutdown, or administratively down.
	Power Supply	1	• Green: Indicates that AC input power is present and operational. • Amber: Indicates an error condition with the AC input power. • Unlit: Indicates that the AC power supply is not installed or recognized.
		2	• Green: Indicates that DC input power is present and operational. • Amber: Indicates an error condition with the DC input power. • Unlit: Indicates that the DC power supply is not installed or recognized.
	Fan		• Green: Indicates that the fans are operational. • Amber: Indicates a fan failure. • Unlit: Indicates that the fans are not operational.
	Compact Flash	1,2,3	• Green: Indicates that the flash card is operational and in a read or write process. **Note:** *Do not* physically remove or attempt to remove the flash card when the LED is lit green. • Amber (blinking): Error condition exists. • Amber (solid): Indicates that the slot is in an operationally down mode. This is the only mode to safely remove the flash card. • Unlit: A flash card is not installed in the slot.
	Alarms	OT	• Red: An overtemperature condition exists. If there are no OT conditions, this LED should remain off.

Table 21: 7450 ESS-1 Front Panel and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
7 (cont)		Crit	• Red: A critical condition exists, such as a severe overtemperature condition, a fan tray failure, an overcurrent condition in a power supply, or an out-of-tolerance voltage. If there are no critical conditions, this LED should remain off.
		Maj	• Red: A serious condition exists, such as an overtemperature condition, a fan tray failure, an overcurrent condition in a power supply, or an out-of-tolerance voltage. If there are no major conditions, this LED should remain off.
		Min	• Amber: A serious condition exists, such as a component failure. If there are no minor alarm conditions, this LED should remain off.
8	Compact Flash #1 (Slot)		• Default filename: cf1: • See the Compact Flash LED description for the status of a compact flash slot. • To remove a flash card, gently depress the ejector button until the flash card releases.
9	Compact Flash #2 (Slot)		• Default filename: cf2: • See the Compact Flash LED description for the status of a compact flash slot. • To remove a flash card, gently depress the ejector button until the flash card releases.
10	Compact Flash #3 (Slot)		• Default filename: cf3: • The compact flash card with the boot image and configuration files should be installed and remain in this slot. • This slot should be used to download the boot and configuration images. • See the Compact Flash LED description for the status of a compact flash slot. • The ejector button for Compact Flash Slot #3 is slightly recessed. Insert a small object such as a pen tip to depress the button.
	Compact flash locking mechanism		When engaged, the locking mechanism prevents the accidental jostling or removal of the flash card inserted in Compact Flash slot #3.
11	Rack mounting brackets		Brackets are factory installed to front-mount the unit in a standard 19-inch wide rack
12	ESD plug		Receptacle to connect an ESD wrist or ankle strap strap (with banana jack) to the ESD connection socket (grounding plug) on the front of the chassis.

Table 21: 7450 ESS-1 Front Panel and LED Descriptions (Continued)

Key	Label/Part	Sub category	Description
13	MDA (installed)		Captive screws secure the MDA in place. For configuration purposes, the left MDA slot is referred to as MDA slot 1. The right MDA slot is referred to as MDA slot 2.
14	MDA slot cover		Captive screws secure the cover in place.

Appendix B: Pinout Assignments

IN THIS CHAPTER

This chapter provides information about standard cable pin assignments.

Topics in this chapter include:

Port Types

Figure 22 displays the port types on the 7450 ESS-1 front panel.

ESS1002
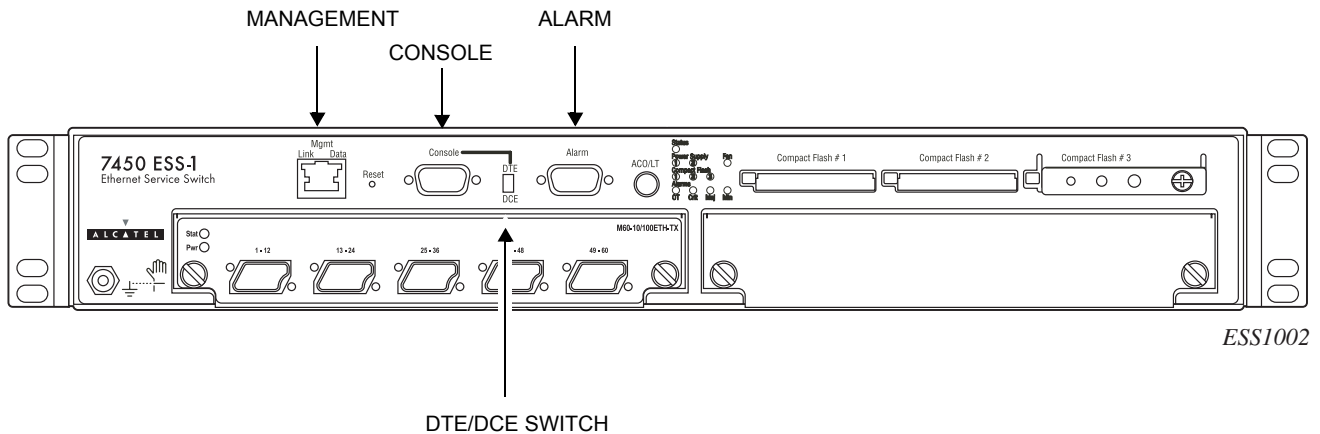
Figure 22: Port Types

• The Management port is a 10/100 Ethernet port which is a channel to download images and manage the system. This port is provisioned with an RJ-45 jack on the front panel. You must provide a CAT5 Ethernet cable to connect to the port.

• The Console port is a Universal Asynchronous Receiver/Transmitter (UART) port used to configure switch and system parameters and can be also be used for monitoring purposes. The console port is enabled by default. The default Baud rate is 115,200. This port is provisioned with an DB-9 connector. Connect the console port to a terminal with an RS-232 serial cable.

  The DTE/DCE switch on the front panel controls the serial port type as either data terminal equipment (DTE) or data communications equipment (DCE).

  Flip the switch to DTE when connecting to the serial port of a PC with a null modem cable. Flip the switch to DCE when connecting to the serial port of a PC with a straight-through cable.

  The port is configured as DTE or DCE depending on the switch setting. No crossover cables are required.

• The Alarm port is provisioned as a DB-9 serial port and is used to connect to external alarm devices that report conditions that trigger red or amber alarms. You must provide an appropriate cable configured according to your alarm panel.

Cable Pin Assignments

Table 22 displays the 10/100 Management Ethernet port pin assignments.

Table 22: 10/100 Management Ethernet Port - RJ45 Female

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

Table 23 displays the DB9 DTE mode Console port pin assignments. Use these pin assignments when the DTE/DCE switch on the 7450 ESS-1 front panel is flipped to DTE.

Table 23: Console Port - DTE Mode - 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

Table 24 displays the DB9 DCE mode Console port pin assignments. Use these pin assignments when the DTE/DCE switch on the ESS-1 front panel is flipped to DCE.

Table 24: Console Port - DCE Mode - DB9 Male

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

Table 25 specifies Alarm port connector pinouts. Examples of critical alarms include a fan failure, a power supply over temperature condition, and a power supply failure. The major alarm LED can illuminate when a power supply is removed. There are no conditions defined for minor alarms.

Table 25: Alarm Port - DB9 Female

Pin	Signal	Direction	Description
1	MAJ_COMMON	Output	Major alarm common
2	MAJ_NORM_CLOSED	Output	Major alarm normally closed
3	CRIT_NORM_OPEN	Output	Critical alarm normally open
4	CRIT_COMMON	Output	Critical alarm common
5	CRIT_NORM_CLOSED	Output	Critical alarm normally closed
6	MIN_NORM_OPEN	Output	Minor alarm normally open
7	MIN_COMMON	Output	Minor alarm common
8	MIN_NORM_CLOSED	Output	Minor alarm normally closed
9	MAJ_NORM_OPEN	Output	Major alarm normally open

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