



## **Cisco ASR 5500 Installation Guide**

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## About this Guide

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### Objectives

This document describes how to install and initially configure a Cisco® ASR 5500 multimedia chassis.

### Audience

This document is intended for use by system engineers and installers planning and executing the installation of an ASR 5500.

### Document Conventions

This document uses the following conventions:

- **Fonts**
  - **Bold font**—Commands, menu options, and user entries are in bold font.
  - `Monospaced font`—Displayed output of CLI commands
- Dimensions such as size, weight and temperature are first presented in their primary measurements (imperial or metric) followed by the converted measurement (metric or imperial) in parentheses.

### Document Organization

Information is presented in the following chapters and appendices:

- [ASR 5500 Hardware Platform Overview](#)
- [Technical Specifications](#)
- [Installation Procedure Overview](#)
- [Chassis Installation](#)
- [Card Installation](#)
- [MIO Port Cabling](#)
- [SSC Alarm Cabling](#)
- [Power Cabling](#)

- [System Power-up](#)
- [Initial System Configuration](#)
- [Replaceable Components](#)
- [Spare Component Recommendations](#)
- [Cable Management System Installation](#)
- [MIO Console Port to Cisco Server Cabling](#)
- [RMA Shipping Procedures](#)



# CHAPTER 1

## ASR 5500 Hardware Platform Overview

---

This chapter describes the hardware components that comprise the ASR 5500 chassis. The ASR 5500 is designed to provide subscriber management services for high-capacity 4G wireless networks.

**Figure 1-1**      *The ASR 5500*



# Chassis

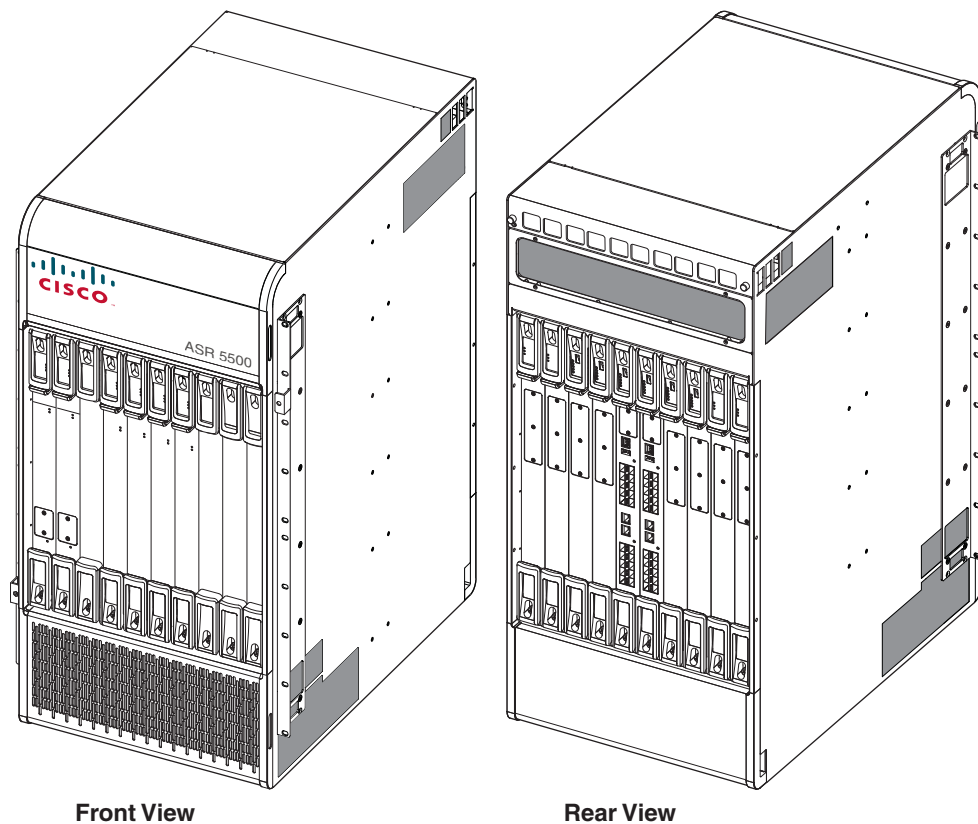
The ASR 5500 is a 21RU, 19" rack-mount midplane-based chassis with input/output (I/O) and processing cards in the rear, and fabric cards in the front (see [Figure 1-2](#)). Two ASR 5500 chassis fit into 42RU of rack space. However, the typical deployment will be a single chassis per rack with other equipment in the same rack.

The rear cards are larger and used for chassis management, I/O and session processing. The smaller front cards are used for fabric crossbars and persistent storage. There are 10 slots at the front and rear of the chassis.

The rear slots have a common midplane connector that is shared between the supported cards. This allows for different mixes of I/O and processing capacity depending on the customer's intended use.

The chassis can be flush-mounted or mid-mounted in a rack or equipment cabinet.

**Figure 1-2** Front and Rear Views of the ASR 5500 Chassis



## Power

The chassis accepts up to eight 80-amp, -48VDC power feeds across redundant power filter units (PFUs). The connections are made at the top-rear of the chassis. The front-mounted PFUs incorporate separate circuit breakers for each power feed.

## Cooling

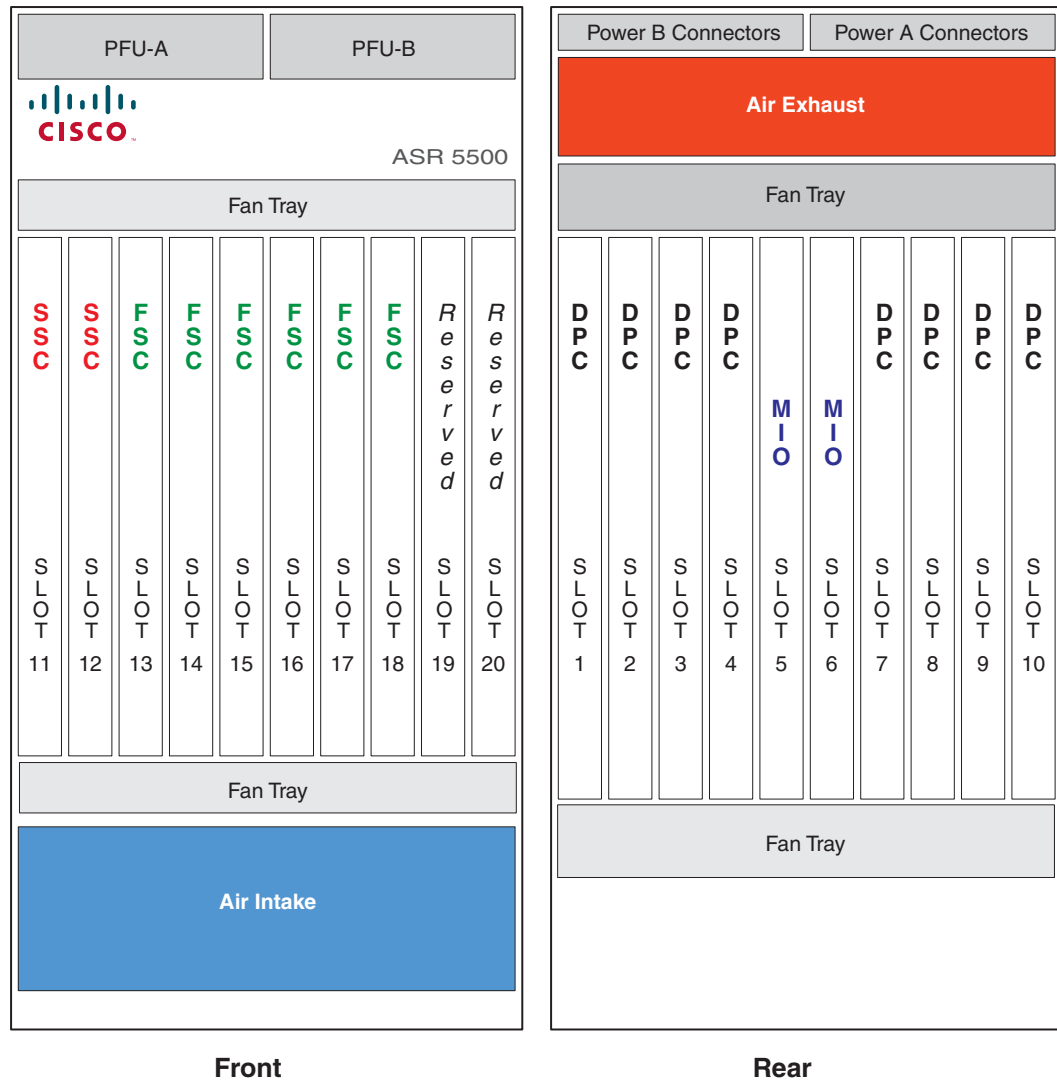
The ASR 5500 uses two types of fan tray units and a total of four fan trays per chassis – two front fan trays and two rear fan trays. Air is drawn from the front and sides of the chassis and exhausted out the top rear and sides. Two fan trays are mounted at the bottom of the chassis with another two at the top. The bottom fan trays incorporate replaceable particulate air filters.

## Slot Numbering

The rear slots are numbered 1 through 10 with slots 5 and 6 used for the chassis management cards. The front slots are numbered 11 through 20. Lower slot numbers begin at the left side. There are no direct relationships between front and rear cards.

Figure 1-3 shows the slot numbering sequence and the general layout of other components in the ASR 5500 chassis.

**Figure 1-3 ASR 5500 Slot Numbering**



## Power Filter Units (PFUs)

Two PFUs mount at the top front of the chassis. Each PFU supports four power planes.

A total of eight -48 VDC, 80-amp power feeds are required for a full chassis. The eight feeds operate in a 4+4 redundant configuration. In lab environments where power redundancy is not required, four 80 A lines can be used.

## Cable Management System

The ASR 5500 cable management system consists of two components. The first is a tray that mounts at the rear of the chassis immediately below the card cage. The second is a cable management bracket that mounts to the front panel of each Management Input/Output (MIO) card.

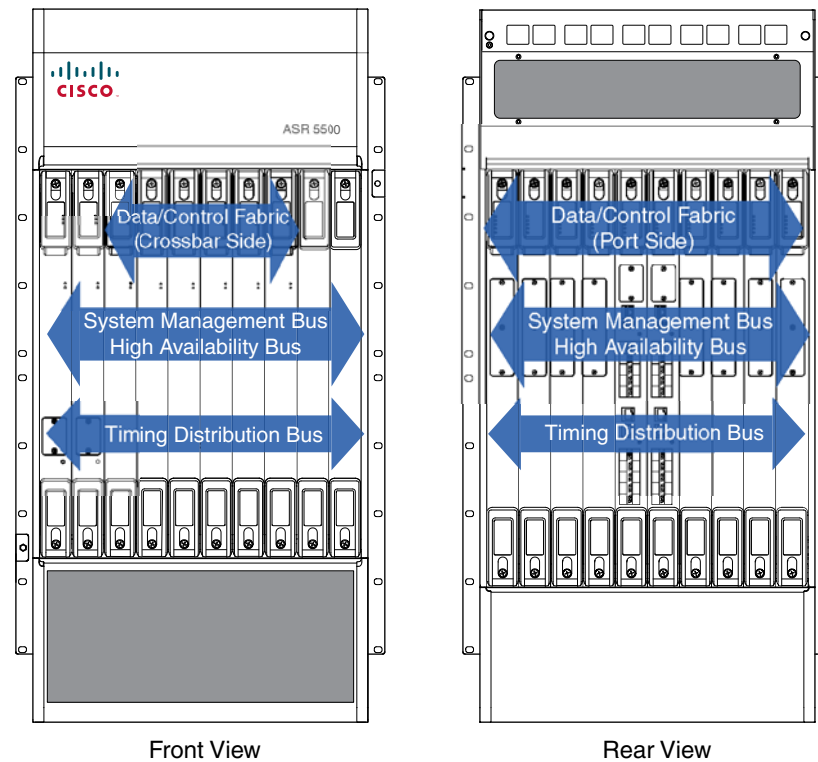
Network cables are fed from either side or both sides of the tray and are then routed to the MIO ports. The cables are secured to the cable management brackets on the MIOs via cable ties or hook-and-loop straps, and within the cable management tray via hook-and-loop straps.

# Midplane

The midplane within the ASR 5500 chassis interconnects rear input/output ports and processing cards with front fabric cards. The larger rear cards support chassis management, input/output, and session processing. The smaller front cards provide fabric crossbars, persistent storage and system status monitoring.

The rear slots have a common midplane connector that is shared between the supported cards. This allows for different mixes of input/output and processing capacity depending on the customer's intended use. The two MIO slots (5 and 6) have additional midplane connections to perform chassis control operations, including support for a serial Console port and dual remote management ports.

**Figure 1-4 ASR 5500 Midplane Buses**

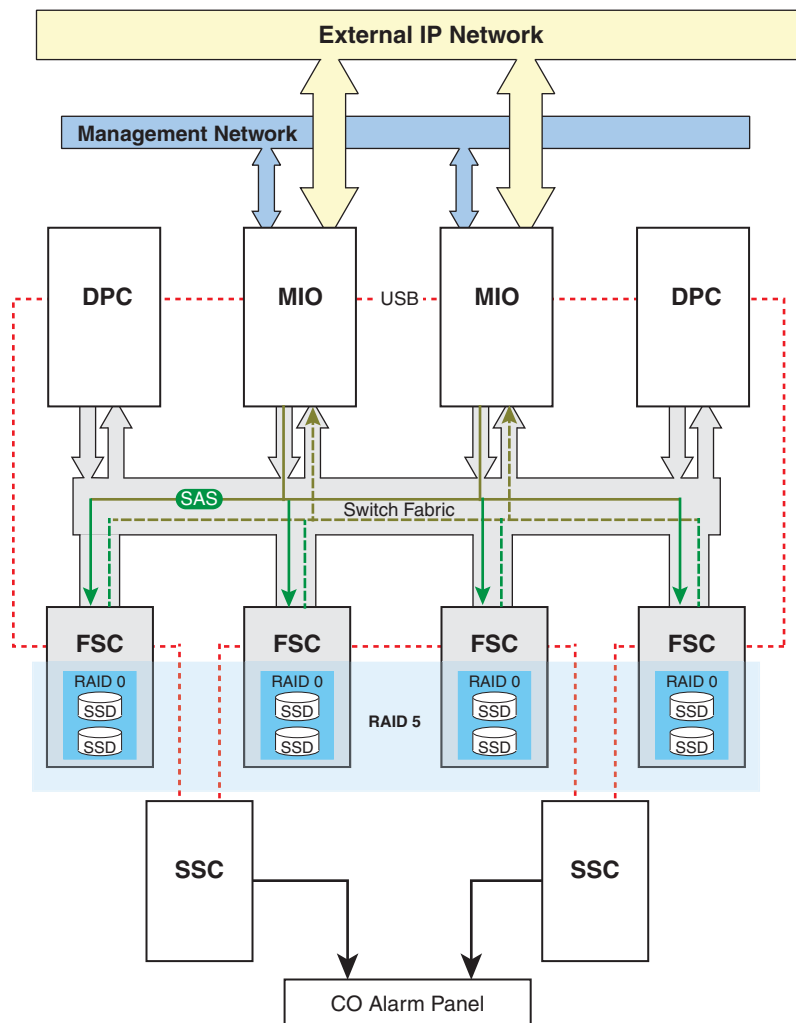


# Card Types

The ASR 5500 supports rear cards and front cards. Rear cards are larger and perform node management, packet processing and I/O functions (traffic sources). Front cards determine the amount of bandwidth for the switching fabric (crossbars), and indicate the operating and alarm status of the ASR 5500.

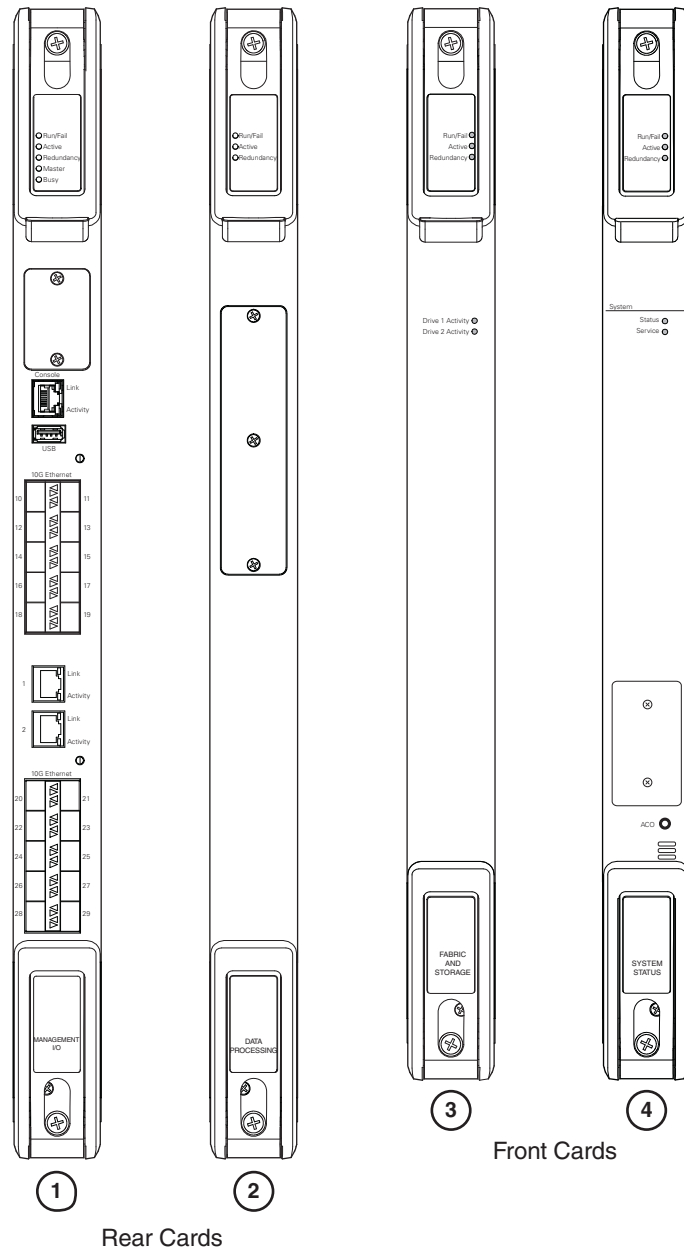
Figure 1-5 is a simplified block diagram showing the ASR 5500 card architecture.

**Figure 1-5 Block Diagram of Card Architecture**





**Figure 1-6 ASR 5500 Circuit Cards**



<b>1</b>	Management I/O	<b>2</b>	Data Processing Card
<b>3</b>	Fabric and Storage Card	<b>4</b>	System Status Card

## Rear Cards

The ASR 5500 supports two types of rear-mounted cards:

- [Management I/O Card \(MIO\)](#)
- [Data Processing Card \(DPC\)](#)

The ASR 5500 supports ten rear cards, a mix of MIOs, and DPCs. Each installed MIO or DPC is connected to the others via the switching fabric.

### Management I/O Card (MIO)

The ASR 5500 chassis supports two MIO cards placed in the rear facing slots of the chassis. The MIO cards perform chassis management, as well as local context and non-local context external I/O operations.



#### Note

The MIO cards automatically implement 1:1 port redundancy (active/standby). Ports are 1:1 redundant across slots 5 and 6. For example, port 10 on the MIO in slot 5 is redundant with port 10 on the MIO in slot 6.

Each MIO has:

- One CPU subsystem with 96 GB of RAM
- Four NPU subsystems

The two 1000Base-T (1GbE) ports on MIO cards can only be used for local context (OAM). An MIO includes support for:

- Midplane connections for chassis control operations
- SAS storage controller for FSC solid state drives (SSDs)
- RS-232 serial console (RJ45) for CLI management
- USB port for an external flash device
- 32GB SDHC internal flash device

MIO cards support two daughter card (DCs) for external I/O interfaces (100Gbps aggregate per DC). The optical ports on the daughter cards can only be used for non-local context. The currently available DC supports ten 10GbE interfaces. The interface ports accept SFP+ SR and LR transceivers.



#### Note

MIO daughter cards are not user installable or replaceable.



#### Note

MIO cards are shipped with SFP+ SR or LR transceivers installed.

## Data Processing Card (DPC)

The ASR 5500 chassis supports multiple DPCs in the rear facing slots of the chassis. The DPC contains a common subset of the midplane connectors on the MIO allowing it to plug into the same slots as the MIO cards.

The DPC has two identical CPU subsystems with each containing:

- 96GB of RAM
- NPU for session data flow offload
- Crypto offload engines located on a daughter card

DPCs manage subscriber sessions and control traffic.

## Front Cards

The ASR 5500 supports two types of front-mounted cards:

- [Fabric and Storage Card \(FSC\)](#)
- [System Status Card \(SSC\)](#)

The crossbars that comprise the switching fabric are on the FSCs. The ASR 5500 supports multiple FSCs. Each FSC provides six physical fabric planes. When fully populated, there are 24 fabric planes in the system. A physical fabric plane provides full-mesh connectivity between all traffic sources.

## Fabric and Storage Card (FSC)

The ASR 5500 chassis supports multiple FSCs in front facing slots of the chassis.

The FSC features:

- Fabric cross-bars providing in aggregate:
  - 120Gbps full-duplex fabric connection to each MIO
  - 60Gbps full-duplex fabric connection to each DPC
- Two 2.5" serial attached SCSI (SAS), 200GB solid state drives (SSDs) with a 6 Gbps SAS connection to each chassis management MIO.

Every FSC adds to the available fabric bandwidth to each card. Each FSC connects to all MIOs or DPCs, with a varying number of links depending on the MIO or DPC slot. Three FSCs provide sufficient bandwidth with the fourth FSC supports redundancy.

**Note**

Four FSCs are required for redundancy; the system can operate with three FSCs in the presence of a fourth failed FSC.

**Note**

The SSDs are not field replaceable units (FRUs). If an SSD fails the FSC must be replaced.

The ASR 5500 uses an array of solid state drives (SSDs) for short-term persistent storage. The RAID 05 configuration has each pair of drives on an FSC striped into a RAID 0 array; all the arrays are then grouped into a RAID 5 array. Each FSC provides the storage for one quarter of the RAID 5 array. Data is striped across all four FSCs with each FSC providing parity data for the other three FSCs. The array is managed by the Master MIO.

**Note**

A minimum of three FSCs must be online at all times for the array to operate. When an FSC is removed, one RAID 0 array is lost with the RAID 5 array providing redundancy.

**Note**

Removal of an FSC while the array is degraded or rebuilding may result in data loss.

The array appears under **/hd-raid** and is available to all DPCs and MIOs.

## System Status Card (SSC)

The ASR 5500 chassis supports two SSCs in front facing slots of the chassis. SSCs use dedicated slots in the left most slots of the front side of the chassis.

The SSC card features:

- Three alarm relays (Form C contacts)
- Audible alarm with front panel Alarm Cutoff (ACO)
- System status LEDs

# LED Indicators

All ASR 5500 circuit cards incorporate light emitting diode (LED) status indicators. A base group appears on all cards. Card-specific indicators show the status of ancillary functions.

## LED Indicators Common to All Cards

**Table 1-1 Base LED Group**

Label	State	Meaning
Run/Fail	Off	Offline
	Green – Blink	Transitioning
	Green – Solid	Online
	Red	Failure
Active	Off	Not applicable
	Green – Blink	Transitioning
	Green – Solid	Active
Redundancy	Off	Not applicable
	Amber – Solid	Non-redundant
	Amber – Blink	Transitioning
	Green	Redundant

## LED Indicators on Specific Cards

**Table 1-2 Card-specific LED Groups**

Label	State	Meaning
<b>MIO</b>		
Master	Off	Not applicable
	Green – Blink	Transitioning
	Green – Solid	Master
Busy	Off	No activity
	Green	Storage activity
<b>Interface Ports</b>		
Link	Off	No link with network
	Amber – Blink	Transitioning
	Green – Solid	Linked with network
Activity	Off	No activity
	Green – Blink	Data exchange

**Table 1-2 Card-specific LED Groups**

Label	State	Meaning
<b>FSC</b>		
Drive 1 Activity	Off	No Activity
	Green	Activity
Drive 2 Activity	Off	No Activity
	Green	Activity
<b>SSC</b>		
System Status	Off	System offline
	Green	System online
	Red	Service loss
System Service	Off	System OK
	Amber	Failed component



## CHAPTER 2

# Technical Specifications

This chapter defines the technical specifications related to the installation of an ASR 5500 system.

## Physical Dimensions

The ASR 5500 can be mounted in any standard (EIA-310-D, IEC 60297) 19-inch (482.6 mm) equipment cabinet or telecommunications rack. [Table 2-1](#) lists the dimensions for the chassis and each component that can be placed within the chassis.

**Table 2-1** *ASR 5500 Physical Dimensions and Weights*

Component	Height	Width	Depth	Weight
Chassis (empty) <sup>1</sup>	36.75 in. (93.3 cm)	17.25 in. (43.8 cm)	27.5 in. (69.8 cm)	113 lbs (51.25 kg)
Chassis as shipped <sup>2</sup>				226 lbs (102.5 kg)
Chassis (maximum) <sup>3</sup>	36.75 in. (93.3 cm)	17.25 in. (43.8 cm)	32.0 in. (81.3 cm)	450 lbs (204.1 kg)
Chassis (shipping) <sup>4</sup>	50 in. (127 cm)	24 in. (61 cm)	32 in. (81.3 cm) <sup>5</sup>	265 lbs (120.2 kg)
Fan Tray – Front	1.625 in. (4.13 cm)	16.37 in. (41.6 cm)	5.625 in. (14.3 cm)	5.5 lbs (2.5 kg)
Fan Tray – Rear	2.125 in. (5.4 cm)	16.87 in. (42.9 cm)	18.5 in. (47 cm)	24.5 lbs (11.1 kg)
Power Filter Unit	3.5 in. (8.9 cm)	8.5 in. (21.6 cm)	21.5 in. (54.6 cm)	15 lbs (6.8 kg)
FSC	19.75 in. (50.2 cm)	1.75 in. (4.44 cm)	6.75 in. (17.1 cm)	6 lbs (2.7 kg)
SSC				4.5 lbs (2 kg)
MIO <sup>6</sup>	21.75 in. (55.24 cm)	1.75 in. (4.44 cm)	19.5 in. (49.5 cm)	18 lbs (8.16 kg)
DPC				18.5 lbs (8.4 kg)
Baffle panel – front	19.75 in. (50.2 cm)	1.75 in. (4.44 cm)	6.25 in. (7 cm)	1 lb (0.45 kg)
Baffle panel – rear	21.75 in. (55.2 cm)	1.75 in. (4.44 cm)	18.625 in. (47.3 cm)	2.5 lbs (1.13 kg)

1. No PFUs or fan trays.

2. Includes four Fan Tray Units and two PFUs.

3. Depth and weight with cable management tray installed and closed, and all card slots filled.

4. Includes shipping container, accessory box, and chassis with four Fan Tray Units and two PFUs.

5. Width on the pallet forks.

6. Without cable management bracket.

# Environmental Specifications

The ASR 5500 is designed for deployment in unattended sites equipped with redundant power systems, redundant data communications connections, environmental controls (air conditioning, fire suppression), security devices and controlled access.

## Environmental Parameters

Table 2-2 lists the environmental parameters (operating and storage) for the ASR 5500 chassis.

**Table 2-2 Environmental Parameters**

Parameter	Subparameter	Range
Temperature	Operating	0°C to +40°C (32°F to 104°F)
	Short Term <sup>1</sup>	-5°C to +50°C (23°F to 122°F)
	Storage	-40°C to +70°C (-40°F to 158°F)
Humidity	Operating	20 to 80 percent non-condensing
	Storage	10 to 95 percent non-condensing
Altitude	Operating	197 ft. (60m) below to 5,905 ft. (1,800m) above sea level, maximum 40°C (104°F)
		5,905 ft. (1,800m) to 13,123 ft. (4000m) above sea level, maximum 30°C (86°F)
	Non-operating	197 ft. (60m) below to 49,212 ft. (15,000m) above sea level
Acoustic Noise	23°C (73.4°F)	81 dB (within GR-63 limits for unattended operation)
	27°C (80.6°F)	81 dB (within GR-63 limits for unattended operation)
	Max. Fan Speed	96 dB (as measured during GR-63 R4-97 testing)

1. Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.)



## Environmental Standards

The ASR 5500 has been successfully tested for compliance with the environmental standards listed in [Table 2-3](#).

**Table 2-3** *Environmental Compliance Standards*

Type	Standard
Acoustic Noise	Telcordia GR-63 Criterion [128]
Airborne Contaminants, Indoor Levels	Telcordia GR-63 Criterion [125]
Airborne Contaminants, Outdoor Levels	Telcordia GR-63 Criteria [126, 127]
Altitude	Telcordia GR-63 Criteria [74, 76]
Earthquake Zone 4	Telcordia GR-63 Criteria [110-112, 114, 115, 117, 119]
Electromagnetic Compatibility and Electrical Safety	Telcordia Technologies GR-1089-CORE
Operational Thermal, Operating Conditions	Telcordia GR-63 Criteria [72, 73]
Operational Thermal, Short-term Conditions	Telcordia GR-63 Criteria [72, 73]
Storage Environments, and Transportation and Handling	Telcordia GR-63 Criteria [69-71, 107-109, 124]
Thermal Heat Dissipation	Telcordia GR-63 Criteria [77, 79]
Electromagnetic Compatibility and Electrical Safety	Telcordia Technologies GR-1089-CORE
Radiated Emissions (Electric Field)	FCC 47 CFR, PART 15, CLASS A
Electromagnetic Compatibility	ETSI EN 300 386 v1.4.1
Environmental Conditions and Environmental Tests for Telecommunications Equipment	ETSI EN 300 019, ETSI EN 300 753

## Chassis Air Flow

Air flow within the ASR 5500 complies with Telcordia recommendations to ensure vertical convection cooling of the system.

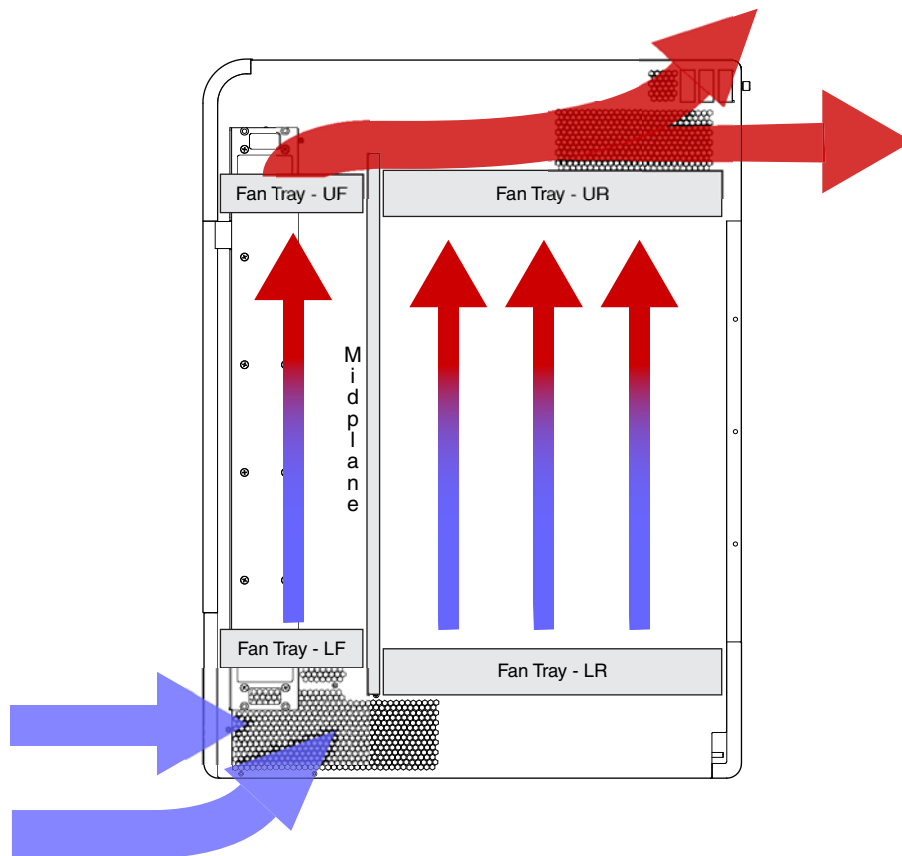
As shown in [Figure 2-1](#), the lower fan trays pull ambient air inward from the front and side intake vents located near the bottom of the chassis. The air absorbs heat from system components as it passes over them.

The upper fan trays pull heated air up through the chassis and exhaust it through the side and rear exhaust vents located near the top rear of the chassis.



### Caution

The environmental control system within the installation site must be able to maintain the ambient environment within the limits for operating temperature and humidity (refer to [Table 2-2](#)).

**Figure 2-1 Air Flow**

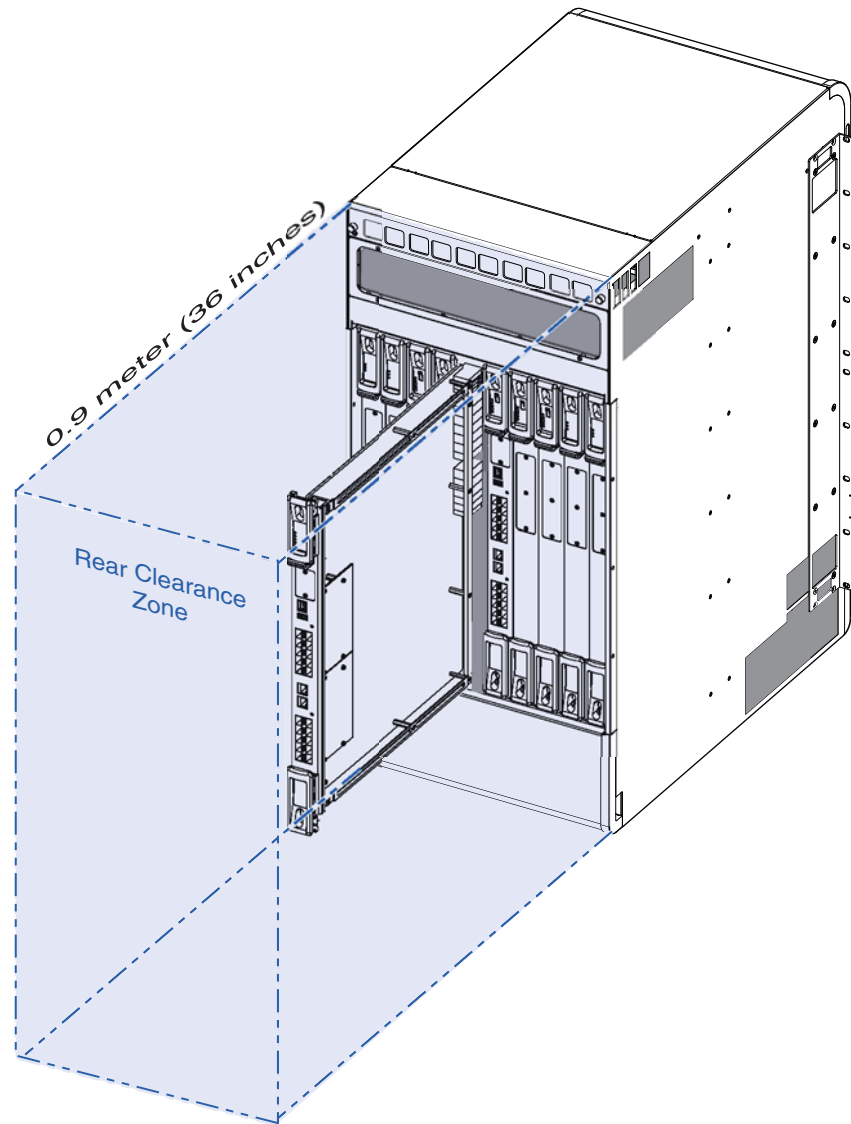
## Clearance

Ensure that the equipment rack or cabinet hardware does not hinder air flow at any of the intake or exhaust vents. Allow approximately 0.9 meter (36 inches) at the front and rear of the chassis for air flow and maintenance access.

**Note**

The rear clearance is also necessary for removing and replacing the rear cards and fan trays (see [Figure 2-2](#)). These units are very large and require additional clearance from cable management bars, PDUs, etc.

**Figure 2-2**      *Rear Clearance Zone*



# Mounting Requirements

Each ASR 5500 chassis occupies 21 RU (rack units) within any standard (EIA-310-D, IEC 60297) 19-inch (482.6 mm) equipment rack or cabinet using the mounting brackets supplied with the chassis. Extension brackets (not supplied) may be used in conjunction with the chassis mounting brackets to install the chassis in a standard 23-inch (584.2 mm) cabinet or rack. The chassis mounting brackets may be repositioned to support flush and mid-mount installations.

The chassis footprint is approximately 19-inch (48.26 cm) wide by 26.75 in. (67.9 cm) long.


**Note**

This footprint does not include the rear-mounted cable management tray.

Two ASR 5500 chassis fit in 42 RU (73.5 in.) of space within an equipment rack or cabinet.


**Note**

Rack mounting requires the use of industry-standard equipment racks or cabinets with supplier-recommended fasteners. The rack should be rated to accommodate the weight of one or two chassis and any auxiliary equipment.

## Power Requirements

Table 2-4 lists the power requirements for individual components of the ASR 5500 chassis.

**Table 2-4 ASR 5500 Power Requirements**

Component	Parameter	Values
Chassis	Input voltage per feed circuit (nominal)	-48VDC
	Input voltage per feed circuit (maximum)	-40VDC to -60VDC
	Power feed circuits per PFU	4
	TUV rated peak current load per feed	80 amps @ -40 VDC
	Maximum power load per chassis	12,800 watts
<b>Cards</b>		
FSC	Maximum power	100 watts
SSC	Maximum power	10 watts
MIO	Maximum power	900 watts
DPC	Maximum power	1,000 watts
<b>Fan Tray Unit</b>		
Front	Maximum power	60 watts each (2 per chassis)
Rear	Maximum power	840 watts each (2 per chassis)

## Central Office Alarm Interface

The Central Office (CO) alarm interface on the SSC is a DB15 connector that supports three dry-contact relay switches. Each of the Form C relays is rated to support a maximum switching current of 1A@30VDC.

**Caution**

The alarm relay contacts should never be connected to high current draw devices, such as sirens or flashing incandescent lamps.

The three relays support both normally-open (NO) and normally-closed (NC) devices. For additional information, refer to [SSC Alarm Cabling](#).

## Chassis Grounding

The ASR 5500 is suitable for installation as part of the Common Bonding Network (CBN) within a network telecommunications facility. It is not intended for installation in an Isolated Bonding Network (IBN).





# CHAPTER 3

## Installation Procedure Overview

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This chapter briefly describes the steps and tools that are required to install the ASR 5500 chassis.



**Warning**

**The copper serial Console port, 1000Base-T management ports, and CO alarm interface of the ASR 5500 are suitable for connection to intra-building or unexposed wiring or cabling only. These ports MUST NOT be metalically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.**

---

## Installation Sequence

Installation of the ASR 5500 requires the completion of the following procedures:

- Unpack the chassis and cards.
- Determine which chassis mounting option to use: flush or mid-mount. Reposition the mounting brackets if necessary.
- Install the chassis into a standard 19-inch equipment rack or telecommunications cabinet.
- Connect the chassis ground point to site ground.
- *Optional:* Install the Chassis Management System.
- Install SSC and FSC cards into the front of the chassis.
- Install MIO cards and DPCs into the rear of the chassis.
- Connect data cables to the local and external ports.
- Connect power cables to the PFU terminals at the top rear of the chassis.
- Apply power to the chassis.
- Verify that the system powers up successfully.

The actual sequence for completing some of the above procedures may be adapted to suit local requirements and the availability of resources. For example, power cabling may be completed before circuit cards are installed in the chassis. However, the chassis must always be grounded immediately after being mounted in the rack or cabinet.



**Caution**

For personal safety and to minimize the risk of equipment damage, power must not be applied to the chassis until all other procedures have been completed.

---

# Required Tools and Equipment

This section lists the tools and equipment needed for installation.

## Hand Tools

The following hand tools are required for installation of the chassis circuit cards and PFUs:

- Cable/wire stripping tool – used to prepare the ends of power and ground cables for attachment to two-hole lugs.
- Knife, scissors or tin snips to cut shipping straps on the chassis container.
- Panduit crimping tool with 4 AWG die – used to crimp two-hole lugs on the ends of power feed cables.
- Phillips #2 and #1 screwdrivers – used to tighten thumb-screws on cards, fan trays, PFUs, and mounting brackets.

**Caution**

The inappropriate use of electric or pneumatic torque drivers, or power drill/impact drivers to loosen or tighten fasteners may result in damage to system components.

- 7/16-inch nut driver or ratchet and socket set – used to connect power and return, as well as chassis grounding cable lugs to PFU terminals.
- Torque wrench (rated 50 in-lb [5.65 N-m]) with 7/16-inch socket for tightening lugs to power terminals.
- Grounding wrist and/or heel straps for prevention of Electro-Static Discharge (ESD).

**Caution**

During installation, maintenance, and/or removal, wear a grounding wrist strap connected to the ASR 5500 chassis to avoid ESD damage to the components. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

## Equipment

The following equipment is necessary to install the chassis and verify that it is ready for configuration:

- Standard 19-inch (48.26 cm) equipment rack (4-post or 2-post) or telecommunications cabinet with mounting hardware.

**Note**

The rack/cabinet must be installed in accordance with OEM recommendations and local practices for electrical/grounding and seismic conditions.

- Multiple -48 VDC power feeds terminated at the rack/cabinet.
- Voltmeter to measure input voltages at the PFU terminals.
- Heat gun for installing shrink wrap tubing over power cable lugs.
- Computer with a DB9 RS-232C serial port or a terminal server port that will connect to the RJ45 Console port on the chassis management MIOs for accessing the Command Line Interface (CLI).



- Pallet jack and/or chassis lift to move and position the ASR 5500 chassis. Without such mechanical assistance, moving and positioning the chassis will require multiple craftpersons trained to safely handle heavy rack-mounted units.

## Site Prerequisites

This section summarizes power, grounding, environment, and clearance requirements that must be met prior to installing and operating the ASR 5500. For detailed information, refer to the [Technical Specifications](#) chapter.

## Power and Grounding

Each PFU requires eight power feeds of 80A @ -48VDC (nominal). The feeds should be routed to the installation rack from the site power supply using adequately sized conductors and circuit breakers in accordance with local electrical codes.

The chassis must be grounded to a site ground point using the recommended conductors and lugs. The ground point should be in close proximity to the ASR 5500 chassis to assure adequate conductivity.

## Environment

The site's heating ventilation and air conditioning (HVAC) systems must be sized to maintain the operating temperatures and relative humidity specified in the [Technical Specifications](#) chapter. HVAC capacity requirements will vary based on the system configuration and associated power draw, as well as the operational characteristics of other equipment installed at the site.

## Clearance

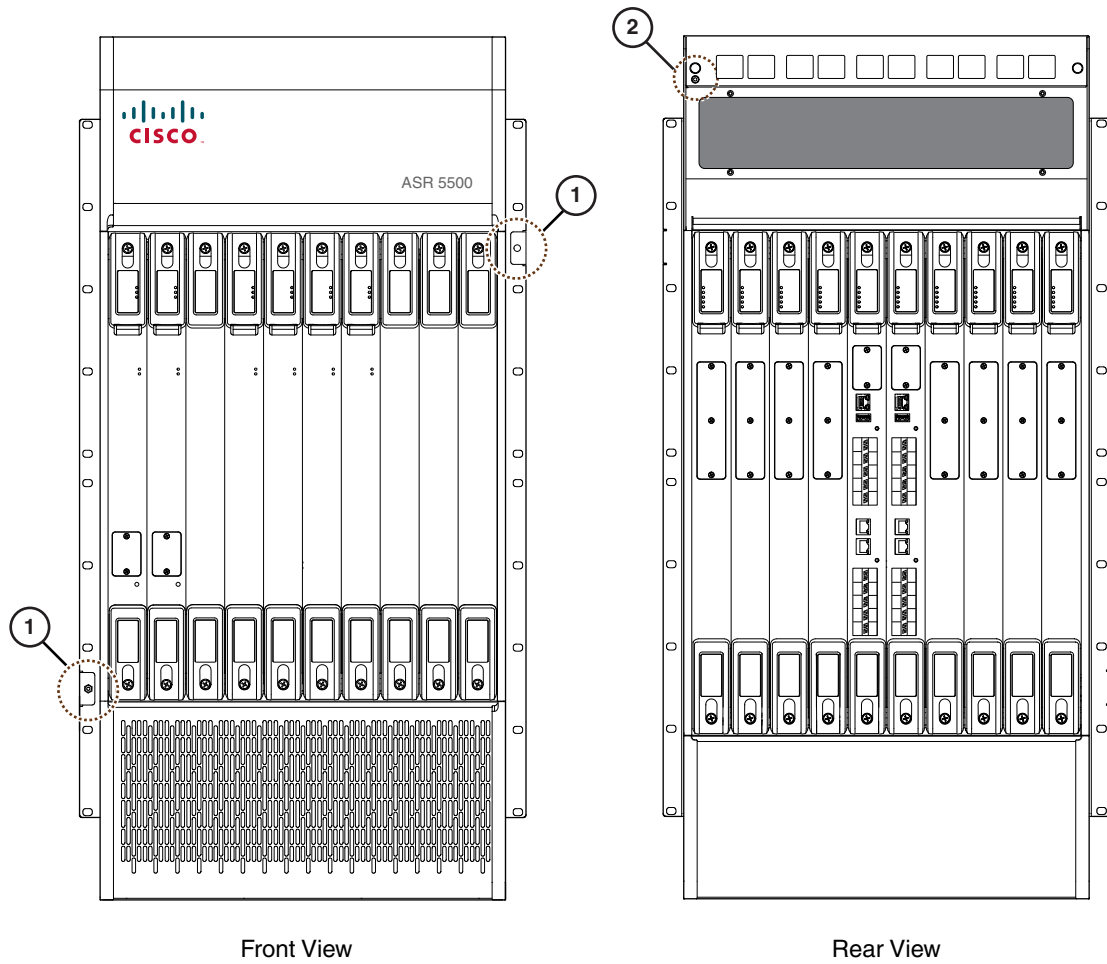
Adequate clearance must be maintained at the front and rear of the ASR 5500 chassis to assure proper air flow and allow maintenance access for the installation, removal and replacement of components. The recommended clearance is 36 inches (92 centimeters) at the front and rear of the chassis.

## ESD Precautions

Electro-Static Discharge (ESD) can cause serious damage to the chassis, its sub-components and/or the cards installed in the chassis. To prevent damage from ESD, you must take proper grounding precautions before handling the chassis or any of its components.

The chassis and its mounting brackets are equipped with ESD jacks (see [Figure 3-1](#)). Use the jacks in conjunction with grounding wrist straps when handling the chassis and/or its components. The following figure shows the location of the jacks.

Before you can use the ESD jacks on the ASR 5500 chassis and its mounting brackets, you must first connect the chassis to ground according to the instructions in the [Chassis Installation](#) chapter of this document.

**Figure 3-1** *Locations of ESD Jacks on the ASR 5500 Chassis.*

<b>1</b>	Front ESD jack	<b>2</b>	Rear ESD jack
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# Standards Compliance

## FCC Warning

This device complies with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and Regulations. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must withstand any interference received, including interference that may cause undesired operation.

The system platform has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules and Regulations. These limits are designed to provide reasonable protection against harmful interference when this 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 and television communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his or her own expense.

Shielded cables must be used with this unit to ensure compliance with the FCC Class A limits.

## ICS Notice

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.

## Laser Notice

The laser devices in this equipment are Class 1 devices. Class 1 laser devices are not considered to be hazardous.





## CHAPTER 4

# Chassis Installation

---

This chapter describes how to install the ASR 5500 chassis and its components.



**Note**

---

The ASR 5500 is suitable for installation in Network Telecommunication Facilities designed for unattended equipment operation.

---

## Mounting Options

There are two options for mounting the chassis in a standard 19-inch equipment rack or telecommunications cabinet:

- **Flush mount:** In this configuration, the flanges of the mounting brackets are flush with the front of the chassis. This is the default configuration as shipped. This method is typically used to mount the chassis in a 4-post rack or equipment cabinet. Refer to [Flush Mount](#).
- **Mid-mount:** In this configuration, the flanges of the mounting brackets are recessed from the front of the chassis. To do this, the mounting brackets must be removed and reinstalled toward the middle of the chassis. This method is typically used to mount the chassis in a two-post rack. Refer to [Mid Mount](#).

## Weight Considerations

The shipping weight of the chassis is approximately 226lbs (102.5 kg). Please consider the following recommendations before proceeding:

- If available, use an equipment lift to move the chassis and position it into the rack/cabinet.
- If a lift is not available, reduce the weight of the chassis by following the instructions in [Reducing the Weight of the Chassis Prior to Installation](#).
- Remove all obstructions in the path from the delivery location to the rack/cabinet.
- At least two people should perform the installation. These individuals should be physically able to lift and control the weight of the chassis.
- When lifting any heavy object, remember to bend at the knees and lift with your legs. Bending at the waist and lifting with your back could cause personal injury.

**Note**

The ASR 5500 chassis is shipped with no circuit cards installed. Only the PFUs, fan trays and air filters are installed. The circuit cards are shipped in separate cartons.

**Caution**

If you are mounting two chassis in a single rack, verify that the rack is rated to handle the combined, fully loaded weight of both chassis and any ancillary equipment.

## Unpacking the Chassis

The ASR 5500 chassis is shipped on a palletized container.

**Note**

The front and rear circuit cards are packaged and shipped in separate cartons.

**Note**

Locate the packing list for the shipment and verify that all components have been received.

**Note**

Safely store the shipping container and its components in case the chassis must be shipped to another site or returned for repair.

## Move the Container to the Installation Site

Before unpacking the chassis, use a pallet jack to move the container as close to the final installation site as possible. The cardboard cap and sleeve will protect the chassis from damage when moving the container.

The chassis container measures:

- Height = 50 in. (127 cm)
- Width = 24 in. (61 cm)
- Depth = 32 in. (81.3 cm) [width on the pallet forks]
- Weight = 265 lbs (120.2 kg)

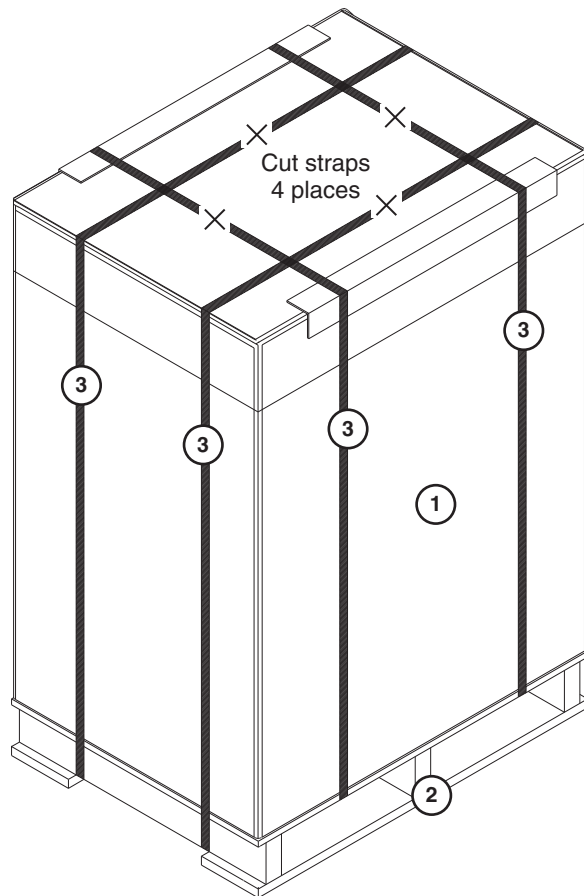
## Unpack the Chassis

**Warning**

**You should wear protective gloves and safety glasses when handling the shipping crate banding while unpacking the system. The straps that connect the packaging material are capable of inflicting damage to your skin or eyes if not handled properly.**

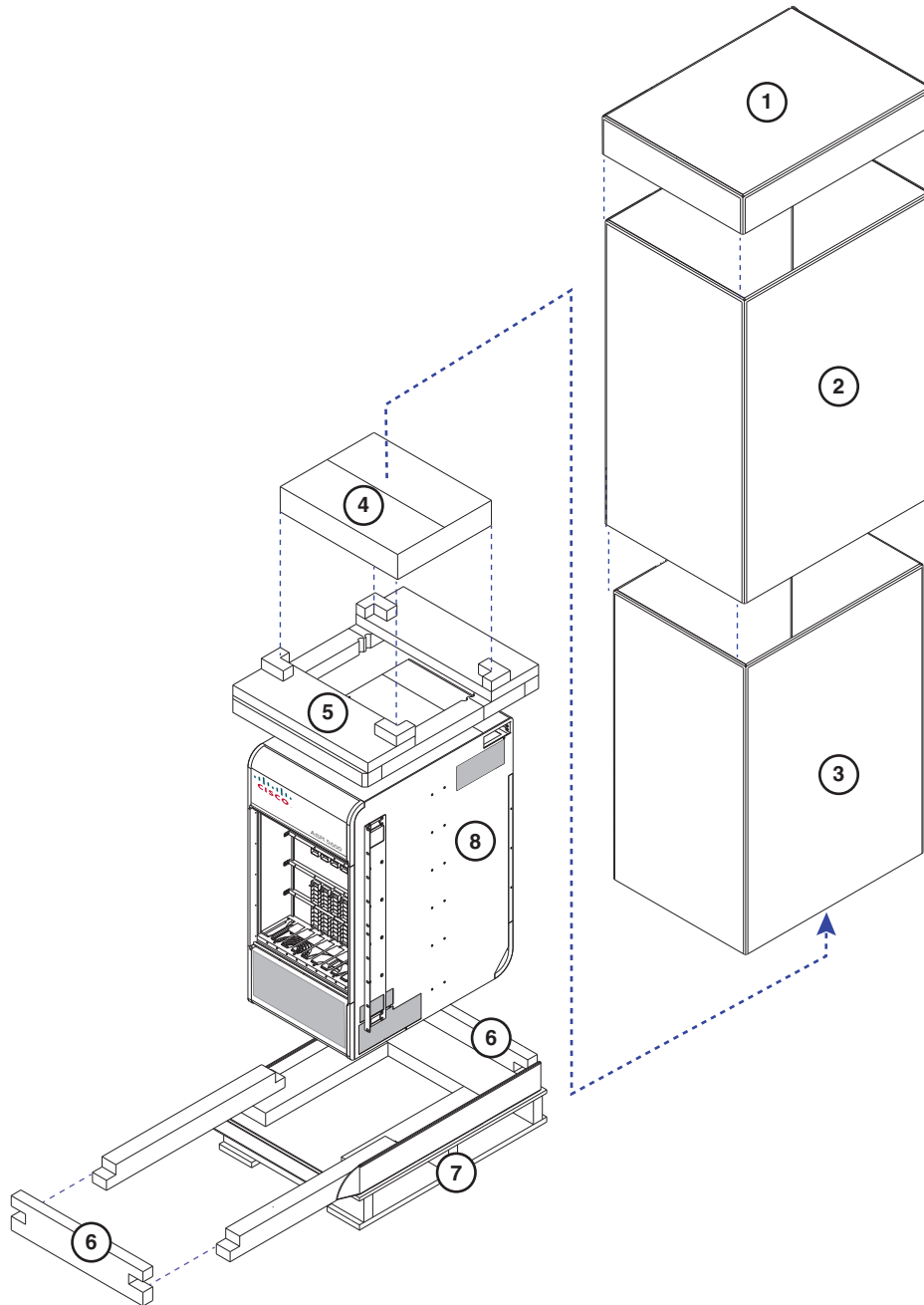
Complete the following procedures to remove the ASR 5500 chassis from the shipping container.

- 
- Step 1** Cut the straps that secure the cap and cardboard sleeve to the pallet. See [Figure 4-1](#). Remove the straps from the pallet and discard.
  - Step 2** Remove the cardboard cap from the top of the container. See [Figure 4-2](#).
  - Step 3** Lift the outer cardboard sleeve up and over the top of the chassis.
  - Step 4** Lift the inner cardboard sleeve up and over the top of the chassis.
  - Step 5** Remove the accessory box. This box contains miscellaneous hardware items and spare air filters.
  - Step 6** Remove the foam cap from the top of the chassis.
  - Step 7** Remove the bottom front and rear end caps from the base of the chassis.
  - Step 8** Remove the plastic bag that covers the chassis.
  - Step 9** If you will be removing chassis components to reduce the weight of the chassis, leave the chassis on the pallet and proceed to [Reducing the Weight of the Chassis Prior to Installation](#).
  - Step 10** Use a chassis lift or multiple craftpersons to lift or slide the chassis off the shipping pallet. Proceed to [Installing the Chassis](#).
-

**Figure 4-1**      **Strapped Shipping Container**

<b>1</b>	Container sleeve	<b>2</b>	Pallet
<b>3</b>	Strap		



**Figure 4-2 ASR 5500 Shipping Container**

<b>1</b>	Cardboard top	<b>2</b>	Outer sleeve
<b>3</b>	Inner sleeve	<b>4</b>	Accessory box
<b>5</b>	Foam cap	<b>6</b>	End cap
<b>7</b>	Pallet	<b>8</b>	Plastic bag (not shown)

# Reducing the Weight of the Chassis Prior to Installation

You can reduce the weight of the chassis prior to installation by removing the upper and lower fan trays, and the PFUs. Follow the instructions below to safely remove these components prior to installation.

## Removing the Fan Trays

**Caution**

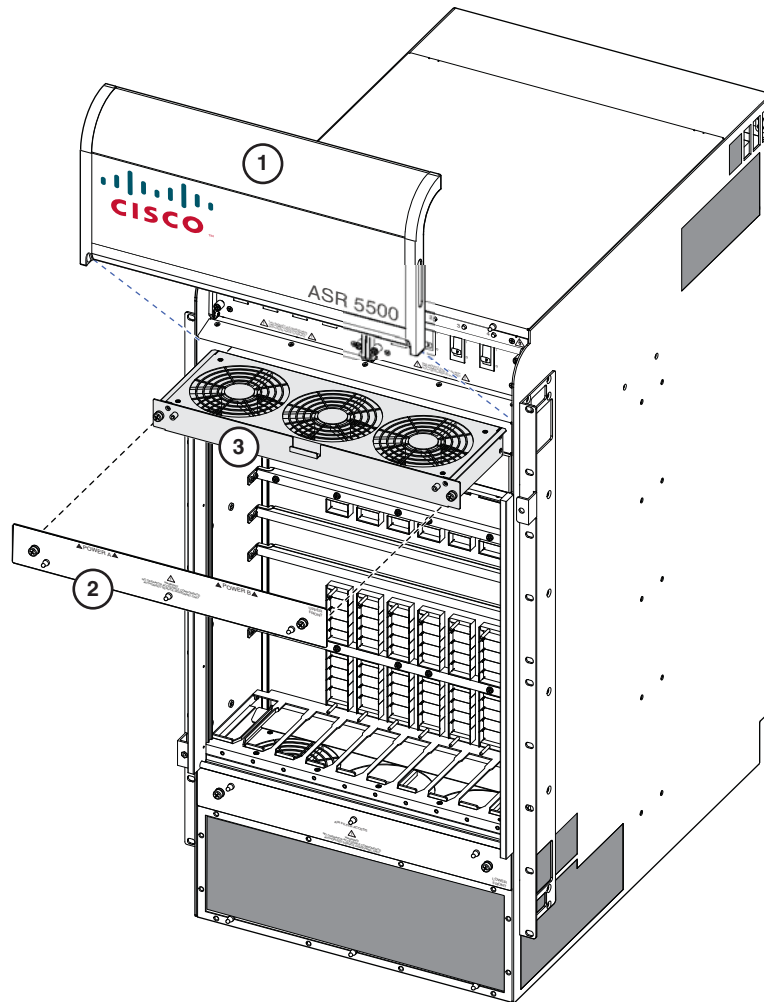
To avoid personal injury and/or damage to the fan trays, be sure to support each fan tray's weight from its front and rear as you slide it completely out of the chassis.

### Remove the Upper Front Fan Tray

- Step 1** At the front of the chassis, remove the cover panel from the top of the chassis (see [Figure 4-3](#)). Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside.
- Step 2** Use a #1 Phillips screwdriver to loosen the screws and remove the access panel from the upper-front of the chassis. Place it safely aside.
- Step 3** Loosen the two screws on the fan tray.
- Step 4** Grasp the center pull on the front of the fan tray and pull. The fan tray should unseat from the midplane connector and slide out of the chassis.
- Step 5** Place the fan tray safely aside.

### Remove the Lower Front Fan Tray

- Step 1** Remove the cover panel from the bottom of the chassis. Firmly grasp the side edges of the panel and pull down and away to unsnap the panel. Put the panel safely aside.
- Step 2** Use a #1 Phillips screwdriver to loosen the screws and remove the access panel from the lower-front of the chassis. Place it safely aside.
- Step 3** Loosen the two screws on the fan tray.
- Step 4** Grasp the center pull on the front of the fan tray and pull. The fan tray should unseat from the midplane connector and slide out of the chassis.
- Step 5** Place the fan tray safely aside.

**Figure 4-3 Removal of Upper Front Fan Tray**

1	Cover panel	2	Access panel
3	Front fan tray		

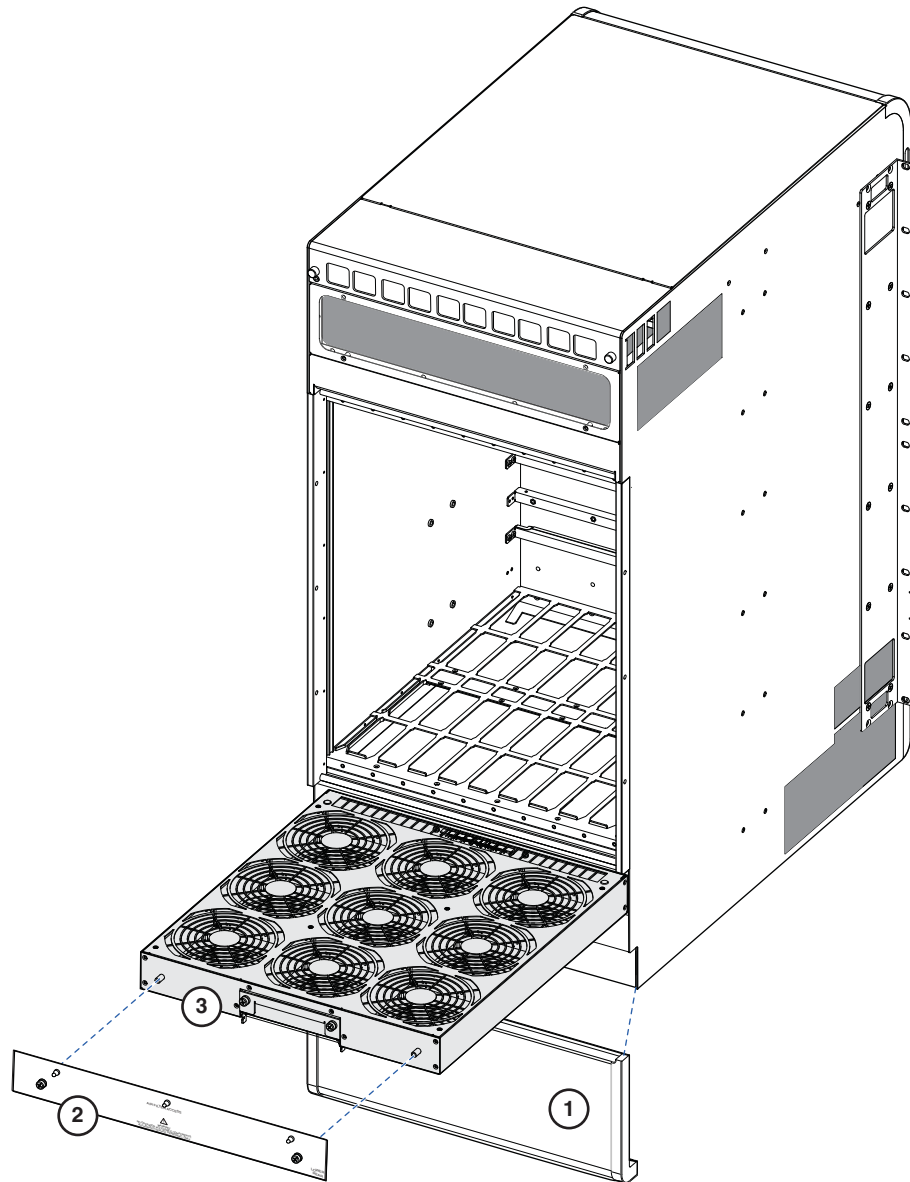
## Remove the Upper Rear Fan Tray

- Step 1** At the rear of the chassis, remove the cover panel from the top of the chassis just below the vent panel. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside.
- Step 2** Loosen the screws and remove the upper fan tray access panel from the chassis. Place it safely aside.
- Step 3** Use a #1 Phillips screwdriver to loosen the two screws that secure the handle to the front of the fan tray.
- Step 4** Flip up and grasp the fan tray handle and pull. The fan tray should unseat from the midplane connector and slide out of the chassis. Support the bottom of the fan tray unit with one hand as you pull it away from the chassis.

- Step 5** Place the fan tray unit safely aside.
- 

## Remove the Lower Rear Fan Tray

- 
- Step 1** Remove the cover panel from the bottom of the chassis. Firmly grasp the side edges of the panel and pull down and away to unsnap the panel. Put the panel safely aside. See [Figure 4-4](#).
- Step 2** Loosen the two screws and remove the access panel from the upper-front of the chassis. Place it safely aside.
- Step 3** Use a #1 Phillips screwdriver to loosen the two screws that secure the handle to the front of the fan tray.
- Step 4** Flip up and grasp the fan tray handle and pull. The fan tray should unseat from the midplane connector and slide out of the chassis. Support the bottom of the fan tray unit with one hand as you pull it away from the chassis.
- Step 5** Place the fan tray unit safely aside.
-

**Figure 4-4**      **Removal of Lower Rear Fan Tray**

1	Cover panel	2	Access panel
3	Rear fan tray		

## Removing the PFUs

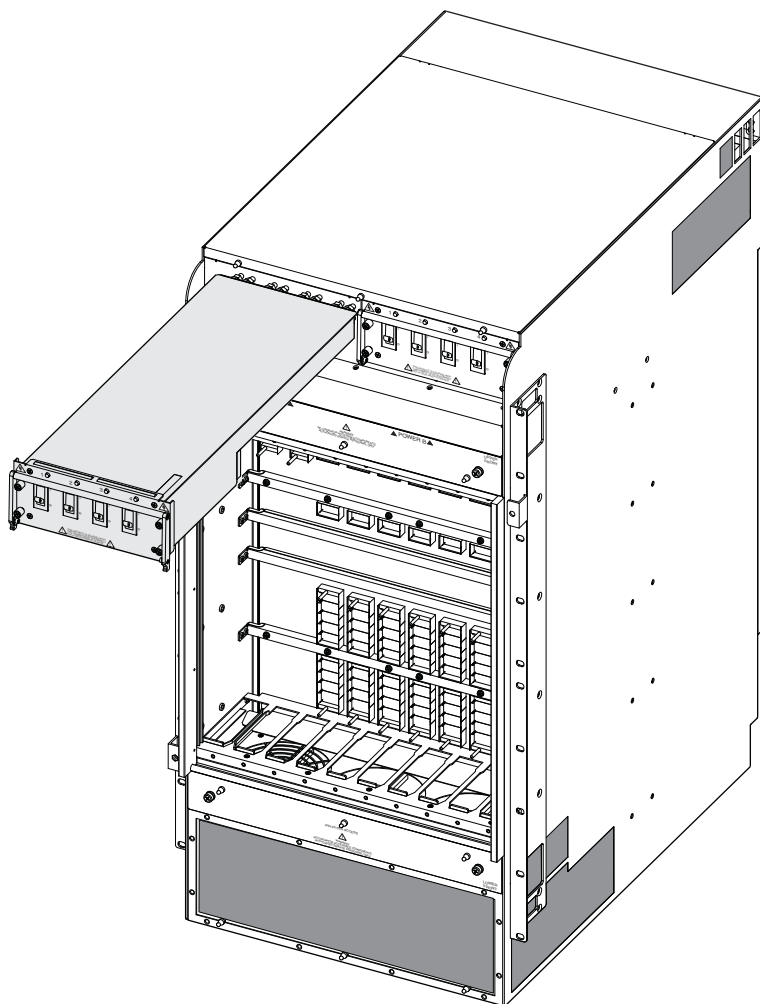
- Step 1** Locate the left PFU bay (Power A) on the upper-left front of the chassis (see [Figure 4-5](#)).
- Step 2** Use a Phillips #2 screwdriver to loosen the four screws that secure the PFU to the chassis.
- Step 3** Grasp the handle on the PFU and pull downward to free the unit from the power plane connectors. Pull the PFU toward you. The PFU should slide easily out of the chassis. Place it safely aside.



**Note** It will take considerable force to move the handle downward and free the PFU from the power plane connectors.

- Step 4** Repeat step 2 through step 4 for the PFU located in the right bay (Power B).

**Figure 4-5** Removal of a PFU



# Installing the Chassis

**Note**

If you are installing more than one chassis in an equipment rack, install the first chassis at the bottom of the rack.

**Caution**

When handling or moving the chassis, lift the chassis from the bottom only. Lifting it by any other part could damage the chassis.

**Caution**

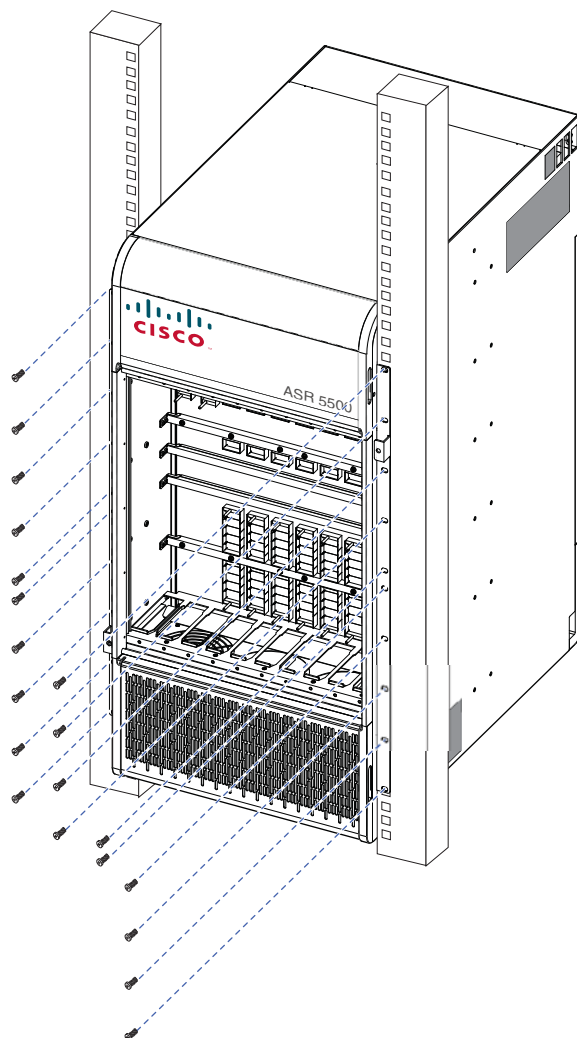
During installation, maintenance and/or removal, wear a grounding wrist strap to avoid ESD damage to the components. Connect the strap to a ground point on the rack/cabinet frame. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

## Mounting the Chassis

### Flush Mount

To flush mount the chassis in an equipment rack/cabinet:

- 
- Step 1** Position the chassis in the equipment rack so that the flanges of the mounting brackets at the front of the chassis are flush with the mounting rails of the equipment rack. See [Figure 4-6](#).
  - Step 2** Mount the chassis to the rack rails using the OEM hardware that was supplied with the equipment rack. Begin with the two bottom holes and work your way up until all holes on each flange are secured.
  - Step 3** Repeat step 1 and step 2 if you are installing an additional chassis in the equipment rack/cabinet.
  - Step 4** If you took steps to reduce the weight of the chassis prior to installation, refer to [Re-Installing Chassis Components](#). Otherwise, proceed to [Grounding the Chassis](#).
-

**Figure 4-6** Flush Mounted ASR 5500 Chassis

## Mid Mount

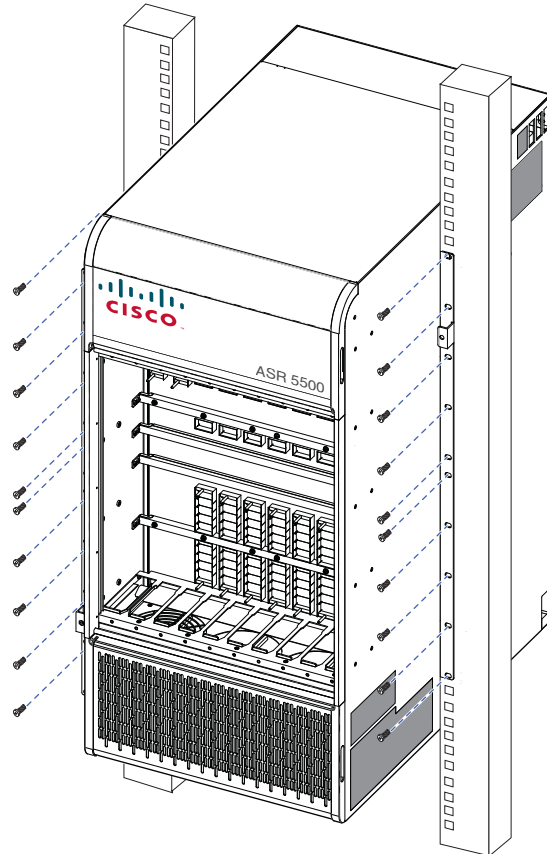
To mid mount the chassis in an equipment rack:

- 
- Step 1** On the side of the chassis, use a Phillips #2 screwdriver to remove the twelve flathead screws that secure the mounting bracket to the chassis.
  - Step 2** Place the mounting bracket over the middle set of mounting holes on the side of the chassis and secure it to the chassis with the screws you removed in step 1.
  - Step 3** Repeat step 1 and step 2 and reposition the bracket on the opposite side of the chassis.
  - Step 4** Position the chassis in the equipment rack so that the flanges of the mounting brackets are flush with the mounting rails of the equipment rack. See [Figure 4-7](#).
  - Step 5** Mount the chassis to the rack rails using the OEM hardware that was supplied with the equipment rack. Begin with the two bottom holes and work your way up until all holes on each flange are secured.



- Step 6** If you took steps to reduce the weight of the chassis prior to installation, refer to [Re-Installing Chassis Components](#). Otherwise, proceed to [Grounding the Chassis](#).

**Figure 4-7** Mid Mounted ASR 5500 Chassis



## Grounding the Chassis

The chassis must be properly grounded prior to installing any chassis components or cards. The chassis and the equipment rack/cabinet must be connected to the same ground point.



**Caution**

Failure to properly ground the chassis could result in personal injury and/or damage to the chassis and its components.

There are two sets of grounding terminals located at the lower-rear of the chassis. [Figure 4-8](#) shows the location of these terminals and provides specifications for the appropriate lug and cable size.

## Ground Cabling



### Note

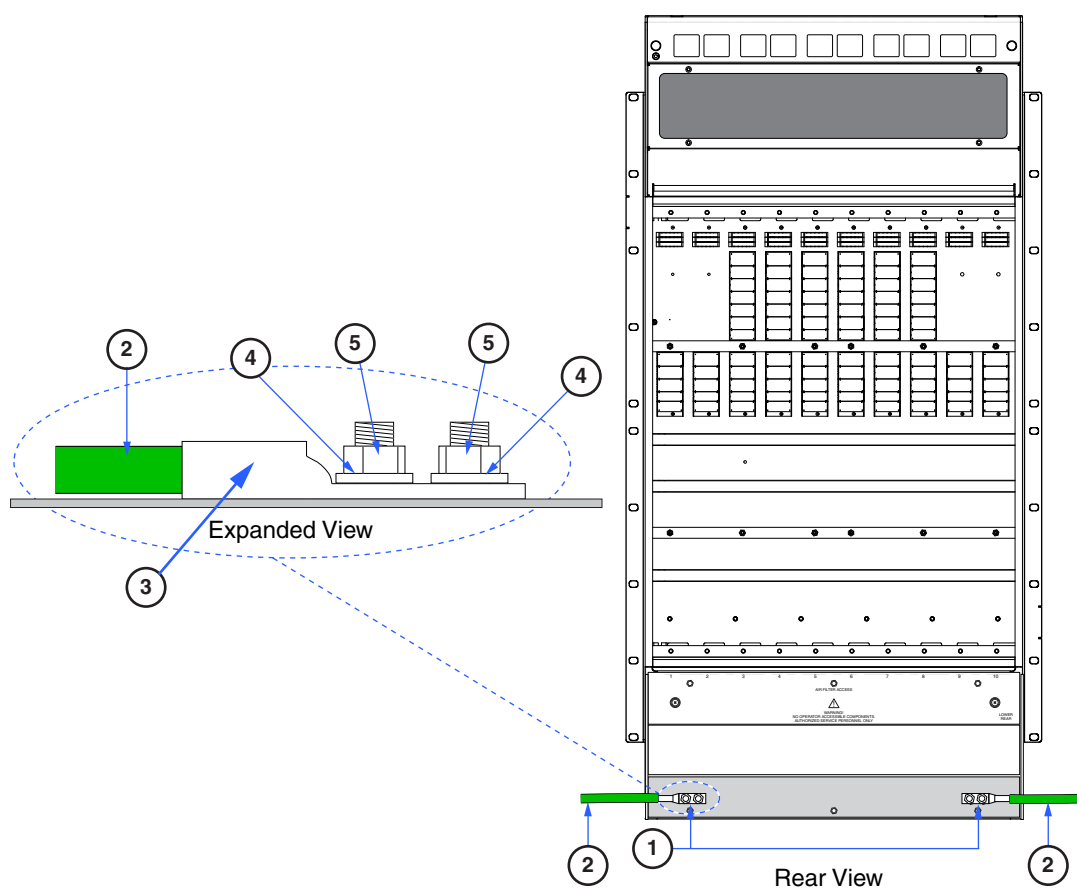
The ASR 5500 is suitable for installation as part of the Common Bonding Network (CBN) in a network telecommunications facility. It is not intended for installation in an Isolated Bonding Network (IBN).

A 2-hole lug (Panduit LCD4-14A-L) is supplied for grounding the chassis. The lug must be crimped to the end of a ground cable using Panduit crimp tool part number CT-720-1 (die color: gray, P29). The wire strip length is 7/8-inch (22 mm),

The minimum, recommended stranded cable size is 4 AWG. the cable length to the site ground point should not exceed 70 feet (21 m) one way.

The method of connection is: chassis -> lug -> flat washer -> nut (7/16-inch).

**Figure 4-8** Location of Chassis Ground Terminals.



1	Chassis ground point	2	Grounding cable
3	2-hole lug	4	Flat washer
5	7/16-inch hex nut		

## Grounding Procedure

- 
- Step 1** Remove the rear bottom cover from the chassis. Grasp both sides of the cover and pull out and up to unsnap the cover.
- Step 2** Locate the ground terminal on the lower-left corner at the rear of the chassis.
- Step 3** Use a 7/16-inch nut driver or socket wrench to remove the nuts and washers from each post.
- Step 4** Insert the lug connected to the grounding cable over the two posts.
- Step 5** Secure the lug to the ground terminals with the nuts and washers you removed in step 2. The nuts should be torqued to 50 in-lb (5.65 N-m).
- Step 6** Repeat step 2 through step 4 to connect the ground cable to the grounding posts on the lower-right corner at the rear of the chassis.
- Step 7** If you took steps to reduce the weight of the chassis prior to installation, refer to the instructions in the [Re-Installing Chassis Components](#). Otherwise, proceed to [Card Installation](#).
- 

## Re-Installing Chassis Components


If you removed chassis components to reduce the weight of the chassis, re-install the components by completing the following the procedures.

**Caution**

During installation, maintenance, and/or removal, wear a grounding wrist strap connected to the ASR 5500 chassis to avoid ESD damage to the components. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

---

## Re-install the PFUs

- 
- Step 1** At the front of the chassis, locate the PFU bays at the top of the chassis.
- Step 2** Slide a PFU into the left bay (Power A). Push the handle on the PFU upward to firmly seat the unit into the power plane connectors.
-  **Note** It will take considerable force to move the handle upward and seat the PFU into the power plane connectors.
- 
- Step 3** Use a Phillips #2 screwdriver to tighten each of the four screws on the PFU to secure it to the chassis.
- Step 4** Re-install the second PFU in the right bay (Power B) by repeating step 2 and step 3.
-

## Re-install the Front Fan Trays

### Lower Front Fan Tray

- 
- Step 1** At the front of the chassis, align the fan tray within the lower chassis opening. With the unit resting on the bottom rail of the opening, push inward until it is seated in the midplane.
  - Step 2** Use a #1 Phillips screwdriver to tighten the two captive screws that secure the fan tray to the chassis.
  - Step 3** Reinstall the lower access cover.
- 

### Upper Front Fan Tray

- 
- Step 1** Align the fan tray within the upper chassis opening. With the unit resting on the bottom rail of the opening, push inward until it is seated in the midplane.
  - Step 2** Use a #1 Phillips screwdriver to tighten the two captive screws that secure the fan tray to the chassis.
  - Step 3** Reinstall the upper access cover.
- 

## Re-install the Rear Fan Trays

### Lower Rear Fan Tray

- 
- Step 1** At the rear of the chassis, align the fan tray within the opening at the bottom rear of the chassis.
  - Step 2** With the unit resting on the bottom rail of the opening, slowly slide the fan tray into the chassis along the guides until it is seated firmly in the midplane connectors.
  - Step 3** Reinstall the lower access cover.
- 

### Upper Rear Fan Tray

- 
- Step 1** Align the fan tray within the opening at the upper rear of the chassis.
  - Step 2** With the unit resting on the bottom rail of the opening, slowly slide the fan tray into the chassis along the guides until it is seated firmly in the midplane connectors.
  - Step 3** Reinstall the upper access cover.
-

## Re-install the Chassis Cover Panels

### Front of Chassis

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Reinstall the top cover panel by aligning the cover over the balled posts on the fan tray access panel and above the PDF bays. Push inwards to snap it in place.            |
| <b>Step 2</b> | Reinstall the bottom cover panel by aligning the cover over the balled posts on the fan tray access panel and below the air intake panel. Push inwards to snap it in place. |
- 

### Rear of Chassis

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Reinstall the top cover panel by aligning the cover over the balled posts on the fan tray access panel. Push inwards to snap it in place.                                   |
| <b>Step 2</b> | Reinstall the bottom cover panel by aligning the cover over the balled posts on the fan tray access panel and below the ground terminals. Push inwards to snap it in place. |
- 

## Cable Management System

The ASR 5500 chassis ships with a cable management tray. This tray can be used in conjunction with cable management brackets that mount on the MIO cards to route and secure network cables to MIO ports.



---

<b>Note</b>	Installation of the cable management system is optional.
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Refer to [Appendix B, “Cable Management System Installation,” Installing the Cable Management Tray](#).





# CHAPTER 5

## Card Installation

This chapter describes how to install circuit cards in the ASR 5500 chassis.

### Card Slot Assignments

[Table 5-1](#) shows recommended card slot assignments for typical installation scenarios. The recommended card assignments are based on the multiple power planes sourcing power to the card slots. Refer to [Power Planes](#) for additional information.

Following the recommendations preserves redundant operation if input power is lost to one or more of the power circuits on the PFUs.

**Table 5-1 ASR 5500 Chassis Card Slot Assignments**

Slot	Card Sequence	Requirement
<b>Rear of Chassis</b>		
1	DPC-5	Available
2	DPC-3	Required for all systems
3	DPC-1	Required for all systems
4	DPC-7	Available
5	MIO-1	Required for all systems
6	MIO-2	Required for all systems
7	DPC-8	Available
8	DPC-2	Required for all systems
9	DPC-4	Required for all system
10	DPC-6	Available
<b>Front of Chassis</b>		
11	SSC-2	Required for all systems
12	SSC-1	Required for all systems
13	FSC-6	Available
14	FSC-4	Required for all systems
15	FSC-2	Required for all systems

**Table 5-1 ASR 5500 Chassis Card Slot Assignments**

Slot	Card Sequence	Requirement
16	FSC-3	Required for all systems
17	FSC-1	Required for all systems
18	FSC-5	Available
19	Reserved	—
20	Reserved	—

## Installing Cards

The installation procedure is identical for all cards in the chassis.

**Caution**

During installation, maintenance, and/or removal, wear a grounding wrist strap connected to the ASR 5500 chassis to avoid ESD damage to the components. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

**Note**

Save several of the shipping cartons and ESD protective bags for use if a card must be returned to Cisco for fault analysis.

**Note**

On a chassis equipped with the cable management tray, you must lower the tray to insert rear circuit cards. Refer to [Lowering the Cable Management Tray](#) in [Appendix B](#). The cable management tray can be installed after all rear cards have been installed.

**Note**

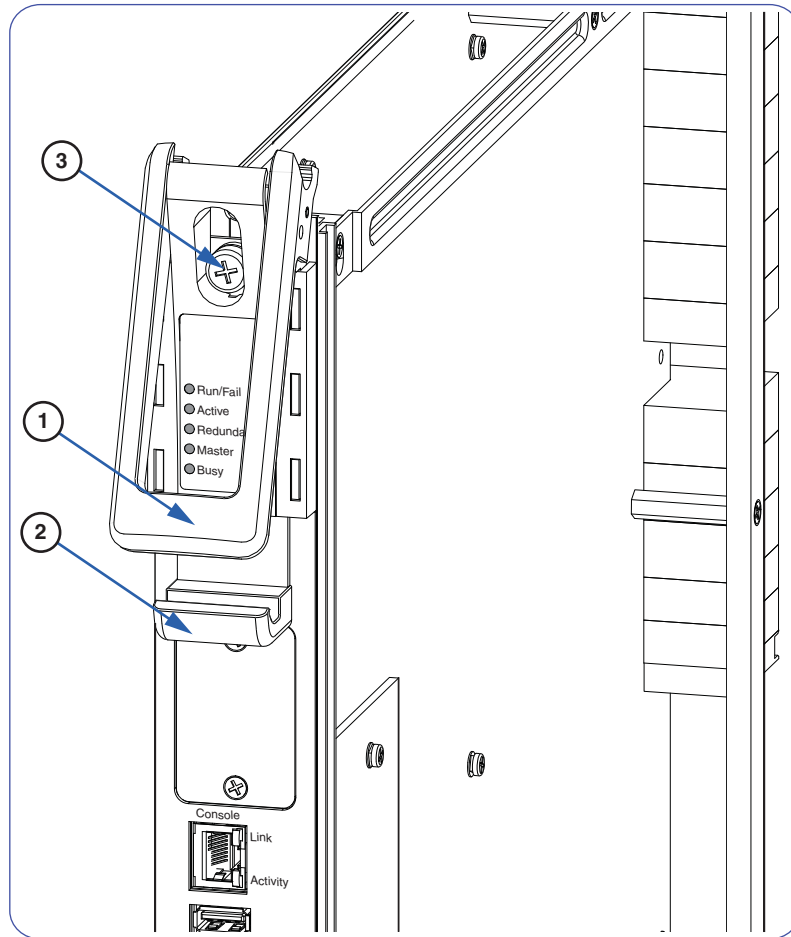
Install cable management brackets on MIO cards before inserting the card into the chassis. Refer to [Installing the Cable Management Bracket on an MIO Card](#) in [Appendix B](#).

## Card Interlock Switch

The top and bottom handles of ASR 5500 circuit cards incorporate hooks that fit behind the upper and lower rails of the card cage (see [Figure 5-1](#)). Lifting the handles outwards ejects the card from the midplane. Pushing the handles inwards seats the card into the midplane.

The top handle incorporates an interlock switch that signals the system that a card is seated in the slot. The blue subhandle must be pushed fully upward to engage the interlock switch. The subhandle also locks the top handle against the front of the card. Tightening the captive screw within the top handle secures the subhandle and circuit card to the card cage.



**Figure 5-1 Card Ejector Handle**

<b>1</b>	Ejector handle	<b>2</b>	Ejector subhandle (interlock)
<b>3</b>	Captive screw		

## Card Installation

- Step 1** Determine the type of card you are installing. The card type is identified by the label within the bottom handle of the card.
- Step 2** Determine in which chassis slot to install the card based on the information in [Table 5-1](#).
- Step 3** Position both handles on the circuit card to be up and away (outwards) from the front panel of the card (see [Figure 5-2](#))
- Step 4** Properly support the weight of the card and align it with the upper and lower card guides of the chassis slot. Gently slide the card into the slot until the levers touch the chassis frame.



### Note

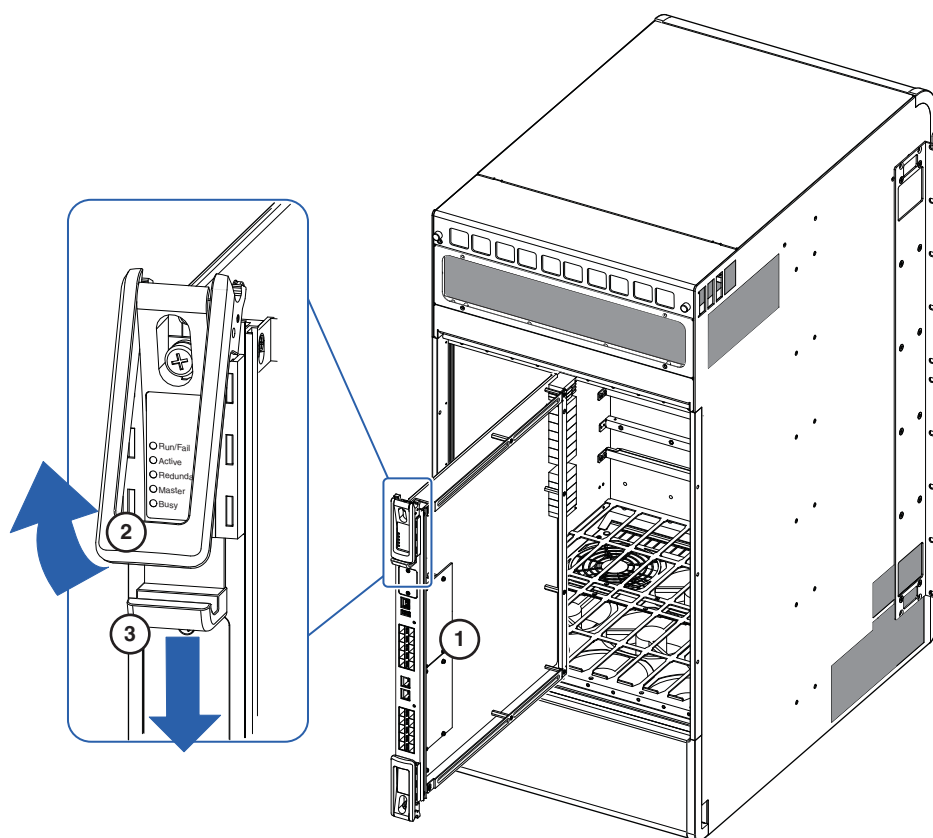
When installing cards that contain heat sinks, avoid any contact with an adjacent card. Such contact may loosen a heat sink as the card is being slid into the chassis slot.

**Caution**

Never use a cable management bracket on an MIO card to lift or insert the card into the chassis. The bracket is not designed to support the weight of the card.

- Step 5** Push both handles inward firmly until the card is seated in the chassis midplane and you cannot push the the handles in any further. Press firmly on the card's faceplate to ensure that it is fully seated. The card's front panel should be flush against the chassis' upper and lower card mounts for the slot.
- Step 6** Raise the blue subhandle under the top handle to engage interlock switch. The subhandle also locks the top handle to the front panel.
- Step 7** Use a Phillips #2 screwdriver to tighten the captive screws within the top and bottom handles to secure the card to the chassis.
- Step 8** Repeat step 1 through step 7 for every card you are installing at the rear and front of the chassis.

**Figure 5-2 Card Insertion**



<b>1</b>	MIO Card	<b>2</b>	Ejector Handle
<b>3</b>	Ejector Subhandle (interlock)		

# Baffle Cards

**Warning**

**To ensure proper ventilation, baffle cards must be used in any chassis slot that is not occupied by a circuit card.**

Baffle cards consist of a blank front panel mounted to a formed metal baffle. The baffle slides into the card slots and provides a directed path for air flow. There are two types of baffle cards – front and rear (see [Figure 5-3](#)).

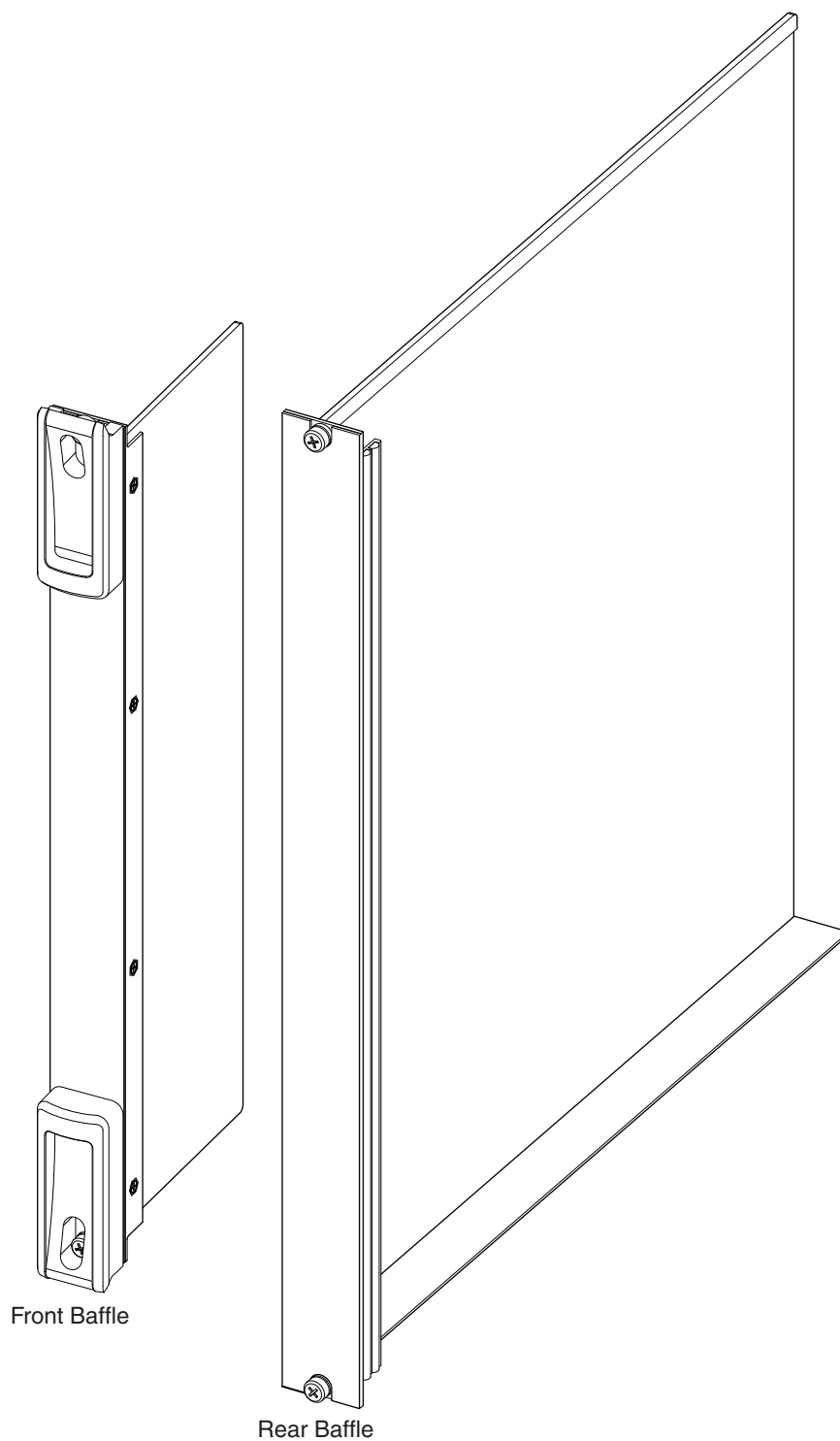
To install a front baffle card:

- 
- Step 1** Flip both ejector handles outward from the front of the card.
  - Step 2** Align the baffle card within an unused chassis slot.
  - Step 3** Slide the card into the slot until its front panel is flush with the upper and lower card rails.
  - Step 4** Push the ejector handles inward until they are flush with the front of the card.
  - Step 5** Use a Phillips #2 screwdriver to tighten the captive screws within the ejector handles on the top and bottom of the card to secure it to the chassis.
  - Step 6** Repeat step 1 through step 5 for any additional unused chassis slots.
- 

To install a rear baffle card:

- 
- Step 1** Align the baffle card within an unused chassis slot.
  - Step 2** Slide the card into the slot until its front panel is flush with the upper and lower card rails.
  - Step 3** Use a Phillips #2 screwdriver to tighten the captive screws at the top and bottom of the baffle card to secure it to the chassis.
  - Step 4** Repeat step 1 through step 3 for any additional unused chassis slots.
-

**Figure 5-3**      **Front and Rear Baffle Cards**



## Save Shipping Cartons

Save several of the shipping cartons and protective ESD bags in which the circuit cards were packaged. Use the cartons to package a circuit card for shipment back to Cisco for failure analysis and replacement. For additional information, refer to [Returning Failed Components](#) and [RMA Shipping Procedures](#).





# CHAPTER 6

## MIO Port Cabling

---

This chapter describes how to cable the interface ports on Management I/O cards.

### MIO Interface Ports

The interface ports are selectively enabled based on their functions in the system – management versus non-management. See [Figure 6-1](#).

### MIO Card Ports

MIO cards in slot 5 and slot 6 of the ASR 5500 chassis support the following twisted-pair copper interface ports:

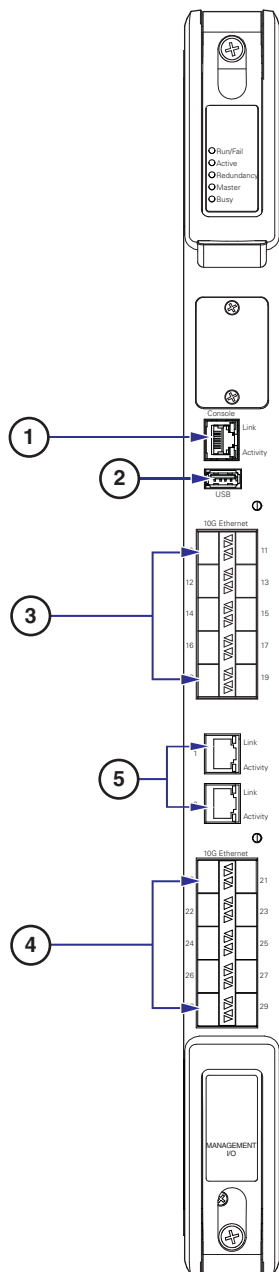
- one serial Console port (RJ45)
- two 1 Gigabit Ethernet ports (RJ45)

### MIO Daughter Card Ports

MIO daughter cards support ten 10Gigabit Ethernet ports each. The 10GbE ports connect to other network devices via fiber optic cables that terminate on SFP+ transceivers.

## Cable Management System

If you have equipped your ASR 5500 chassis and MIO cards with the Cable Management System, refer to [Routing and Securing Network Cables](#) for additional information.

**Figure 6-1 MIO Ports**

<b>1</b>	Console port	<b>2</b>	USB port
<b>3</b>	10GbE ports, DC-1	<b>4</b>	10GbE ports, DC-2
<b>5</b>	1GbE ports (1000Base-T)		



# Console Port

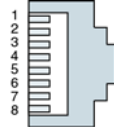
The Console port (logical port 3) is an RJ45 RS-232 interface on a chassis management MIO that provides access to the command line interface (CLI). The interface communicates at 9600 to 115200 bps; the default is 115,200 bps.


**Note**

A connection to the Console port is required if you wish to view boot messages whenever the ASR 5500 chassis is powered up or rebooted. Only the Console port on the Master MIO supports logs and CLI sessions. The Console port on the Standby MIO is inactive.

## RJ45 Port Pinouts

**Table 6-1 Console Port RJ45 Serial Pinout**

Pin	Signal Description	Signal Type	Pinout
1	Not connected	—	
2	Not connected	—	
3	Receive Data (RX)	Input	
4	Signal Ground (SGND)	Not applicable	
5	Not connected	—	
6	Transmit Data (TX)	Output	
7	Not connected	—	
8	Not connected	—	


**Note**

Hardware flow control is not supported and must be disabled on the connected equipment.

## RJ45 to DB9 Adapter

An RJ45-to-RJ45 serial cable and an RJ45-to-DB9 adapter are supplied with each MIO. The DB9 adapter is female. If you use the cable and adapter together, refer to the following figure and table for the cable pinout.

**Table 6-2 Console RJ45 to DB9 Adapter Pinouts**

Signal Description	Signal Type	RJ45 Pin	DB9 Pin
Not connected	—	1	7
Not connected	—	2	4
Receive Data (RX)	Input	3	3
Signal Ground (SGND)	Not applicable	4	5
Not connected	—	5	8

**Table 6-2 Console RJ45 to DB9 Adapter Pinouts (continued)**

Signal Description	Signal Type	RJ45 Pin	DB9 Pin
Transmit Data (TX)	Output	6	2
Not connected	—	7	1
Not connected	—	8	6

## Connect Console Port to Workstation

You can connect the Console port to a workstation with a serial port running a communications application, such as Minicom for Linux® or HyperTerminal® for Windows.

To connect a workstation to the Console port, do the following:

- 
- Step 1** Plug one end of an RJ45 cable to the port labeled Console on the MIO.
- Step 2** Plug the other end of the RJ45 cable into the DB9 adapter.
- Step 3** Connect the DB9 end of the adapter into the serial port on the workstation.
- Step 4** Configure the communications application on the workstation to support the following:
- Baud Rate = 115200 bps
  - Data Bits = 8
  - Parity = None
  - Stop Bits = 1
  - Flow Control = None
- 

## Connect Console Port to Terminal Server

You can connect the terminal server to a serial port on a terminal server.

**Note**

The MIO Console port does not support flow control signaling required by some types of terminal servers. Flow control must be disabled on the connected equipment.

To connect a terminal server to the Console port, do the following:

- 
- Step 1** Plug one end of an RJ45 cable to the port labeled Console on the MIO.
- Step 2** Plug the other end of the RJ45 cable into a port on the terminal server.
- Step 3** Configure the communications protocol on the terminal server port to support the following:
- Baud Rate = 115200 bps
  - Data Bits = 8
  - Parity = None

- Stop Bits = 1
- Flow Control = None

**Note**

For additional information on connecting the MIO Console port to Cisco servers equipped with asynchronous interface modules, refer to [Appendix C](#).

## Ethernet Management Ports

The MIOs support two autosensing RJ45 10/100/1000Base-T (IEEE 802.3ab) Ethernet, twisted-pair copper interfaces (logical Ports 1 and 2) for out-of-band system management access to the CLI.

**Note**

To comply with GR-1089 intra-building, lightning-immunity requirements and FCC Radiated Emissions Criteria, you must use shielded-twisted pair (STP) cable and ensure that it is properly terminated at both ends.

**Warning**

**The 1000Base-T management ports of the MIO are suitable for connection to intra-building or unexposed wiring or cabling only. These intra-building ports MUST NOT be metalically connected to interfaces that connect to the outside plant (OSP) or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.**

The ports support MDI and MDI-X connectors. Ethernet ports normally use MDI connectors and Ethernet ports on a hub normally use MDI-X connectors.

An Ethernet straight-through cable is used to connect an MDI to an MDI-X port. A cross-over cable is used to connect an MDI to an MDI port, or an MDI-X to an MDI-X port.

## RJ45 Port Pinouts

**Table 6-3 1000Base-T RJ45 Ethernet Pinouts**

Pin	100Base-T 100Mbps Cat5	1000Base-T 1Gbps Cat5+	Pinout
1	TX+	BI DA+	
2	TX-	BI DA-	
3	RX+	BI DB+	
4	—	BI DC+	
5	—	BI DC-	
6	RX-	BI DB-	
7	—	BI DD+	
8	—	BI DD-	

1.RX = Receive Data TX = Transmit Data BI = BI directional data DA, DB, DC, DD = Data Pair A, B, C, and D

## Port Status LEDs

Each of these interfaces is equipped with two status LEDs:

- **Link:** This green LED shows whether or not the line card is connected to the network. The LED is illuminated when the card is connected.
- **Activity:** This green LED shows when data is transmitted or received. The LED is illuminated when data is passing through the interface.

## Connect 1000Base-T Interface to Network Device

**Note**

To facilitate maintenance of the network cabling, the Cat-5 cables should be labeled with terminating destinations.

To cable the Ethernet management ports:

- 
- Step 1** Insert one end of the Cat-5 cable into the top MGMT connector (Port 1).
- Step 2** Attach the other end of the Cat-5 cable to the appropriate network interface.
- Step 3** Repeat Steps 1 and 2 to connect the bottom MGMT connector (Port 2).
- 

## MIO 10GbE Optical Daughter Card Ports

**Caution**

The 10Gigabit Ethernet ports on the MIO daughter card are only certified to work with SFP+ transceivers tested and approved by Cisco. MIO cards ship with SFP+ transceivers installed.

The 10 Gigabit Ethernet ports accept the following fiber optic to electrical signal Small Form-Factor Pluggable (SFP+) transceiver types:

- 10GBase-SR – connects the port to a multimode fiber optic cable over relatively short distances (30.80 meters).
- 10GBase-LR – connects the port to a single-mode fiber optic cable over a maximum distance of 10km.

[Table 6-4](#) lists the signaling parameters supported for the above transceiver types.

**Note**

Refer to [Table 10-1](#) for a complete listing of the logical port numbers supported on an MIO.

**Table 6-4 SFP+ Transceiver Parameters**

SFP+ Transceiver Type	Parameter	Value
10GBase-SR	Maximum transmit level	-1.0 dBm
	Minimum transmit level	-7.3 dBm
	Maximum receive level	-1.0 dBm (saturation average power)
	Minimum receive level	-11.1 (sensitivity average power)
10GBase-LR	Maximum transmit level	0.5 dBm
	Minimum transmit level	-8.2 dBm
	Maximum receive level	0.5 dBm (saturation average power)
	Minimum receive level	-12.6 (sensitivity average power)

## Fiber Optical Connections

**Caution**

The SFP+ transceiver modules are static sensitive devices. Always use an ESD wrist strap or similar individual grounding device when coming into contact with SFP+ modules.

**Caution**

SFP+ transceiver modules were installed in the MIO prior to being shipped. Before connecting fiber optic cables, press each module into the slot firmly with your thumb to firmly reseal them.

**Note**

Before removing the dust plugs and making any optical connections, observe the following guidelines:

- Always keep the protective dust plugs on the unplugged fiber-optic cable connectors and the transceiver optical bores until you are ready to make a connection.
- Always inspect and clean the LC connector end-faces just before making any connections.
- Always grasp the LC connector housing to plug or unplug a fiber-optic cable.

**Note**

To facilitate maintenance of the network cabling, all fiber optic cables should be labeled with terminating destinations.

To connect fiber optic cables to the SFP+ transceivers:

- Step 1** Remove the dust plug from the network interface LC connector of the SFP+ module. Save the dust plug for future use.
- Step 2** Inspect and clean the LC connector's fiber-optic end-faces.
- Step 3** Insert the duplex LC/PC connector on the network cable into the duplex port on the module.
- Step 4** Attach the other end of the network fiber-optic cable to the network device that you want to connect.

**Step 5** Repeat Step 1 through Step 4 for the remaining ports on the daughter card.

**Step 6** Repeat Step 1 through Step 4 for ports on the second DC.

---



# CHAPTER 7

## SSC Alarm Cabling

This chapter describes how to cable the alarm contacts on the System Status Card (SSC).



Warning

**The CO alarm interface of the SSC is suitable for connection to intra-building or unexposed wiring or cabling only. This interface **MUST NOT** be metalically connected to interfaces that connect to the outside plant (OSP) or its wiring. This interface is designed for use as an intra-building interface only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and requires isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.**

## CO Alarm Interface

The Central Office (CO) Alarm interface on the SSC is a DB15 female connector that supports three low voltage, normally-closed/normally-open dry-contact relays (see [Figure 7-1](#)). These Form C relays interface with an CO alarm monitor panel to trigger external audio and/or visual indicators.

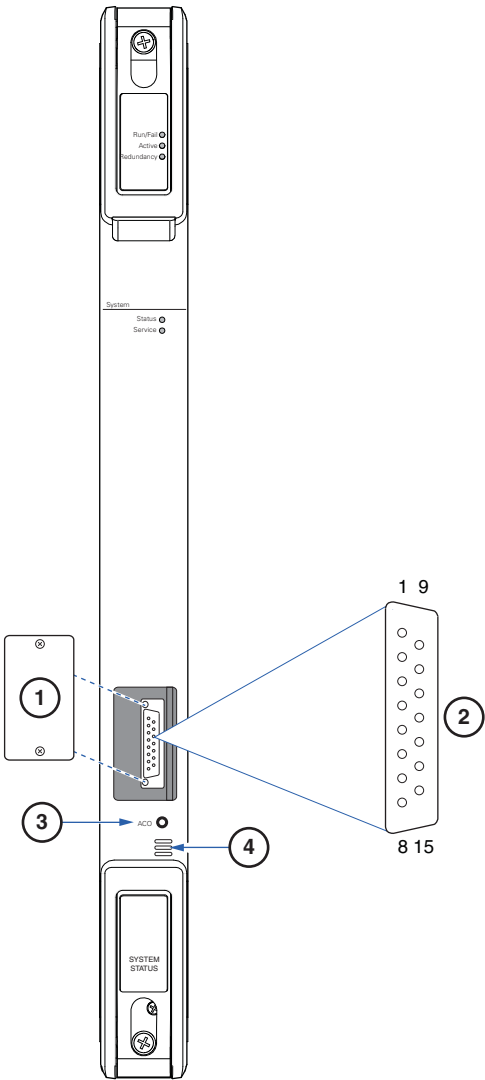
Three alarm levels are supported by the relays:

- **Minor Alarm** – This alarm is triggered when a high temperature is detected on a card, causing the fan tray to switch the fans to high speed.
- **Major Alarm** – This alarm is triggered when there is a:
  - Hardware failure that causes the card to be placed in an off-line state
  - PFU failure or removal from the chassis
  - Failure of one or more fans on any of the upper or lower fan tray units
  - Fan tray failure or any fan tray unit is removed from the chassis
- **Critical Alarm** – This alarm is triggered when a degradation in service is detected. For example, if the system is supporting a large number of subscribers and DPCs are removed, the amount of available CPU and memory resources available for use are reduced.

# Alarm Cutoff (ACO)

The front panel of the SSC includes an audible system alarm and an Alarm Cutoff (ACO) switch (see [Figure 7-1](#)). Press and release this switch to reset the system alarm speaker.

Figure 7-1    *SSC CO Alarm Interface*



1	Connector cover plate	2	CO alarm interface (DB15)
3	Alarm Cutoff (ACO) switch	4	Audible alarm



# Alarm Connector Pinout

The CO alarm connector pinout is provided in [Figure 7-1](#) and [Table 7-1](#).

Use a Phillips #1 screwdriver to remove the two screws that secure the cover plate over the alarm connector.

**Table 7-1 DB15S CO Alarm Connector Pinout**

Pin	Alarm Level	Signal
1	Minor	Normally Open
2		Normally Closed
3	—	Not connected
4	Major	Normally Open
5		Normally Closed
6	—	Not connected
7	Critical	Normally Open
8		Normally Closed
9	Minor	Minor, Common
10	—	Not connected
11	—	Not connected
12	Major	Major, Common
13	—	Not connected
14	—	Not connected
15	Critical	Critical, Common

## Electrical Characteristics

Each of the three dry-contact, Form C relay switches is rated to support a maximum switching current of 1A@30VDC.



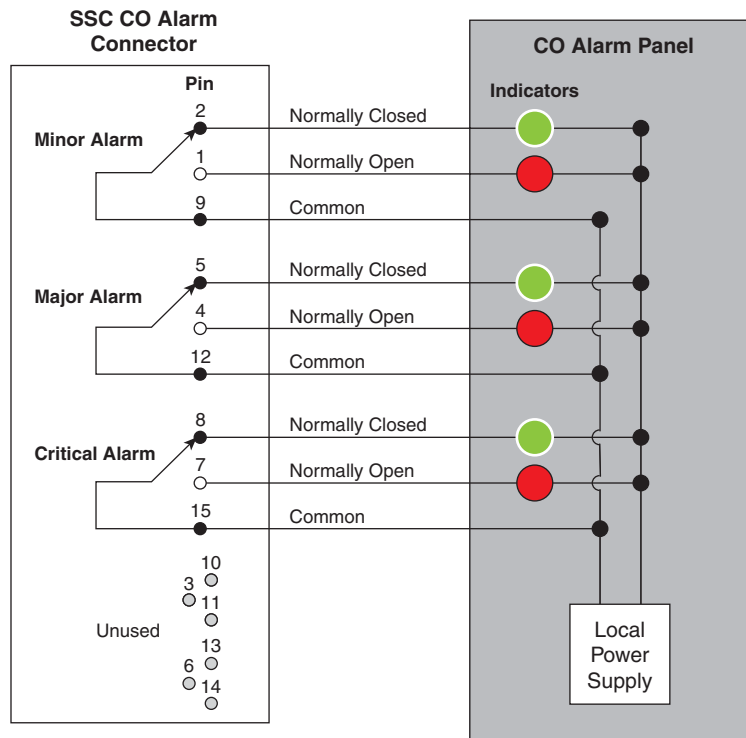
### Caution

Never connect a high voltage/high current device such as an audible alarm/siren or incandescent lamp directly to the EO alarm connector.

# CO Alarm Wiring Example

Figure 7-2 depicts how the three dry-contact relay contacts can each control up to two alarming devices. In this example the SSC CO alarm interface is connected to a CO Alarm Panel, where green LEDs are wired to indicate normal operation, and red LEDs are wired to indicate alarm conditions.

**Figure 7-2 CO Alarm Interface Schematic**



With all relays de-energized, the green LEDs are illuminated. If an alarm relay is energized, its NO (normally open) contact closes; the green LED is extinguished and the red LED is illuminated.



## CHAPTER 8

# Power Cabling

This chapter describes how to connect -48 VDC power feeds to the Power Filter Units (PFUs) on the ASR 5500 chassis.



**Note**

The -48 VDC Battery Return (BR) input terminals to the PFUs are treated as Isolated DC returns (DC-I).

## Power Considerations

Each chassis supports up to eight -48 VDC, 80-amp power feeds, four per PFU. [Table 8-1](#) lists the power load factors that should be considered for this installation site. Each feed consists of a supply and return cable.

Typically, the DC power feeds are fed from a power distribution frame (PDF) to a power distribution panel (PDP) at the rack.



**Note**

Minimum 4 AWG multiple strand, high-flex cable is recommended for final connections from the PDP to the PFUs.

Each feed connects to supply and return terminals on the rear of the PFUs using two-hole lugs crimped to the end of each cable. The feed cables are routed through openings in each side of the chassis. The input terminals are wired through EMI filters to the ASR 5500 backplane.



**Caution**

The circuit breakers at the power distribution panel must simultaneously disconnect both poles (supply and return) of each -48 VDC feed to completely isolate the ASR 5500 from the power source. Set the circuit breakers on the distribution panel to the OFF position before making the power connections at the PFUs.

To maintain power redundancy, separate -48 VDC supply circuits should be used to feed each DC power input on both PFUs. [Figure 8-2](#) is a block diagram for wiring the PFUs.

Each power input cable must be terminated with a supplied Panduit LCD4-14AF-L 2-hole, 90° lug using the appropriate crimping tool and die.

If a DC power input should fail, the operating supply circuits continue to power the ASR 5500.

[Figure 8-1](#) shows recommended power connections for redundant power circuits.

# Power Planes

Four inputs are labeled A1 through A4 and the other inputs are labeled B1 through B4. A1 is redundant for B1 and so on. The inputs correspond to the four power planes that supply power to various chassis components as shown in [Table 8-1](#) and [Figure 8-1](#).

**Table 8-1 Chassis Power Planes**

Card Type	Slot	Plane 1	Plane 2	Plane 3	Plane 4
<b>Rear Cards</b>					
DPC	1				Yes
DPC	2				Yes
DPC	3				Yes
DPC	4		Yes		
MIO	5		Yes		
MIO	6			Yes	
DPC	7			Yes	
DPC	8	Yes			
DPC	9	Yes			
DPC	10	Yes			
<b>Front Cards</b>					
SSC	11		Yes		
SSC	12		Yes		
FSC	13	Yes			
FSC	14			Yes	
FSC	15			Yes	
FSC	16		Yes		
FSC	17		Yes		
FSC	18				Yes
Reserved	19			Yes	
Reserved	20			Yes	
<b>Fan Trays</b>					
Upper	Top			Yes	
Lower	Bottom		Yes		

The SSC monitors all eight feeds for outages.

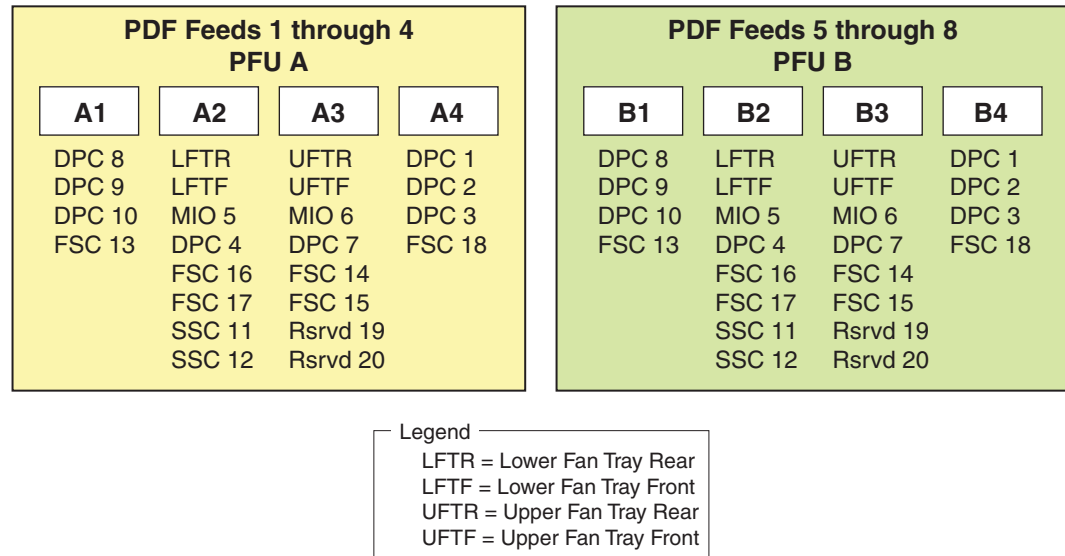
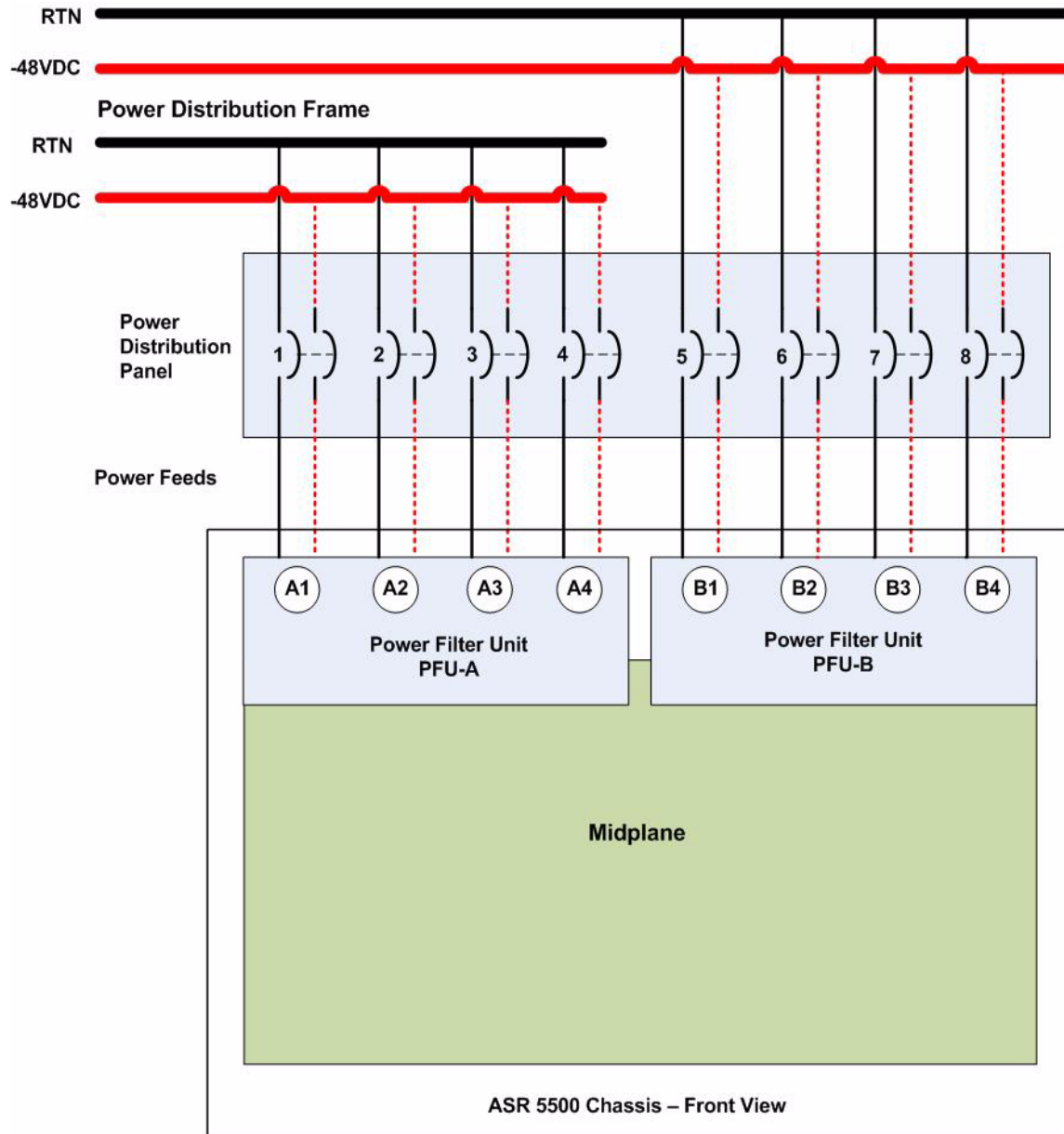
**Figure 8-1 PFU Redundant Power Planes**

Figure 8-2 shows a recommended method for connecting -48VDC power feeds from the power distribution frame (PDF) through a power distribution panel (PDP) to the power filter units (PFUs) on the ASR 5500 chassis.

This method preserves electrical redundancy from the PDF to the PFUs.

**Figure 8-2** Power Feeds to ASR 5500 Chassis



# Power Cable Requirements

## Sizing Power Cables

The following guidelines should be adhered to when sizing cable gauges for connecting the PFUs to a rack-mounted power distribution panel.

- Each conductor between the PDF and PDP should be calculated assuming a 0.3 volt drop from the PDF to the panel.
- Each cable between the PDP and ASR 5500 PFUs should be calculated a 0.3 volt drop from the panel to the chassis. This is a total voltage drop of 0.6 volts.
- Use high-flex, multiple-strand cable (minimum 4 AWG) between the power distribution panel and the chassis.

## Terminating Power Cables

Each cable should be terminated with a 90°, 2-hole lug (supplied). Each feed consists of a supply (-48VDC) and return (RTN) cable. The feed cables terminate at the rear of each PDU on 0.25-inch posts spaced 0.63-inch on center.

## Cable Routing

All feed cables must be routed through the openings at the upper rear sides of the chassis.

## Method of Connection

The method of connection at each PDU terminal is: flat washer, lug, lock washer and nut (7/16-inch). The nut(s) must be torqued to 8 in-lb. (5.65 N-m).

## Insulate Lugs

Use heat shrink tubing or non-conductive tape to insulate much of the exposed metal on the lug without interfering with the attachment point.

## Install Lugs on Cables

Use the Panduit® lugs supplied with the chassis (LCD4-14AF-L). The lug must be crimped to the end of a ground cable using Panduit crimp tool part number CT-720-1 (die color: gray, P29). The wire strip length is 7/8-inch (22 mm),

Follow the OEM recommendations for preparing and crimping the lugs on the ends of each feed cable.

## Label All Cables

Label the supply and return cables going to each terminal on the rear of the PDUs. Include the terminal number (A-1 to A4, B1 to B4) and power distribution panel circuit number. This will facilitate troubleshooting, as well as removal and replacement of a failed PDU.

# Connect Power Feeds to the PFUs

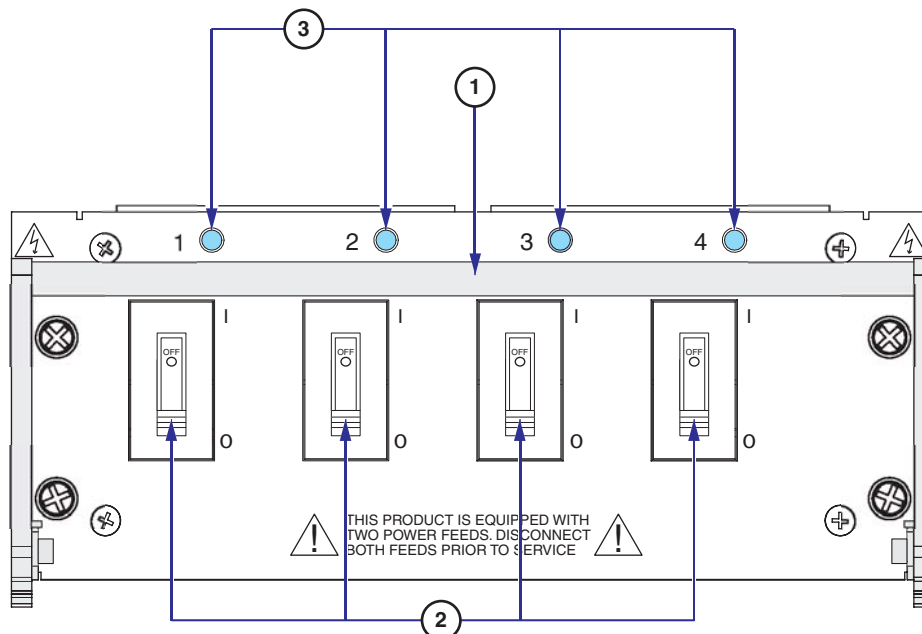

**Warning**

To avoid personal injury or possible equipment damage, ensure that the circuit breakers for all ASR 5500 chassis feeds from the power distribution panel are all set to OFF before attempting to attach power cables to the PFU(s).


**Warning**

Verify that all circuit breakers on the front panels of both PFUs (four per PFU) are set to OFF before attaching power feed cables to the PFUs (see [Figure 8-3](#)). The breakers must remain OFF until the chassis is to be powered up.

**Figure 8-3** PFU Front Panel



<b>1</b>	Handle	<b>2</b>	Circuit breaker
<b>3</b>	Blue LED		


**Note**

The eight power terminals on the back of each PFU are shipped with nuts and washers attached.

- Step 1** Remove the plastic power input cover from the top-rear of the ASR 5500 chassis. Use a Phillips #2 head screw driver to loosen the two captive screws securing the cover to the chassis. Removing this cover exposes the power feed terminals at the rear of the PFUs.
- Step 2** Remove one nut, a lock washer and a flat washer from each of the eight terminals; leave the bottom nut on each terminal. The nuts on the PFU terminals require a 7/16-inch nut driver or socket wrench for removal.
- Step 3** Before proceeding, verify that the bottom nuts on all terminals are torqued to 50 in-lb. (5.65 N-m).



- Step 4** Slide a 1.25 in. (3.2 cm) length of heat shrink tubing over the end of each feed cable. You can skip this step if you choose to use non-conductive tape to insulate the crimp portion of the 2-hole lug.
- Step 5** Crimp a 2-hole 90° lug to each -48 VDC and Return cable.
- Step 6** Slide the heat shrink tubing over the crimp portion of the lug until it contacts the flat attachment point. Use a heat source to warm the tubing until it tightly wraps the metal. Alternatively, you can firmly wrap the crimp portion of the lug with a non-conductive tape.
- Step 7** Thread each cable through an opening in the side of the chassis and route it to the appropriate terminal (-48V 1, Return 1, -48V 2, Return 2, etc.). Rectangular openings are provided at the sides of the chassis for this purpose. See [Figure 8-4](#).

**Caution**

Do not route any cables through openings in the plastic power input cover. The openings are for air flow only.

- Step 8** Install each lug over the two terminals.
- Step 9** Secure each lug to the terminals with flat washers, lock washers and nuts. Tighten the nuts while holding the lug perpendicular to the attachment studs and maintaining as much separation as possible with adjacent cables. The nuts should be torqued to 8 in-lb. (0.9 N-m).

**Note**

The supply and return lugs for each power feed will be separated by the ridge in the insulating spacer shown in Detail A of [Figure 8-4](#).

After all feeds are attached, move/push all cables to verify there are no potential shorts.

**Warning**

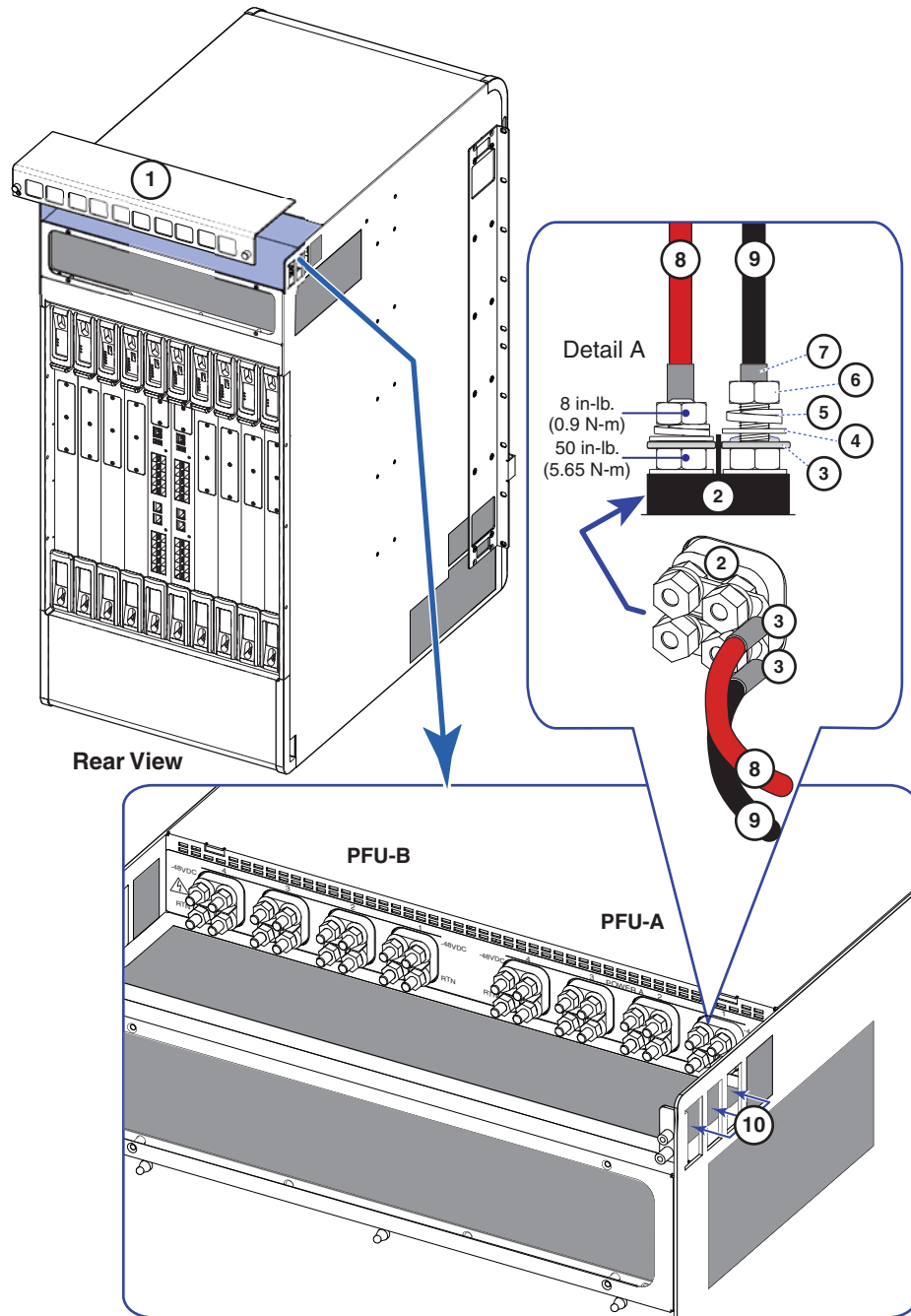
**To avoid the risk of fire, take proper precautions to ensure that the power supply and return lugs are not touching.**

- Step 10** Continue installing the feeds on the terminals until all power feed connections have been completed to both PFUs.
- Step 11** Reinstall the plastic terminal cover on the top-rear of the chassis.

**Caution**

To avoid the risk of personal injury and/or potential damage to the system, never operate the chassis without the power input cover.

- Step 12** Proceed to [System Power-up](#) for information and instructions on applying power to the chassis and verifying that the installation was successful.

**Figure 8-4 PFU Power Input Connections**

<b>1</b>	Power input cover	<b>2</b>	Insulating spacer
<b>3</b>	2-hole, 90° lug	<b>4</b>	Flat washer
<b>5</b>	Lock washer	<b>6</b>	7/16-inch hex nut
<b>7</b>	Non-conductive wrap	<b>8</b>	-48 VDC Supply cable
<b>9</b>	-48 VDC Return cable	<b>10</b>	Cable access opening



# CHAPTER 9

## System Power-up

---

This chapter describes the boot process that occurs when the system is first powered up.

### System Boot Process

The boot process is initiated after power is applied to the chassis.

- Step 1** When power is first applied to the chassis, the MIOs in slots 5 and 6 and all fan trays are the first to receive power.

Once the software is running, power is then quickly applied to the remaining cards in the system.



**Note** The fans in the fan trays initially rotate at medium speed until the first MIO completes its boot up. If no MIO boots successfully within a few minutes, the fan speed increases to 100%.

- Step 2** During the startup process, each card performs a series of Power-On Self Tests (POSTs) to ensure that the hardware is operational.

- Step 3** If the MIO in slot 5 successfully executes all POSTs, it becomes the active chassis management MIO for the system. The MIO in slot 6 becomes the standby.



**Note** If the MIO in slot 5 fails to boot, the MIO in slot 6 automatically becomes the active chassis management MIO.

- Step 4** The active MIO begins loading the operating system software image that is designated in the boot stack. The boot stack entries are contained in the boot.sys file that resides on the MIO's flash device.

The standby MIO observes the active card's startup. If the file on the active card is loading normally, the standby MIO boots from the active card's image. If the active MIO experiences a problem during this phase, the standby card loads its software image, that is designated by its own boot stack entry in its boot.sys file, and takes control of the system as the active card.

- Step 5** After the software image is loaded into MIO RAM, the active card determines if other cards are installed in the chassis by applying power to the other slots and signaling them. If the chassis slot contains a card, power is left on to that slot. All empty slots are powered off.

**Note**

If no MIOs are installed in slots 5 and 6 or if they both fail to boot, other cards in the system will not boot.

**Step 6** When power is applied to the other installed cards, they each perform their own series of POSTs.

**Note**

After successful completion of the POSTs, each of the DPCs enter standby mode. Installed DPCs remain in standby mode until they are made active via configuration.

**Step 7** After entering the standby mode, each of the DPC control processors communicate with the active chassis management MIO to receive the appropriate code.

**Step 8** Upon successful loading of the software image, the system loads a configuration file designated in the boot stack (boot.sys file). If this is the first time the system is powered on and there is no configuration file, the active MIO invokes the system's Quick Setup Wizard. Use the Quick Setup Wizard to configure basic system parameters that enable the system to communicate across the management network.

The Wizard creates a configuration file, saved as system.cfg, that can be used as a starting point for subsequent configurations. The system is configured by automatically applying the configuration file during any subsequent boot.

After the system successfully boots and the initial configuration is applied, the system is ready to be configured or offer services.

## Applying Power to the Chassis

With all power and ground cables connected, you apply power to the chassis by following the instructions below.

**Caution**

Never operate the chassis if any slots are uncovered. This reduces airflow through the chassis and could cause it to overheat. A card or blank panel must be installed in every chassis slot at all times.

**Step 1** If the top-front cover is installed on the chassis, remove the cover to access the PFU circuit breakers.

**Step 2** At the front of the chassis verify that the circuit breakers on the PFUs are in the OFF position.

**Step 3** Set the circuit breakers on the power distribution panel (PDP) to ON.

**Step 4** At the rear of the chassis, remove the plastic terminal cover to access the PFU input terminals.

**Step 5** Use a voltmeter to check the voltage level and polarity across the input terminals for each PFU. The meter should display a voltage approximately equal to that of the power source.

**Step 6** Turn ON all the circuit breakers on both PFUs.

**Step 7** Proceed to [Verifying System Startup](#).

**Step 8** When the initial checks are completed, reinstall the covers removed in step 1 and step 4.

# Verifying System Startup

When power is applied to the chassis, power is provided to the upper and lower fan trays, and every installed card.

Light emitting diodes (LEDs) on all circuit cards and daughter cards indicate operating status.



## Note

As the system progresses through its boot process, LED activity will eventually occur on all cards. Allow several minutes to elapse prior to checking the status LEDs on the various cards.

## Checking PFU Status

The blue LEDs above the circuit breakers on each PFU should all be ON.

If all of the LEDs on a PFU are OFF, check the following:

- The PFU is firmly seated in the midplane connectors.
- All circuit breakers on the PFU are set to ON.
- All circuit breakers for power feeds from the local power distribution panel are ON.
- -48VDC power is available from the PDF to the local PDP.

If any LED is OFF, check the following:

- PFU circuit breaker is ON.
- Voltage is present at corresponding input terminal at rear of the PFU.
- Cable connection at PFU terminals is secure.
- Circuit breaker for the power feed from the local PDP is ON.
- Cable connection at the PDP terminal is secure.

## Checking Status LEDs on MIOs

Table 9-1 identifies the operational and transitional states for LED indicators on an MIO card.

**Table 9-1 MIO Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
<b>Card Transitions</b>			
Run/Fail	Green	Blink	Card is booting, starting or initializing.
Active	—	OFF	
Redundant	—	OFF	
Master	—	OFF	
Busy	—	OFF	

**Table 9-1 MIO Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
Card Active – Master (Normal)			
Run/Fail	Green	ON	Card is backed up by other MIO.
Active	Green	ON	All ports are backed up by other MIO.
Redundant	Green	ON	
Master	Green	ON	
Busy	—	OFF	
Card Active – Master			
Run/Fail	Green	ON	Card is <u>not</u> backed up by other MIO.
Active	Green	ON	Port may not be backed up by other MIO.
Redundant	Amber	ON	
Master	Green	ON	
Busy	—	OFF	
Card Active – Standby (Normal)			
Run/Fail	Green	ON	Card is online and functioning as a Slave.
Active	—	OFF	Any port can be active.
Redundant	Green	ON	
Master	—	OFF	All ports are backed up by other MIO
Busy	—	OFF	
Card Active – Secondary (Normal)			
Run/Fail	Green	ON	Card is online and functioning as a Slave.
Active	Green	ON	Any port can be active.
Redundant	Green	ON	
Master	—	OFF	All ports are backed up by other MIO
Busy	—	OFF	
Card Active – Secondary			
Run/Fail	Green	ON	Card is online and functioning as a Slave.
Active	Green	ON	Any port can be active.
Redundant	Amber	ON	
Master	—	OFF	Any port may not be backed up by other MIO.
Busy	—	OFF	
Card Switchover			
Run/Fail	Green	ON	Card is online; switchover to or from other MIO is in progress.
Active	Green	Blink	
Redundant	Amber	Blink	
Master	Green	Blink	
Busy	—	OFF	

**Table 9-1 MIO Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
Card Failed			
Run/Fail	Red	ON	Card has failed and is offline.
Active	—	OFF	
Redundant	—	OFF	
Master	—	OFF	
Busy	—	OFF	
Card Offline			
Run/Fail	—	OFF	Card is offline.
Active	—	OFF	
Redundant	—	OFF	
Master	—	OFF	
Busy	—	OFF	
Port Status			
Port – Link	Green	ON	Port is in active mode.
	Amber	ON	Port is in standby mode.
	—	OFF	Port is down.
Port – Activity	Green	Blink	Data is being sent/received.
	—	OFF	Data is <u>not</u> being sent/received.

## Checking Status LEDs on DPCs

Table 9-2 identifies the operational and transitional states for LED indicators on a DPC.

**Table 9-2 DPC Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
Card Transitions			
Run/Fail	Green	Blink	Card is booting, starting or initializing.
Active	—	OFF	
Redundant	—	OFF	
Card Active (Normal)			
Run/Fail	Green	ON	Card is backed up by other DPC.
Active	Green	ON	
Redundant	Green	ON	

**Table 9-2 DPC Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
Card Active			
Run/Fail	Green	ON	Card is <u>not</u> backed up by other DPC.
Active	Green	ON	
Redundant	Amber	ON	
Card Standby (Normal)			
Run/Fail	Green	ON	Card is online and in standby mode.
Active	—	OFF	
Redundant	Green	ON	
Card Migrate			
Run/Fail	Green	ON	Card is online and migrating from or to other DPC.
Active	Green	Blink	
Redundant	Amber	ON	
Card Failed			
Run/Fail	Red	ON	Card has failed and is offline.
Active	—	OFF	
Redundant	—	OFF	
Card Offline			
Run/Fail	—	OFF	Card is offline.
Active	—	OFF	
Redundant	—	OFF	

## Checking Status LEDs on FSCs

Table 9-3 identifies the operational and transitional states for LED indicators on an FSC.

**Table 9-3 FSC Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
<b>Card Transition</b>			
Run/Fail	Green	Blink	Card is booting, starting or initializing.
Active	—	OFF	
Redundant	—	OFF	
Drive 1 Active	—	OFF	SSD 1 is idle.
Drive 2 Active	—	OFF	SSD 2 is idle



**Table 9-3 FSC Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
<b>Card Active (Normal)</b>			
Run/Fail	Green	ON	Redundant switch fabric Redundant storage
Active	Green	ON	
Redundant	Green	ON	
Drive 1 Active	Green	Blink	SSD 1 is being accessed.
Drive 2 Active	Green	Blink	SSD 2 is being accessed
<b>Card Active</b>			
Run/Fail	Green	ON	Non-redundant switch fabric Non-redundant storage
Active	Green	ON	
Redundant	Amber	ON	
Drive 1 Active	Green	Blink	SSD 1 is being accessed.
Drive 2 Active	Green	Blink	SSD 2 is being accessed
<b>Card Failed</b>			
Run/Fail	Red	ON	Card has failed and is offline.
Active	—	OFF	
Redundant	—	OFF	
Drive 1 Active	—	OFF	SSD 1 is idle.
Drive 2 Active	—	OFF	SSD 2 is idle
<b>Card Offline</b>			
Run/Fail	—	OFF	Card is offline.
Active	—	OFF	
Redundant	—	OFF	
Drive 1 Active	—	OFF	SSD 1 is idle.
Drive 2 Active	—	OFF	SSD 2 is idle

## Checking Status LEDs on SSC

Table 9-4 identifies the operational and transitional states for LED indicators on an SSC.

**Table 9-4 SSC Operating States and Status LED Indicators**

Label	LED Color	LED State	Notes
<b>Card Transition</b>			
Run/Fail	Green	Blink	Card is booting, starting or initializing.
Active	—	OFF	
Redundant	—	OFF	

**Table 9-4** *SSC Operating States and Status LED Indicators*

Label	LED Color	LED State	Notes
Card Active (Normal)			
Run/Fail	Green	ON	Card is backed up by other SSC.
Active	Green	ON	
Redundant	Green	ON	
Card Active			
Run/Fail	Green	ON	Card is <u>not</u> backed up by other SSC.
Active	Green	ON	
Redundant	Amber	ON	
Card Failed			
Run/Fail	Red	ON	Card has failed and is offline.
Active	—	OFF	
Redundant	—	OFF	
Card Offline			
Run/Fail	—	OFF	Card is offline.
Active	—	OFF	
Redundant	—	OFF	
System Indicators			
Normal			
System Status	Green	ON	System is in service.
System Service	—	OFF	There are no failed components.
Failed Components			
System Status	Green	ON	System is in service.
System Service	Amber	ON	There are failed components.
Service Loss and Failed Components			
System Status	Red	ON	System is out of service.
System Service	Amber	ON	There are failed components.
Service Loss with No Failed Components			
System Status	Red	ON	System is out of service.
System Service	—	OFF	There are no failed components.
Offline or Transitioning			
System Status	—	OFF	SSC is offline.
System Service	—	OFF	SSC is offline.

## show leds Command

The **show leds** command displays the current operating state (color) of the status LEDs of all cards in the system.



# CHAPTER 10

## Initial System Configuration

---

This chapter describes how to configure initial system parameters for the ASR 5500.

### Basic Configuration

After power is applied to the chassis and the ASR 5500 has successfully booted, the command line interface (CLI) appears on a terminal connected to the Console port of the Master MIO.

The initial configuration requires completing the following tasks via the CLI:

- Configuring a context-level security administrator and hostname
- Configuring the Ethernet interface(s) on the MIO
- Configuring the system for remote CLI access via Telnet, SSH, or FTP (secured or unsecured)

### Context-level Security Administrator and Hostname



#### Note

You must configure a context-level security administrator during the initial configuration. After completing the initial configuration process and ending the CLI session, if you have not configured a security administrator CLI access will be locked.

---

**Step 1** At the CLI prompt, enter **config**.

```
[local]asr5500# config
[local]asr5500(config)#
```


**Step 2** Enter the context configuration mode by entering **context local**.

The local context is the system's management context. Contexts allow you to logically group services or interfaces. A single context can consist of multiple services and can be bound to multiple interfaces. Enter **context local** at the CLI prompt.

```
[local]asr5500(config) context local
[local]asr5500(config-ctx)#
```

**Step 3** Enter the following command to configure a context-level security administrator for the system:

```
administrator <name> {password <password>lencrypted password <enc_password>} [ftp] [no-cli]
[timeout-absolute <absolute_time>] [timeout-idle <idle_time>]
```

Keyword/Variable	Description
<name>	Specifies the security administrator's name. The name can be between 1 and 32 alphanumeric characters and is case sensitive.
<b>password</b> <password>	Specifies the password for the security administrator. The <password> can be between 1 and 63 alphanumeric characters and is case sensitive.
<b>encrypted password</b>	Specifies the encrypted password for the security administrator. This keyword is only used by the system when you save configuration scripts. The system displays the encrypted keyword in the configuration file as a flag indicating that the variable following the keyword is the encrypted version of the plain text password. Only the encrypted password is saved as part of the configuration file.
<b>ftp</b>	Specifies that the security administrator is allowed to access the system with the File Transfer Protocol (FTP). This option is useful to upload files (configuration or software images).
<b>no-cli</b>	Specifies that the security administrator cannot access the system's command line interface (CLI).
	 <b>Note</b> Use this keyword in conjunction with the <b>ftp</b> keyword to allow access to the system with FTP only.
<b>timeout-absolute</b>	Specifies the maximum amount of time that the operator can maintain a session with the system. The <absolute_time> is measured in seconds. Use any integer value between 0 and 300000000. The default <absolute_time> is 0. When the absolute timeout value is reached, the operator session is automatically terminated.
<b>timeout-idle</b>	Specifies the maximum amount of time that an operator session can remain idle before being automatically terminated. The <idle_time> is measured in seconds. Use any integer value between 0 and 300000000. The default <idle_time> is 0.

For example:

```
[local]asr5500(config-ctx)# administrator Secure1 301delta ftp timeout-idle 120
```



**Note**

For additional information on configuring system administrators, refer to the *System Administration Guide*.

**Step 4** Enter **exit** at the prompt to exit the context configuration mode.

```
[local]asr5500(config-ctx)# exit
[local]asr5500(config)#
```

**Step 5** *Optional:* Enter **system hostname** <hostname> to configure a hostname by which the system will be recognized on the network. <host\_name> is the name by which the system will be recognized on the network. The hostname can be up to 63 alphanumeric characters and is case sensitive.

**Note**

The new *<hostname>* replaces the default hostname “asr5500” that appears in the CLI prompt. It also becomes the system hostname parameter for SNMP.

For example:

```
[local]asr5500(config)# system hostname node1033
[local]node1033(config)#
```

## MIO Port Numbering

The two 1 GbE ports on the MIOs in slots 5 and 6 can only be used as management ports. 10GbE ports can only be used for non-local contexts (service ports). MIO port numbers are non-contiguous.

**Note**

For lab environments where network booting of the chassis is desirable, Ethernet 1 port on an MIO can be used to network boot the chassis. Other MIO ports cannot be used for network booting.

The MIO can be equipped with one or two daughter cards (DCs). Each DC supports ten 10GbE ports.

**Note**

MIO ports 10 through 19 only exist on the 20-port MIO equipped with two DCs.

Ports are referenced in CLI commands by “*x/yy*” where *x* is the slot number (5 or 6) and *yy* the port number (1 to 29). For example, **show port info 5/20** [slot 5, port 20].

**Table 10-1 MIO Port Numbering**

Port Number	Type	Connector	MIO DCs	Notes
1	1000Base-T	RJ45	—	Management Port
2	1000Base-T	RJ45	—	Management Port
3	RS-232	RJ45	—	Console
10	10GbE	SFP+	Yes	Service Port
11	10GbE	SFP+	Yes	Service Port
12	10GbE	SFP+	Yes	Service Port
13	10GbE	SFP+	Yes	Service Port
14	10GbE	SFP+	Yes	Service Port
15	10GbE	SFP+	Yes	Service Port
16	10GbE	SFP+	Yes	Service Port
17	10GbE	SFP+	Yes	Service Port
18	10GbE	SFP+	Yes	Service Port
19	10GbE	SFP+	Yes	Service Port
20	10GbE	SFP+	Yes	Service Port
21	10GbE	SFP+	Yes	Service Port
22	10GbE	SFP+	Yes	Service Port
23	10GbE	SFP+	Yes	Service Port

**Table 10-1 MIO Port Numbering**

Port Number	Type	Connector	MIO DCs	Notes
24	10GbE	SFP+	Yes	Service Port
25	10GbE	SFP+	Yes	Service Port
26	10GbE	SFP+	Yes	Service Port
27	10GbE	SFP+	Yes	Service Port
28	10GbE	SFP+	Yes	Service Port
29	10GbE	SFP+	Yes	Service Port

The output of **show port table** reflects the port numbering scheme in the table above for MIOs equipped with two 10-port, 10GbE daughter cards.

```
[local]host_name# show port table
```

Port	Role	Type	Admin	Oper	Link	State	Pair	Redundant
5/1	Mgmt	1000 Ethernet	Disabled	Down	Up	Active	6/1	L2 Link
5/2	Mgmt	1000 Ethernet	Disabled	Down	Up	Active	6/2	L2 Link
5/3	Mgmt	RS232 Serial Console	Enabled	Down	Unkn	Standby	6/3	L2 Link
5/10	Srv	10G Ethernet	Disabled	Down	Up	Active	6/10	L2 Link
5/11	Srv	10G Ethernet	Disabled	Down	Up	Active	6/11	L2 Link
5/12	Srv	10G Ethernet	Disabled	Down	Up	Active	6/12	L2 Link
5/13	Srv	10G Ethernet	Disabled	Down	Up	Active	6/13	L2 Link
5/14	Srv	10G Ethernet	Disabled	Down	Up	Active	6/14	L2 Link
5/15	Srv	10G Ethernet	Disabled	Down	Up	Active	6/15	L2 Link
5/16	Srv	10G Ethernet	Disabled	Down	Up	Active	6/16	L2 Link
5/17	Srv	10G Ethernet	Disabled	Down	Up	Active	6/17	L2 Link
5/18	Srv	10G Ethernet	Disabled	Down	Up	Active	6/18	L2 Link
5/19	Srv	10G Ethernet	Disabled	Down	Up	Active	6/19	L2 Link
5/20	Srv	10G Ethernet	Disabled	Down	Up	Active	6/20	L2 Link
5/21	Srv	10G Ethernet	Disabled	Down	Up	Active	6/21	L2 Link
5/22	Srv	10G Ethernet	Disabled	Down	Up	Active	6/22	L2 Link
5/23	Srv	10G Ethernet	Disabled	Down	Up	Active	6/23	L2 Link
5/24	Srv	10G Ethernet	Disabled	Down	Up	Active	6/24	L2 Link
5/25	Srv	10G Ethernet	Disabled	Down	Up	Active	6/25	L2 Link
5/26	Srv	10G Ethernet	Disabled	Down	Up	Active	6/26	L2 Link
5/27	Srv	10G Ethernet	Disabled	Down	Up	Active	6/27	L2 Link
5/28	Srv	10G Ethernet	Disabled	Down	Up	Active	6/28	L2 Link
5/29	Srv	10G Ethernet	Disabled	Down	Up	Active	6/29	L2 Link
6/1	Mgmt	1000 Ethernet	Disabled	Down	Up	Active	5/1	L2 Link
6/2	Mgmt	1000 Ethernet	Disabled	Down	Up	Active	5/2	L2 Link
6/3	Mgmt	RS232 Serial Console	Enabled	Down	Unkn	Standby	5/3	L2 Link
6/10	Srv	10G Ethernet	Disabled	Down	Up	Active	5/10	L2 Link
6/11	Srv	10G Ethernet	Disabled	Down	Up	Active	5/11	L2 Link
6/12	Srv	10G Ethernet	Disabled	Down	Up	Active	5/12	L2 Link
6/13	Srv	10G Ethernet	Disabled	Down	Up	Active	5/13	L2 Link
6/14	Srv	10G Ethernet	Disabled	Down	Up	Active	5/14	L2 Link
6/15	Srv	10G Ethernet	Disabled	Down	Up	Active	5/15	L2 Link
6/16	Srv	10G Ethernet	Disabled	Down	Up	Active	5/16	L2 Link
6/17	Srv	10G Ethernet	Disabled	Down	Up	Active	5/17	L2 Link
6/18	Srv	10G Ethernet	Disabled	Down	Up	Active	5/18	L2 Link
6/19	Srv	10G Ethernet	Disabled	Down	Up	Active	5/19	L2 Link
6/20	Srv	10G Ethernet	Disabled	Down	Up	Active	5/20	L2 Link
6/21	Srv	10G Ethernet	Disabled	Down	Up	Active	5/21	L2 Link
6/22	Srv	10G Ethernet	Disabled	Down	Up	Active	5/22	L2 Link
6/23	Srv	10G Ethernet	Disabled	Down	Up	Active	5/23	L2 Link
6/24	Srv	10G Ethernet	Disabled	Down	Up	Active	5/24	L2 Link
6/25	Srv	10G Ethernet	Disabled	Down	Up	Active	5/25	L2 Link

6/26 Srvc 10G Ethernet	Disabled Down Up	Active	5/26 L2 Link
6/27 Srvc 10G Ethernet	Disabled Down Up	Active	5/27 L2 Link
6/28 Srvc 10G Ethernet	Disabled Down Up	Active	5/28 L2 Link
6/29 Srvc 10G Ethernet	Disabled Down Up	Active	5/29 L2 Link

## Configure the Ethernet Management Interface

### IP Address Notation

When configuring a port interface via the CLI you must enter an IP address. The CLI always accepts an IPv4 address, and in some cases accepts an IPv6 address as an alternative.

For some configuration commands, the CLI also accepts CIDR notation.



#### Note

Always view the online Help for the CLI command to verify acceptable forms of IP address notation.

### IPv4 Dotted-Decimal Notation

An Internet Protocol Version 4 (IPv4) address consists of 32 bits divided into four octets. These four octets are written in decimal numbers, ranging from 0 to 255, and are concatenated as a character string with full stop delimiters (dots) between each number.

For example, the address of the loopback interface, usually assigned the host name localhost, is 127.0.0.1. It consists of the four binary octets 01111111, 00000000, 00000000, and 00000001, forming the full 32-bit address.

IPv4 allows 32 bits for an Internet Protocol address and can, therefore, support  $2^{32}$  (4,294,967,296) addresses.

### IPv6 Colon-Separated-Hexadecimal Notation

An Internet Protocol Version 6 (IPv6) address has two logical parts: a 64-bit network prefix and a 64-bit host address part. An IPv6 address is represented by eight groups of 16-bit hexadecimal values separated by colons (:).

A typical example of a full IPv6 address is 2001:0db8:85a3:0000:0000:8a2e:0370:7334

The hexadecimal digits are case-insensitive.

The 128-bit IPv6 address can be abbreviated with the following rules:

- Leading zeroes within a 16-bit value may be omitted. For example, the address fe80:0000:0000:0202:b3ff:fe1e:8329 may be written as fe80:0:0:0202:b3ff:fe1e:8329
- One group of consecutive zeroes within an address may be replaced by a double colon. For example, fe80:0:0:0202:b3ff:fe1e:8329 becomes fe80::0202:b3ff:fe1e:8329.

IPv6 allows 128 bits for an Internet Protocol address and can support  $2^{128}$  (340,282,366,920,938,000,000,000,000,000,000,000) internet addresses.

## CIDR Notation

Classless Inter-Domain Routing (CIDR) notation is a compact specification of an Internet Protocol address and its associated routing prefix. It is used for both IPv4 and IPv6 addressing in networking architectures.

CIDR is a bitwise, prefix-based standard for the interpretation of IP addresses. It facilitates routing by allowing blocks of addresses to be grouped into single routing table entries. These groups (CIDR blocks) share an initial sequence of bits in the binary representation of their IP addresses.

CIDR notation is constructed from the IP address and the prefix size, the latter being the number of leading 1 bits of the routing prefix. The IP address is expressed according to the standards of IPv4 or IPv6. It is followed by a separator character, the slash (/) character, and the prefix size expressed as a decimal number.

The address may denote a single, distinct, interface address or the beginning address of an entire network. In the latter case the CIDR notation specifies the address block allocation of the network. The maximum size of the network is given by the number of addresses that are possible with the remaining, least-significant bits below the prefix. This is often called the host identifier.

For example:

- the address specification 192.168.100.1/24 represents the given IPv4 address and its associated routing prefix 192.168.100.0, or equivalently, its subnet mask 255.255.255.0.
- the IPv4 block 192.168.0.0/22 represents the 1024 IPv4 addresses from 192.168.0.0 to 192.168.3.255.
- the IPv6 block 2001:DB8::/48 represents the IPv6 addresses from 2001:DB8:0:0:0:0:0:0 to 2001:DB8:0:FFFF:FFFF:FFFF:FFFF:FFFF.
- ::1/128 represents the IPv6 loopback address. Its prefix size is 128, the size of the address itself, indicating that this facility consists of only this one address. An application sending a packet to this address will get the packet back after it is looped back by the IPv6 stack. The equivalent IPv4 local host address is 127.0.0.1.

The number of addresses of a subnet defined by the mask or prefix can be calculated as  $2^{\text{address size} - \text{mask}}$ , in which the address size for IPv4 is 32 and for IPv6 is 128. For example, in IPv4, a mask of /29 gives:  $2^{32-29} = 2^3 = 8$  addresses.

## Configuring the Ethernet Management Interface

The procedure below describes how to configure an Ethernet management interface on the primary MIO in slot 5.



### Note

Repeat the procedure below to configure the second Ethernet management interface on the MIO in slot 5.

**Step 1** Enter **config** to enter the configuration mode.

```
[local]host_name# config
```

**Step 2** Enter **context local** to enter the context configuration mode. The following prompt appears:

```
[local]host_name(config)# context local
[local]host_name(config-ctx)#
```



- Step 3** Enter **interface** *<interface\_name>* to specify a name for the interface. *<interface\_name>* is the name of the interface. The interface name can be between 1 and 79 alphanumeric characters and is case sensitive. The following prompt appears as the system enters the Ethernet Interface Configuration mode:

```
[local]host_name(config-ctx)# interface local101
[local]host_name(config-if-eth)#
```

- Step 4** Configure the IP address for the interface.

- **For IPv4:** Configure an IP address for the interface configured in the previous step by entering **ip address** *<ipaddress>* *<subnetmask>*.
  - *<ip\_address>* specifies the IP address for the interface in dotted-decimal format.
  - *<subnetmask>* specifies the subnet mask for the interface in dotted-decimal or CIDR format.
- **For IPv6:** Configure an IP address for the interface configured in the previous step by entering **ipv6 address** *<ipaddress>* *<subnetmask>*.
  - *<ip\_address>* specifies the IP address for the interface in colon-separated-hexadecimal format.
  - *<subnetmask>* specifies the subnet mask for the interface in colon-separated-hexadecimal or CIDR format.

For example:

```
[local]host_name(config-if-eth)# ip address 10.0.153.100 255.255.255.248
```

–or–

```
[local]host_name(config-if-eth)# ipv6 address 2620:0:60:48::10/64
```

- Step 5** Enter **exit** to exit the Ethernet interface configuration mode. The following prompt appears:

```
[local]host_name(config-ctx)#
```

- Step 6** If necessary, configure a static route to point the system to a default gateway by entering the following command: **{ip|ipv6} route** *<gw\_address>* *<interface\_name>*.

- *<gw\_address>* specifies the IP address of the default gateway in IPv4 dotted-decimal format or IPv6 colon-separated-hexadecimal format).
- *<interface\_name>* specifies the name of the interface that was configured in Step 2.

Refer to the *System Administration Guide* for additional information.

- Step 7** Enter **exit** at the prompt to exit the context configuration mode. The following prompt appears:

```
[local]host_name(config-ctx)# exit
[local]host_name(config)#
```

- Step 8** Enter **port ethernet** *<slot#>/<port#>* to enter the Ethernet Port Configuration mode.

- *<slot#>* – the actual chassis slot in which the MIO card is installed. This could be either slot number 5 or 6.
- *<port#>* – the physical port on the MIO that will be used. This will be either port 1 or 2. Port 1 is the top most port.

```
[local]host_name(config)# port ethernet <slot#/port#>
[local]host_name(config-port-<slot#/port#>)#
```


- Step 9** Bind the port to the interface that you created in Step 2. Binding associates the port and all of its settings to the interface. Enter the following commands:

```
[local]host_name(config-port-<slot#/port#>)# bind interface <interface_name> local
[local]host_name(config-port-<slot#/port#>) #no shutdown
```

- *<interface\_name>* is the name of the interface that you configured in Step 3.

**Step 10** *Optional* – Configure the port speed by entering the following command:

**medium {auto | speed {10|100|1000} duplex {full|half} }**

Keyword/Variable	Description
<b>auto</b>	Configures the system to auto detect the port speed. This is the default setting.
<b>speed</b>	<p>Specifies the port speed for the port itself. When manually configuring the port speed, you must ensure that the network server configuration supports the speed and duplex configuration. The possible rates are:</p> <ul style="list-style-type: none"> <li>• <b>10</b> = 10 Mbps</li> <li>• <b>100</b> = 100 Mbps</li> <li>• <b>1000</b> = 1000 Mbps</li> </ul> <p>If you manually configure the port speed, you must also configure the duplex mode.</p>
<b>duplex</b>	<p>If you manually configure the speed, you must also use this parameter to configure the duplex mode. You can implement either a full or half duplex mode.</p> <div>  <p><b>Note</b> Ethernet networking rules dictate that if a device whose interface is configured to auto-negotiate is communicating with a device that is manually configured to support full duplex mode, the first device negotiates with the manually configured speed of the second device, but only communicates in half duplex mode.</p> </div>

**Step 11** Enter **exit** to exit the Ethernet Interface Configuration mode.

```
[local]host_name(config-port-<slot#/port#>)# exit
[local]host_name(config)#
```

## Configuring the Management Interface with a Second IP Address

If necessary, you can configure a second IP address on the same MIO management interface.

**Step 1** Enter **configure** to enter the configuration mode. The following prompt appears:

```
[local]host_name# config
[local]host_name(config)#
```

**Step 2** Enter **context local** to enter the context configuration mode. The following prompt appears:

```
[local]host_name(config)# context local
[local]host_name(config-ctx)#
```

**Step 3** Enter **interface <interface\_name>** to specify the previously named interface.

```
[local]host_name(config-ctx)# interface local01
[local]host_name(config-if-eth)#
```

**Step 4** Configure the second IP address for the interface.

- **For IPv4:** Configure an IP address for the interface configured in the previous step by entering **ip address** *<ip\_address>* *<subnetmask>*.
  - *<ip\_address>* specifies the IP address for the interface in dotted-decimal format.
  - *<subnetmask>* specifies the subnet mask for the interface in dotted-decimal or CIDR format.
- **For IPv6:** Configure an IP address for the interface configured in the previous step by entering **ipv6 address** *<ip\_address>* *<subnetmask>*.
  - *<ip\_address>* specifies the IP address for the interface in colon-separated-hexadecimal format.
  - *<subnetmask>* specifies the subnet mask for the interface in colon-separated-hexadecimal or CIDR format.

For example:

```
[local]host_name(config-if-eth)# ip address 10.0.154.100 255.255.255.248
```

–or–

```
[local]host_name(config-if-eth)# ipv6 address 2620:0:60:49::10/64
```

**Step 5** Leave the configuration mode by entering the following command:

```
[local]host_name(config-if-eth)# end
[local]host_name#
```

**Step 6** Confirm the interface ip addresses by entering **show config context local**.

## Configure the System for Remote Access

When the system is configured for remote access, an administrative user may access the system from a remote location over a local area network (LAN) or wide area network (WAN) via the following communication protocols:

- Telnet
- Secure Shell (SSH)
- File Transfer Protocol (FTP) (secured or unsecured)
- Trivial File Transfer Protocol (TFTP)



### Note

For maximum security, use SSH v2.

**Step 1** At the CLI command prompt enter **context local** to enter the context configuration mode.

```
[local]host_name# context local
[local]host_name(config-ctx)#
```

**Step 2** Go to a previously defined interface.

```
[local]host_name(config-ctx)# interface <interface_name>
```

**Step 3** Enter **server telnetd** to allow Telnet access.

```
[local]host_name(config-ctx)# server telnetd
```

**Step 4** Enter the following command sequence to allow SSH and SFTP access:



**Note** **v2-rsa** is the default SSH key type.

```
[local]host_name(config-ctx)# ssh generate key
| (key sequences)
|
[local]host_name(config-ctx)# server sshd
[local]host_name(config-sshd)# subsystem sftp
[local]host_name(config-sshd)# exit
[local]host_name(config-ctx)#
```

**Step 5** Enter **server ftpd** to allow FTP access.

```
[local]host_name(config-ctx)# server ftpd
```

**Step 6** Enter **server tftpd** to allow TFTP access.

```
[local]host_name(config-ctx)# server tftpd
```

**Step 7** Enter **exit** to exit the context configuration mode.

```
[local]host_name(config-ctx)# exit
[local]host_name(config)#
```

**Step 8** Enter **end** to exit the configuration mode.

```
[local]host_name(config)# end
[local]host_name#
```

**Step 9** Proceed to [Save the Basic Configuration](#).

## Set System Timing

### Setting the System Clock and Time Zone

Use the following command sequence to configure the system clock and time zone:

```
[local]host_name# clock set <YYYY:MM:DD:HH:mm or YYYY:MM:DD:HH:mm:ss>
[local]host_name# config
[local]host_name(config)# clock timezone <timezone> [ local ]
[local]host_name(config)#end
[local]host_name#
```



**Note** See the online help for the **clock timezone** command for a complete list of supported time zones. The optional **local** keyword indicates that the time zone specified is the local timezone.



**Note** Daylight Savings Time is automatically adjusted for time zones supporting it.

Save your configuration as described in the Verifying and Saving Your Configuration (refer to [Save the Basic Configuration](#)).

Enter **show clock** to verify that you configured the time and time zone correctly:

```
[local]host_name# show clock
```

Wednesday October 26 13:08:27 us-eastern 2011

## Configuring Network Time Protocol Support

This section describes how to enable the use of the Network Time Protocol (NTP) on the ASR 5500 chassis.

### Overview of NTP Support

Many of the services offered by the ASR 5500 platform require accurate timekeeping derived through NTP. If the time reference(s) used by StarOS are not accurate, the services may be unreliable. For this reason it should be assumed that normal system operation requires that NTP be configured.

The system uses NTP to synchronize internal clocks on the chassis to external time sources (typically GPS NTP sources, or other Stratum 2 or 3 servers, switches or routers).

By default, NTP is not enabled externally and should be configured when the system is initially installed. When enabled, the active MIO will synchronize with external sources. If not enabled, the active MIO will use its local clock as a time source. In the event of an NTP server or network outage, an already running MIO will continue to use NTP to maintain time accuracy, but in a holdover mode.

All cards with CPUs synchronize to the active MIO internally. This occurs even if an external NTP server is not configured. In the event of a MIO switchover, all other cards will start synchronizing with the newly active MIO automatically.

The system should have:

- NTP enabled.
- NTP configured for use in the *local* context only. Use of other contexts (which can be specified in the enable configurable) will cause issues.
- NTP configured for three external NTP servers. With three or more servers, outliers and broken or misconfigured servers can be detected and excluded. Generally, the more servers the better (within reason).



#### Note

Do not configure any external NTP servers using the **prefer** keyword. The NTP clock selection algorithms already have the built-in ability to pick the best server. Use of prefer usually results in a poorer choice than NTP can determine for itself.



#### Note

Do not change the **maxpoll**, **minpoll**, or **version** keyword settings unless instructed to do so by Cisco TAC.

### Basic NTP Configuration



#### Note

Configure the system clock and time zone prior to implementing NTP support. This greatly simplifies the time zone shift that must be corrected by the NTP server. See [Setting the System Clock and Time Zone](#).

Use the following example to configure the necessary NTP association parameters:

```
[local]host_name# config
[local]host_name(config)# ntp
[local]host_name(config-ntp)# enable
[local]host_name(config-ntp)# server <ip_address1>
[local]host_name(config-ntp)# server <ip_address2>
[local]host_name(config-ntp)# server <ip_address3>
[local]host_name(config-ntp)# end
[local]host_name#
```

By default <context\_name> is set to *local*. This is the recommended configuration.

A number of options exist for the **ntp server** command. Refer to the *NTP Configuration Mode Commands* chapter in the *Command Line Interface Reference* for more information.


**Note**


---

Configure the system with at least three (preferably four) NTP servers.

---

Save the configuration as described in [Save the Basic Configuration](#).

## Configuring NTP Servers with Local Sources

NTP can use network peers, local external clocks (such as GPS devices), or a local clock with no external source.

A local clock with no external source is usually a last-resort clock when no better clock is available. It is typically configured on a site's intermediate NTP server so that when a WAN network outage occurs, hosts within the site can continue to synchronize amongst themselves.

You can configure this in ntpd or on many commercially available NTP devices. This local clock should always have a high stratum number (8+) so that under normal conditions (when real sources are available) this local clock will not be used.

## Using a Load Balancer

The NTP daemon and protocol assume that each configured server is running NTP. If a NTP client is configured to synchronize to a load balancer that relays and distributes packets to a set of real NTP servers, the load balancer may distribute those packets dynamically and confuse the NTP client. NTP packets are latency and jitter sensitive. Relaying them through a load balancer can confuse the NTP client and is not a supported practice.

## Verifying the NTP Configuration

To verify the NTP Configuration, enter the **show ntp associations** command at the Exec mode. The output displays information about all NTP servers.

[Table 10-2](#) lists and briefly describes the parameters that appear in the output of the **show ntp associations** command.

**Table 10-2**      **Output Parameters for show ntp associations**

Column Title	Description
remote	Lists the current NTP servers. One of these characters precedes each IP address to show the server's current condition: <ul style="list-style-type: none"> <li>• () Rejected/No response</li> <li>• X False tick</li> <li>• (.) Excess</li> <li>• - Outlyer</li> <li>• + Candidate</li> <li>• # Selected</li> <li>• * System peer</li> <li>• (o) PPS peer</li> </ul>
refid	Last reported NTP reference to which the server is synchronizing.
st	NTP server stratum level.
t	Communication type: broadcast, multicast, etc.
when	Number of seconds since the last contact.
poll	Polling interval between the system and the NTP server.
reach	Octal value of the reachability shift register indicating which responses were received for the previous eight polls to this NTP server.
delay	Round-trip delay (in milliseconds) for messages exchanged between the system and the NTP server.
offset	Number of milliseconds by which the system clock must be adjusted to synchronize it with the NTP server.
jitter	Jitter in milliseconds between the system and the NTP server

## Enable CLI Timestamping

To display a timestamp (date and time) for every command that is executed on the CLI, enter the following command at the root prompt for the Exec mode:

```
[local]host_name# timestamps
```

Immediately after you execute the command, the date and time appear.

Save the configuration as described in [Save the Basic Configuration](#).

# Save the Basic Configuration

Save this basic system configuration information to a file locally. The following procedure saves the configuration file to flash memory in the MIO.

- 
- Step 1** You must be at the root prompt for the Exec mode to save the configuration file.
- ```
[local]host_name#
```
- Step 2** To save your current configuration, enter the following command: **save configuration /flash/system.cfg**
- ```
[local]host_name# save configuration /flash/system.cfg
```
- 

This completes the basic configuration process.

## Additional Configuration Tasks

Establishing the basic configuration allows an operator to access the ASR 5500 for management purposes. Additional configuration settings are required for full operational deployment within a provider network. To complete these tasks, refer to the following documents:

- *System Administration Guide*
- *CLI Reference Guide*
- *Administration Guide* specific to the type of product being deployed.
- *StarOS Release Notes*





# CHAPTER 11

## Replaceable Components

---

This chapter describes how to remove and replace the following components:

- [Air Filters](#)
- [Fan Tray Units](#)
- [PFU](#)
- [Circuit Cards](#)



### Caution

During installation, maintenance, and/or removal, wear a grounding wrist strap connected to the ASR 5500 chassis to avoid ESD damage to the components. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

---

## Air Filters

Lower fan trays draw ambient air into the chassis. Each is equipped with a particulate air filter to prevent dust and debris from entering the chassis. The two air filters (one front and one rear) must be changed periodically to ensure proper ventilation and air flow through the chassis.

You should replace the air filters at least every six months. Keep replacement air filters on site: one for the front fan tray (ASR55-FLTR-AIR-F=), and one for the rear fan tray (ASR55-FLTR-AIR-R=). This ensures that qualified service personnel can quickly replace a filter as necessary. The filters should be replaced during a maintenance window when low traffic volume is expected.

## Determining When an Air Filter Needs Replacing

If the air filters are replaced at least every six months as part of routine maintenance, there should be no need for out-of-cycle replacement. However, under certain conditions, the air filters may need replacement between maintenance periods.

### High Operating Temperatures and Fan Speeds

One possible indication that air filters need to be replaced is if the chassis temperature remains high for extended periods of time. This condition causes the multi-speed fans to run at high speed. Clogged and dirty air filters could hinder air flow through the chassis and result in higher operating temperatures.

## Temperature and Fan Alarm Commands

### show fans Command

To monitor chassis temperature and fan speed, issue the **show fans** command in the CLI Exec mode:

The following is a sample output for this command:

```
[local]asr5500# show fans
Lower Rear    Fan Tray: State=Normal    Speed=65% Temp=27 C
Lower Front   Fan Tray: State=Normal    Speed=65% Temp=27 C
Upper Rear    Fan Tray: State=Normal    Speed=70% Temp=28 C
Upper Front   Fan Tray: State=Normal    Speed=70% Temp=40 C
```

**Note**

The safe operating temperature range for the chassis and its components is between -5°C and 50°C (23°F and 122°F).

### show temperature Command

The **show temperature** command displays the relative temperature state of all cards currently installed, as well as the ambient temperature at all fan tray units.

```
[local]asr5500# show temperature
Card 2:      Normal
Card 5:      Normal
Card 6:      Normal
Card 7:      Normal
Card 9:      Normal
Card 11:     Normal
Card 12:     Normal
Card 14:     Normal
Card 15:     Normal
Card 16:     Normal
Card 17:     Normal
Fan Lower Rear: 26 C
Fan Lower Front: 27 C
Fan Upper Rear: 28 C
Fan Upper Front: 40 C
```

## Replacing an Air Filter

**Caution**

Do not operate the chassis for extended periods of time after removing an air filter. Doing so will cause dust to build up within the chassis, possibly hindering air flow and clogging open connector ports.

The fan tray filters are mounted underneath the front and rear card cages. A gap between the top of the fan tray unit and the air filter allows you to remove the filter without having to remove the fan tray. The air filter is spring-loaded at the rear.

### Front Air Filter

- Step 1** Remove the bottom cover panel from the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside. See [Figure 11-1](#).
- Step 2** Loosen the screws securing the lower fan tray access cover. Remove the cover and set it safely aside.
- Step 3** In the gap above the top of the fan tray, locate the two plastic tabs that hang down from the front of the air filter. Pull the tabs down and back towards the midplane to free the filter from the lip under the front rail of the card cage.
- Step 4** While continuing to hold the tabs, allow the filter to spring forward and downward to clear the retaining lip and the slot at the rear of the card cage. Remove the old filter from the chassis.
- Step 5** Verify that the arrows located on the sides of the replacement air filter point upwards (metal grid facing up). These arrows indicate the direction of the airflow into the chassis through the filter. The spring indicates the rear of the filter and goes toward the midplane.

**Caution**

Installing the air filter incorrectly may cause over-temperature conditions within the system.

- Step 6** Slide the replacement air filter into the gap above the fan tray assembly towards the midplane. Tilt the filter slightly upward to catch the slot in back of the card cage.
- Step 7** Push the filter into the rear slot and flush with the bottom of the card cage. Allow the filter to spring forward into the lip under the front rail of the card cage. The plastic tabs should be hanging down.
- Step 8** Reinstall the fan tray access cover.
- Step 9** Reinstall the chassis cover panel by snapping it in place.
- Step 10** Discard the old air filter.

### Rear Air Filter

- Step 1** Remove the bottom cover panel from the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside. See [Figure 11-2](#).
- Step 2** Loosen the screws securing the lower fan tray access cover. Remove the cover and set it safely aside.
- Step 3** Because of the narrow gap between the fan unit and air filter, use a flat blade screw driver to gently force the air filter back toward the mid plane. Allow the filter to spring downward and forward, away from the retaining lip at the front of the card cage.

- Step 4** Verify that the arrows located on the sides of the replacement air filter point upwards (metal grid facing up). These arrows indicate the direction of the airflow into the chassis through the filter. The spring indicates the rear of the filter and goes toward the midplane.

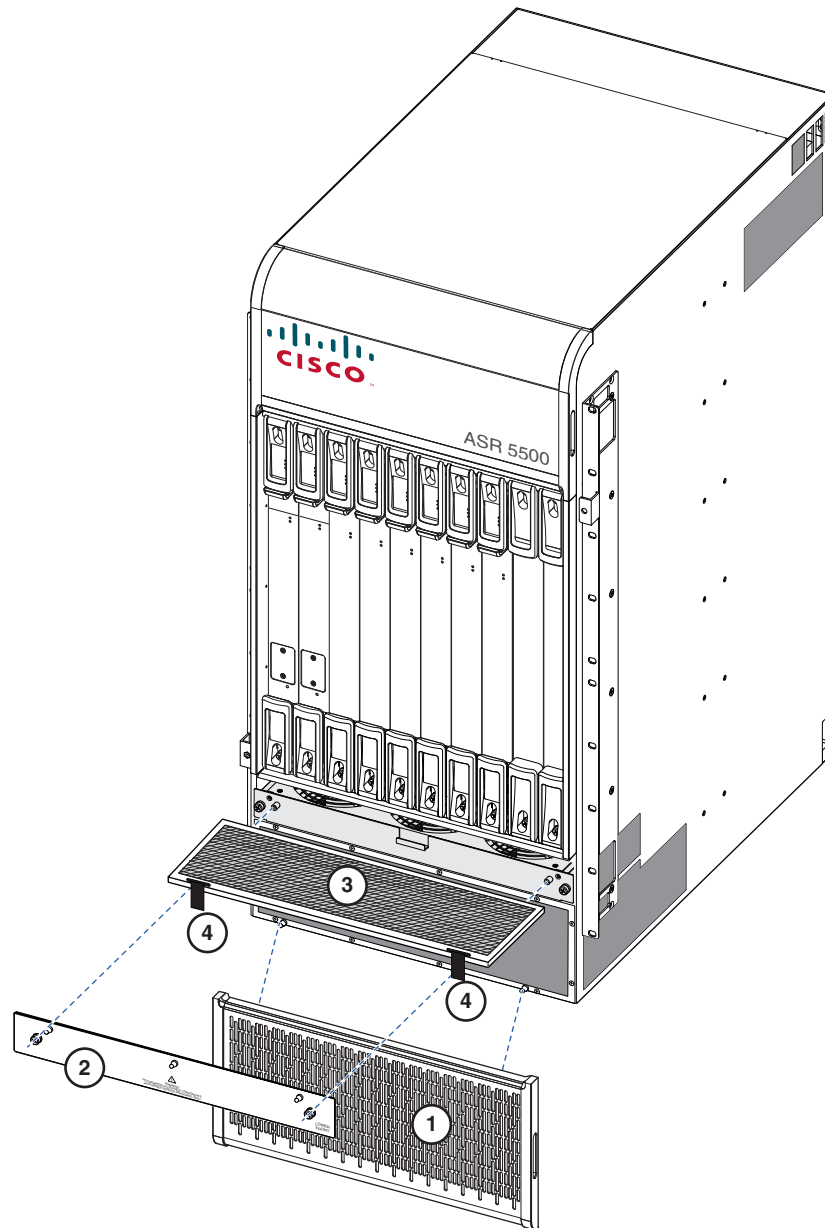


---

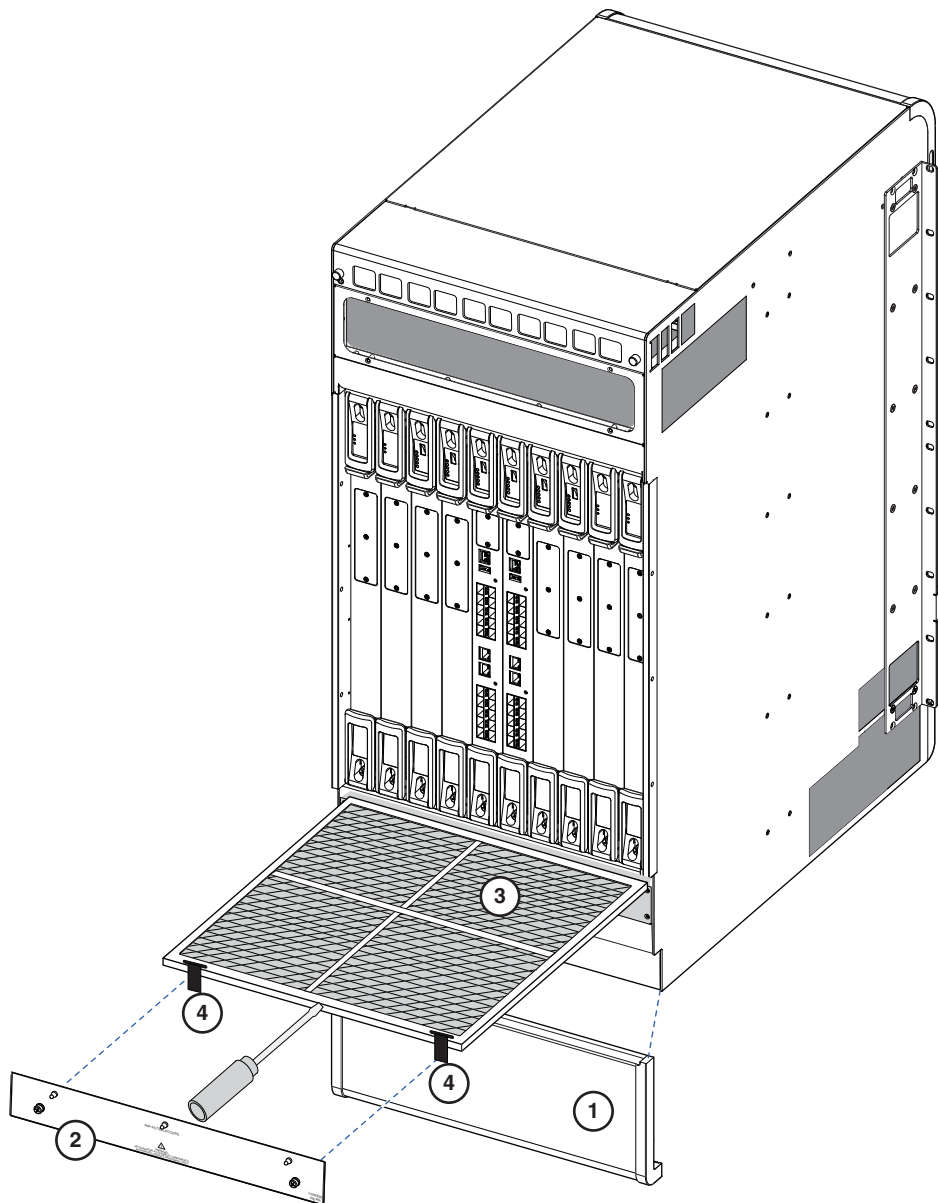
**Caution** Installing the air filter incorrectly may cause over-temperature conditions within the system.

---

- Step 5** Slide the replacement air filter into the gap above the fan tray assembly towards the midplane. Tilt the filter slightly upward to catch the slot in back of the card cage.
- Step 6** Use a flat blade screwdriver to push the filter into the rear slot and flush with the bottom of the card cage. Allow the filter to spring forward into the lip under the front rail of the card cage. The plastic tabs should be hanging down.
- Step 7** Reinstall the fan tray access cover.
- Step 8** Reinstall the chassis cover panel by snapping it in place.
- Step 9** Discard the old air filter.
-

**Figure 11-1**      **Removal and Replacement of Front Air Filter**

1	Cover panel	2	Access cover
3	Front air filter (ASR55-FLTR-AIR-F=)	4	Pull tab

**Figure 11-2**      **Removal and Replacement of Rear Air Filter**

1	Cover panel	2	Access cover
3	Rear air filter (ASR55-FLTR-AIR-R=)	4	Pull tab

# Fan Tray Units

The four fan tray units draw air up through the chassis for cooling and ventilation. The heated air exhausts through the vents at the rear and sides of the chassis.

This section describes how to remove and replace the front and rear fan tray units should there be a partial or complete failure of a unit.

**Caution**

Do not operate the chassis for more than a very brief period of time (less than one minute) with one or more fan trays out of service. Doing so may cause the system to overheat and result in component damage.

**Note**

Each front fan tray is controlled by its corresponding rear fan tray. Removal or failure of a rear fan tray will cause the corresponding front fan tray to cease running.

## Determining Whether a Fan Tray Unit Needs Replacing

The system has several ways to indicate a fan tray failure. The first indicator is that the System Status LED on the System Status Card (SSC) illuminates red to indicate the failure of a chassis component.

If you see a red System Status LED on the SSC, you can determine whether it is a fan tray failure by using the CLI. Refer to [Temperature and Fan Alarm Commands](#) and [show temperature Command](#).

## Replacing Front Fan Trays

**Warning**

**Fan tray units contain multiple fans that spin at a high rate of speed when the system is powered on. If the system is powered on when a fan tray is removed, do not touch moving fans. To minimize the risk of personal injury and potential equipment damage, pull the fan tray towards you until the fan tray extends out of the chassis approximately two inches (5cm). Wait a few seconds to allow fans to spin down before fully removing the fan tray.**

**Note**

Have the replacement fan tray available and ready to be installed before starting the replacement procedure.

## Replace the Upper Fan Tray

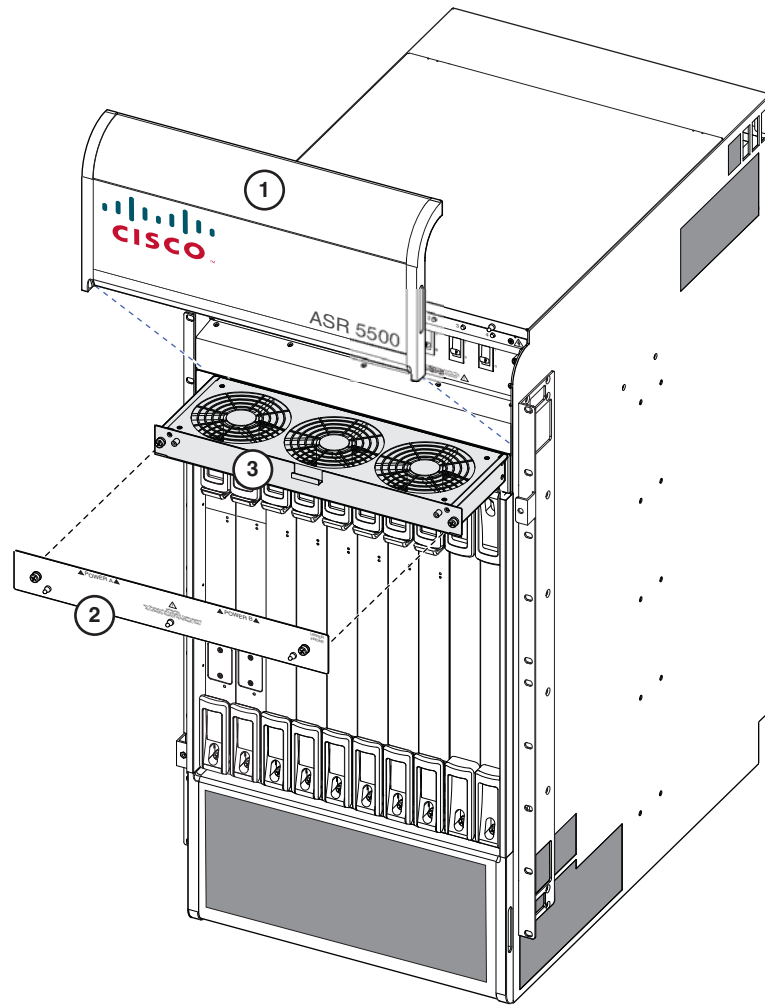
- Step 1** At the front of the chassis, remove the cover panel from the top of the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside. See [Figure 11-3](#).
- Step 2** Loosen the screws and remove the upper fan tray access panel from the chassis. Place it safely aside.
- Step 3** Loosen the two screws that secure the fan tray to the chassis.
- Step 4** Grasp the center pull and pull the failed fan tray unit from the chassis.
- Step 5** Set the failed fan tray safely aside.

- Step 6** Hold the front of the replacement fan tray by its sides and align it with the upper fan tray bay of the chassis.
  - Step 7** Slowly slide the fan tray into the chassis along the guides until the rear connector is firmly seated in the midplane. If the ASR 5500 is powered up, the fans should begin spinning.
  - Step 8** Tighten the screws that secure the fan tray to the chassis.
  - Step 9** Reinstall the access panel.
  - Step 10** Reinstall the top cover panel by aligning it over the balled posts and snapping it in place.
  - Step 11** Refer to [Returning Failed Components](#) for additional instructions.
- 

## Replace the Lower Fan Tray

- 
- Step 1** Remove the cover panel from the bottom of the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside.
  - Step 2** Loosen the screws and remove the fan tray access panel from the chassis. Place it safely aside.
  - Step 3** Use a #1 Phillips screwdriver to loosen the two screws that secure the handle to the front of the fan tray.
  - Step 4** Flip up and grasp the fan tray handle and pull. Support the bottom of the fan tray unit with one hand as you pull it away from the chassis.
  - Step 5** Place the failed fan tray unit safely aside.
  - Step 6** Align the replacement fan tray within the lower chassis opening. With the unit resting on the bottom rail of the opening, push inward until it is firmly seated in the rear connectors. If the ASR 5500 is powered up, the fans should begin spinning.
  - Step 7** Reinstall the access panel.
  - Step 8** Reinstall the bottom cover panel by aligning it over the balled posts and snapping it in place.
  - Step 9** Refer to [Returning Failed Components](#) for additional instructions.
-



**Figure 11-3** Removal and Replacement of Front Fan Tray

1	Cover panel	2	Access cover
3	Front fan tray		

## Replacing Rear Fan Trays

**Warning**

Fan tray units contain multiple fans that spin at a high rate of speed when the system is powered on. If the system is powered on when a fan tray is removed, do not touch moving fans. To minimize the risk of personal injury and potential equipment damage, pull the fan tray towards you until the fan tray extends out of the chassis approximately two inches (5 cm). Wait a few seconds to allow fans to spin down before fully removing the fan tray.

**Note**

Removing a rear fan tray will cause its companion front fan tray to power down. The front fan tray will power back up when the rear tray is replaced.

**Note**

Have the replacement fan tray available and ready to be installed before starting the replacement procedure.

## Replace the Upper Fan Tray

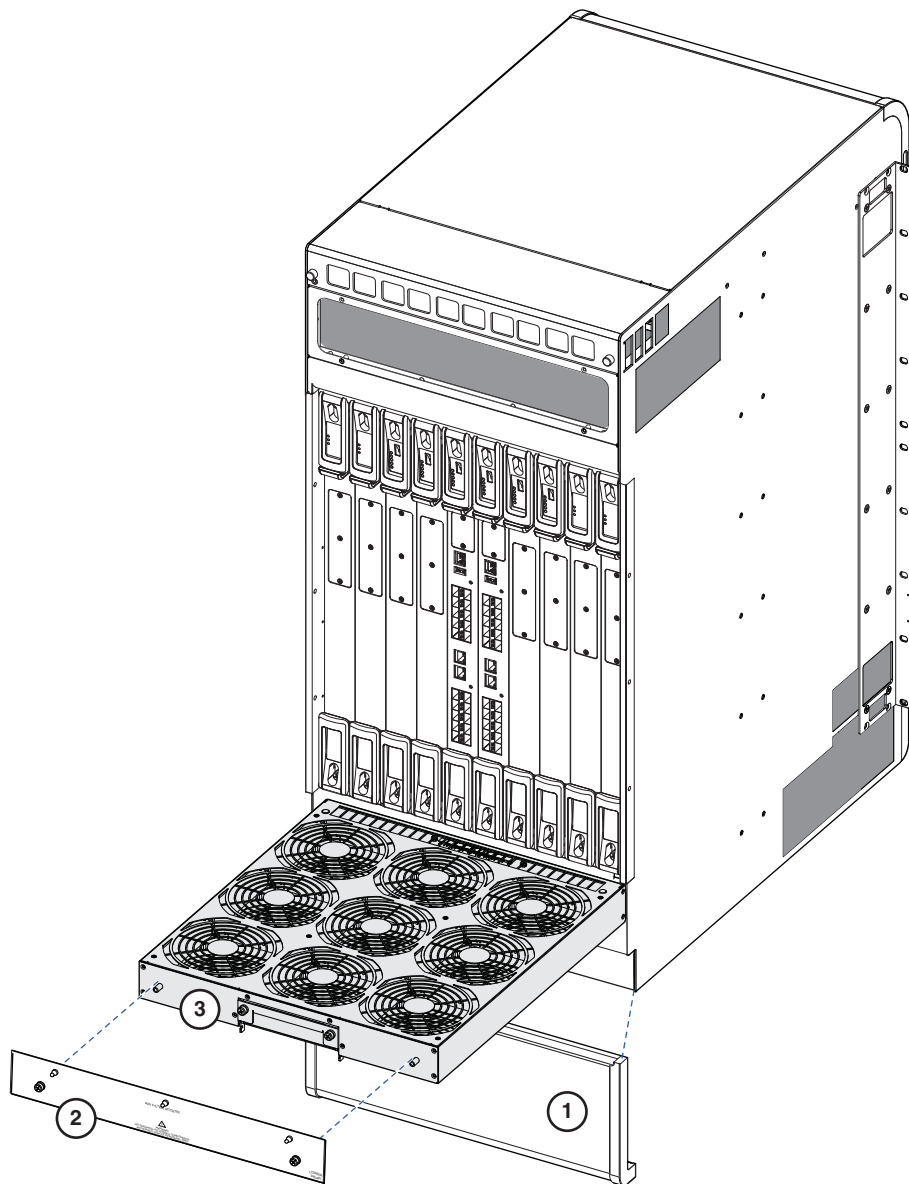
- Step 1** At the rear of the chassis, remove the cover panel below the vent panel at the top of the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside.
- Step 2** Loosen the knurled screws and remove the upper fan tray access panel from the chassis. Place it safely aside.
- Step 3** Use a #1 Phillips screwdriver to loosen the two screws that secure the fan tray to the chassis.
- Step 4** Grasp screw posts on the ends of the unit and pull the failed fan tray unit from the chassis.
- Step 5** Place the failed fan tray unit safely aside.
- Step 6** Align the replacement fan tray within the upper chassis opening. With the unit resting on the bottom rail of the opening, push inward until the rear connector is firmly seated in the midplane. If the ASR 5500 is powered up, the fans should begin spinning.
- Step 7** Tighten the screws that secure the fan tray to the chassis.
- Step 8** Reinstall the access panel.
- Step 9** Reinstall the top cover panel by aligning it over the balled posts and snapping it in place.
- Step 10** Refer to [Returning Failed Components](#) for additional instructions.

## Replace the Lower Fan Tray

**Note**

If your chassis is equipped with a cable management tray, the tray must be in the up and latched position to remove the lower fan tray. Refer to [Raising the Cable Management Tray](#) in [Appendix B](#).

- 
- Step 1** Remove the cover panel from the bottom of the chassis. Firmly grasp the side edges of the panel and pull up and away to unsnap the panel. Put the panel safely aside. See [Figure 11-4](#).
- Step 2** Loosen the screws and remove the fan tray access panel from the chassis. Place it safely aside.
- Step 3** Use a #1 Phillips screwdriver to loosen the two knurled screws that secure the handle to the front of the fan tray.
- Step 4** Flip up and grasp the fan tray handle and pull. Support the bottom of the fan tray unit with one hand as you pull it away from the chassis.
- Step 5** Place the failed fan tray unit safely aside.
- Step 6** Align the replacement fan tray within the lower chassis opening. With the unit resting on the bottom rail of the opening, push inward until the rear connector is firmly seated in the midplane. If the ASR 5500 is powered up, the fans should begin spinning.
- Step 7** Tighten the screws that secure the fan tray to the chassis.
- Step 8** Reinstall the access panel.
- Step 9** Reinstall the bottom cover panel by aligning it over the balled posts and snapping it in place.
- Step 10** Refer to [Returning Failed Components](#) for additional instructions.
-

**Figure 11-4** Removal and Replacement of Rear Fan Tray

1	Cover panel	2	Access cover
3	Rear fan tray		

# PFU

**Caution**

Although a single PFU can provide power for a fully loaded chassis, it is strongly recommended that two fully functional PFUs always be installed for load-balancing and redundancy.

## Determining that a PFU has Failed

There are several mechanisms to indicate a PFU failure.

- Run the **show power** command from the CLI.
- Verify that all circuit breakers are in the ON position. The four blue LEDs should be ON.
- Verify that the RTN and -48VDC lugs are securely attached to all posts at the upper rear of the chassis.
- Verify that the ground lugs are securely attached to the posts on the bottom rear of the chassis.
- Use a voltmeter to verify that the power distribution panel is supplying the correct voltage and sufficient current to the terminals at the rear of the PFU.
- Check the cables from the power source to the rack for continuity.

If all of the above checks fail to isolate a fault, you may assume that the PFU has failed.

## Replacing a PFU

In the event of a PFU failure, follow these instructions to safely remove the PFU from the system.

- Step 1** At the upper front of the chassis, unsnap and remove the cover over the front of the PFUs. See [Figure 11-5](#).
- Step 2** Power down the failed PFU by setting the four circuit breakers at the front of the PFU to OFF (O).
- Step 3** At the power distribution panel, turn OFF the four power feeds going to the failed PFU.
- Step 4** Remove all the power feed cables from the terminals at the rear of the PFU.

**Caution**

Trying to remove a PFU with one or more of the rear cables still attached may cause severe damage to the PFU and other chassis components.

**Note**

All cables going to the PFU should be labeled with the PFU terminal number and power distribution panel circuit number.

- a. Loosen the screws and remove the plastic terminal cover.
- b. Use a 7/16-inch nut driver or socket wrench to remove the nuts, lock washers and flat washers from each of the eight terminals and set them aside for reuse.
- c. Remove the 2-hole lugs from each of the terminals.

- Step 5** From the front of the chassis, use a Phillips #2 screwdriver to loosen the four screws securing the failed PFU to the chassis.
- Step 6** Grasp the handle on the front of the PFU and pull forcefully downward to extract the PFU from the power plane connectors. Pull the unit from the chassis and set it aside.
- Step 7** Verify that the four circuit breakers on the front of the replacement PFU are in the OFF (O) position. the handle on the front of the PFU should be in the down position.
- Step 8** Slide the replacement PFU into the PFU bay until it is flush against the rear connectors. Firmly push the PFU into the power plane connectors. Pull the handle forcefully upwards to fully seat the PFU into the power plane connectors.
- Step 9** Use a Phillips #2 screwdriver to tighten each of the four screws on the PFU to secure it to the chassis.
- Step 10** At the rear of the chassis replace the power feed cables on the PFU input terminals.
- Before proceeding, verify that the bottom nuts on all terminals are torqued to 50 in-lb. (5.65 N-m).
  - Thread each cable through an opening in the side of the chassis and route it to the appropriate terminals (-48V 1, Return 1, -48V 2, Return 2, etc.).
  - Install each lug over the two terminals.
  - Secure each lug to the terminals with flat washers, lock washers and nuts. The nuts should be torqued to 8 in-lb. (0.9 N-m).
  - Continue installing the feeds on the terminals until all power feed connections have been completed to the replacement PFU.

**Warning**


---

**To avoid the risk of fire verify that the supply and return lugs are not touching.**

---

- Step 11** Turn ON the four power feeds from the power distribution panel to the PFU.
- Step 12** At the front of the chassis, power up the PFU by setting the four circuit breakers on its front panel to ON (I). The four blue LEDs should be ON.
- Step 13** Reinstall the plastic terminal cover on the top-rear of the chassis.

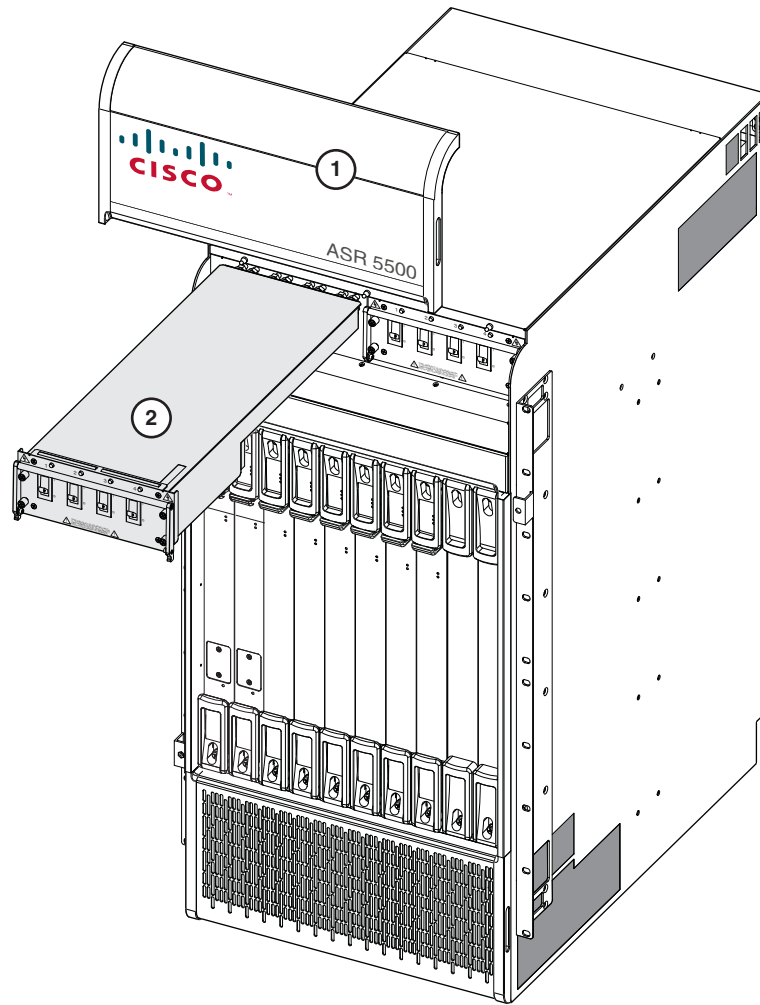
**Caution**


---

To avoid the risk of personal injury and/or potential damage to the system, never operate the chassis without the plastic cover.

---

- Step 14** Reinstall the front top cover panel by aligning it over the balled posts and snapping it in place.
- Step 15** Refer to [Returning Failed Components](#) for additional instructions.
-

**Figure 11-5**      **Removal and Replacement of PFU**

<b>1</b>	Cover panel	<b>2</b>	PFU
----------	-------------	----------	-----

# Circuit Cards

This section describes how to replace circuit cards in the ASR 5500 chassis.

## Determining Whether a Card has Failed

The ASR 5500 has several ways to indicate an application card failure. The first indicator is that the Status LED on the System Status Card (SSC) turns red to indicate the failure of a chassis component. Another indicator is the Run/Fail LED on an application card is red or turns off if that card has a problem.

If you see either of these indicators, you can determine the nature of the problem by using the CLI or checking the Simple Network Management Protocol (SNMP) traps that may have been generated.

### show card diag Command

Execute the **show card diag <slot\_#>** command from the CLI in Exec mode. The *slot\_#* is the chassis slot number in which the particular card that you wish to monitor is installed. The following is a sample output for this command to monitor the card in chassis slot 5:

```
[local]asr5500# show card diag 5

Card 5:
Counters:
    Successful Warm Boots : 0
        (last at Friday July 29 13:45:58 us-eastern 2011)
    Successful Cold Boots : 2
        (last at Friday July 29 13:46:20 us-eastern 2011)
    Total Boot Attempts   : 1
    In Service Date       : Fri Jul 29 13:50:58 2011
Status:
    IDEEPROM Magic Number : Good
    Boot Mode              : Normal
    Card Diagnostics       : Pass
    Current Failure        : None
    Last Failure           : None
    Card Usable            : Yes
Current Environment:
    Temp: DDR-C0D0         : 30.00 C (limit 100.00 C)
    Temp: DDR-C0D1         : 30.00 C (limit 100.00 C)
    Temp: DDR-C1D0         : 30.00 C (limit 100.00 C)
    Temp: DDR-C1D1         : 30.00 C (limit 100.00 C)
    Temp: DDR-C2D0         : 30.00 C (limit 100.00 C)
    Temp: DDR-C2D1         : 30.00 C (limit 100.00 C)
    Temp: CPU-N0C0         : 30.00 C (limit 101.00 C)
    Temp: CPU-N0C1         : 30.00 C (limit 101.00 C)
    Temp: CPU-N0C2         : 30.00 C (limit 101.00 C)
    Temp: CPU-N0C3         : 30.00 C (limit 101.00 C)
    Temp: CPU-N0C4         : 30.00 C (limit 101.00 C)
    Temp: CPU-N0C5         : 30.00 C (limit 101.00 C)
    Temp: IOH              : 35.00 C (limit 110.00 C)
    Temp: NP4 #0           : 35.00 C (limit 115.00 C)
    Temp: NP4 #1           : 35.00 C (limit 115.00 C)
    Temp: NP4 #2           : 35.00 C (limit 115.00 C)
    Temp: NP4 #3           : 35.00 C (limit 115.00 C)
    Temp: LM94             : 0.00 C
    Temp: Petral           : 35.00 C (limit 100.00 C)
    Temp: Petra2           : 35.00 C (limit 100.00 C)
    Temp: Upper-right      : 27.50 C (limit 85.00 C)
    Temp: Petra3           : 35.00 C (limit 100.00 C)
```



```

Temp: Petra4           : 35.00 C (limit 100.00 C)
Temp: Mid-right        : 27.50 C (limit 85.00 C)
Temp: MDF              : 25.00 C (limit 80.00 C)
Temp: Lower-right      : 22.50 C (limit 75.00 C)
Temp: Upper-left       : 27.50 C (limit 85.00 C)
Temp: Lower-left       : 27.50 C (limit 85.00 C)
Temp: DC1              : 27.50 C (limit 85.00 C)
Temp: DC2              : 27.50 C (limit 85.00 C)
Temp: F600 #1          : 0.00 C
Temp: F600 #2          : 0.00 C
Voltage: 12V-A          : 0.000 V
Voltage: CPU0 VTT       : 1.136 V (min 0.992 V, max 1.281 V)
Voltage: 12V-B          : 0.000 V
Voltage: 12V-C          : 0.000 V
Voltage: 1.8V           : 1.800 V (min 1.700 V, max 1.900 V)
Voltage: 1.5V           : 1.505 V (min 1.430 V, max 1.580 V)
Voltage: CPU0 VCC       : 1.064 V (min 0.712 V, max 1.417 V)
Voltage: 1.2V           : 1.200 V (min 1.140 V, max 1.260 V)
Voltage: 3.3V           : 3.305 V (min 3.140 V, max 3.470 V)
Voltage: 5V             : 5.000 V (min 4.750 V, max 5.250 V)
Voltage: 3.0V Batt      : 0.000 V
Voltage: 2.5V           : 2.505 V (min 2.380 V, max 2.630 V)
Voltage: 1.53V DDR0     : 1.444 V (min 1.282 V, max 1.606 V)
Voltage: 7.5V           : 7.505 V (min 7.130 V, max 7.880 V)
Voltage: 1.1V IOH       : 1.099 V (min 1.045 V, max 1.155 V)
Voltage: 3.3V Stdbys    : 3.300 V (min 2.970 V, max 3.630 V)
Voltage: 48V-A          : 0.000 V
Voltage: 48V-B          : 0.000 V
Current: 48V-A          : 0.00 A
Current: 48V-B          : 0.00 A
Airflow: Lower Left     : 0 FPM
Airflow: Lower Middle   : 0 FPM
[local]asr5500#

```

## SNMP Traps

The ASR 5500 supports a limited set of SNMP traps that are triggered when conditions indicate status changes on application cards.

To display SNMP trap statistics, run the **show snmp trap statistics** command. A sample output appears below.

```

[local]asr5500# show snmp trap statistics
SNMP Notification Statistics:
  Total number of notifications      : 13
  Last notification sent             : Friday July 29 13:46:38 us-eastern 2011
  Notification sending is            : enabled
  Notifications have never been disabled
  Notifications have never been cleared
  Notifications in current period    : 0
  Notifications in previous period   : 0
  Notification monitor period        : 300 seconds

```

Trap Name	#Gen	#Disc	Disable	Last Generated
CardUp	4	0	0	2011:07:29:13:46:35
PortLinkDown	2	0	0	2011:07:29:13:46:38
CLISessStart	1	0	0	2011:07:29:13:46:37
CardActive	1	0	0	2011:07:29:13:46:20
CardStandby	3	0	0	2011:07:29:13:46:35
PortDown	2	0	0	2011:07:29:13:46:38

```

Total number of notifications Disabled : 0

```

```
[local]asr5500#
```

**Note**

Run the **show snmp trap history** command to view recently sent SNMP traps.

## Replacing a Failed Card

This section describes how to remove a failed circuit card.

**Note**

Circuit cards can be replaced while the ASR 5500 is operating.

**Note**

The optical SFP interfaces on the MIO comply with the limits for Class 1 laser devices for IEC825, EN60825, and 21CFR1040 specifications.

**Caution**

Before you remove and replace a circuit card on an active system, refer to the *System Administration Guide* for instructions on how to migrate or switch processes and services to a redundant (standby) card.

**Caution**

During installation, maintenance, and/or removal, wear a grounding wrist strap connected to the ASR 5500 chassis to avoid ESD damage to the components. Failure to do so could result in damage to sensitive electronic components and potentially void your warranty.

**Note**

All status LEDs on the failed card should be OFF prior to removing the card from the chassis.

## Remove I/O Connections (MIO and SSC)

**Note**

To facilitate removal and reconnection, all I/O cables should be labeled with their terminating destinations prior to removal.

### MIO

**Note**

If your ASR 5500 chassis is equipped with a cable management system, refer to the special instructions for [Detaching Network Cables from an MIO Bracket](#) in [Appendix B](#).

- 
- Step 1** Unplug the cable connected to the RJ45 serial Console port.
  - Step 2** Unplug any cables connected to the RJ45, 1 GbE ports.
  - Step 3** If necessary, remove a USB memory stick from the USB port.
  - Step 4** Remove the fiber optic cables connected to 10GbE ports on the daughter card(s).

- Step 5** Remove the SFP+ transceivers from the daughter card ports and set them aside for reuse.

## SSC

- Step 1** Disable the CO alarms from the SSC at the alarm monitoring panel.
- Step 2** Remove the DB15 connector from the SSC alarm port, if necessary.

## Remove and Replace the Circuit Card



### Caution

Do not leave chassis slots uncovered for extended periods of time (more than a few minutes). This reduces air flow through the chassis and could cause overheating. Make sure a card or baffle panel is installed in every unpopulated chassis slot at all times.



### Note

If your ASR 5500 chassis is equipped with a cable management system, refer to the special instructions for [Lowering the Cable Management Tray](#) in [Appendix B](#).

- Step 1** Use a Phillips #2 screwdriver to loosen the captive screws within the top and bottom handles of the failed card. See [Figure 11-6](#).
- Step 2** Slide the blue subhandle underneath the top handle downward to unlock the handle and disable the card interlock switch.
- Step 3** Simultaneously pull both card handles firmly outward until the card is unseated from the midplane connectors.
- Step 4** Firmly grasp the top and bottom edges of the card and pull the card slowly out of the chassis. Set the failed card safely aside.
- Step 5** Flip the top and bottom handles of the replacement card fully outwards.
- Step 6** Holding the card by the top and bottom edges of the front panel, align the card with the upper and lower card guides of the chassis slot. Gently slide the card into the slot until the handles touch the card cage rails.
- Step 7** Simultaneously push the top and bottom handles firmly inward until the card is fully seated in the midplane connectors. Press firmly on the card's faceplate to ensure that it is fully seated. The front panel should be flush against the chassis upper and lower card mounts for the slot.
- Step 8** Slide the blue subhandle under the top handle to lock the handle in place and enable the interlock switch.
- Step 9** Use a Phillips #2 screwdriver to tighten the captive screws within the top and bottom handles of the card.
- Step 10** For each MIO daughter card, reinstall SFP+ transceivers in the appropriate optical ports and reconnect the fiber optic cables.
- Step 11** Reconnect any I/O cables that may have been removed from the failed card.

**Note**

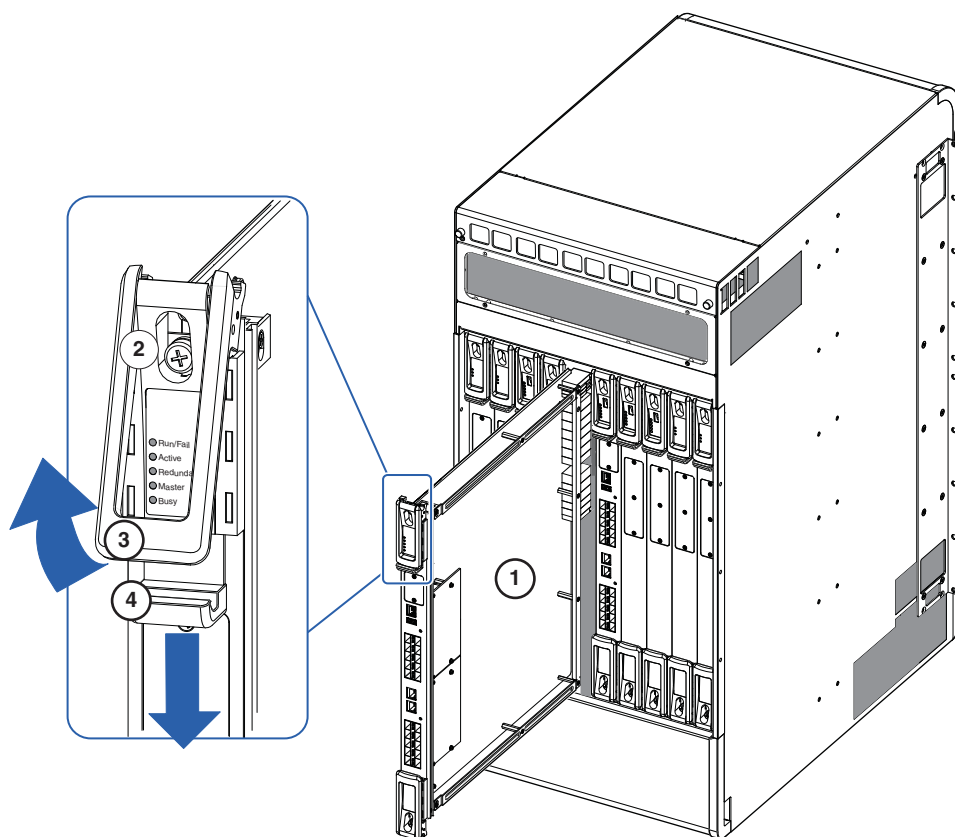
If your ASR 5500 chassis is equipped with a cable management system, refer to the special instructions for [Reconnecting Network Cables to an MIO Bracket](#) and [Raising the Cable Management Tray](#) in [Appendix B](#).

**Step 12** Refer to [Returning Failed Components](#) for additional instructions.

**Note**

The MIOs reference the chassis serial number and license keys stored on the midplane EEPROM. There is no need to swap a memory card between a failed and replacement MIO card.

**Figure 11-6** Removal and Replacement of an MIO Card



<b>1</b>	MIO card	<b>2</b>	Screw
<b>3</b>	Ejector handle	<b>4</b>	Ejector subhandle

# Returning Failed Components

If the failed component is still under Cisco warranty or a hardware maintenance contract, return it for repair or replacement.

If the failed component is out of warranty or not covered by a maintenance contract, contact Cisco to determine if it can be sent in for repair at an additional cost.

Please contact your local Cisco sales or service representative for additional information.

**Caution**

Use a saved shipping carton and anti-static bag when returning a circuit card to Cisco for fault analysis. Failure to use the proper packaging will make it impossible to isolate problems resulting from physical or ESD damage during shipping. For additional information see [Appendix D, “RMA Shipping Procedures”](#).

**Note**

Disposal of this product should be performed in accordance with all national laws and regulations.





# APPENDIX A

## Spare Component Recommendations

This section provides a recommended quantity of spare components to be stocked as part of a sparing program for the ASR 5500. This information should only be used as a guideline for designing a sparing program that meets your company's design, deployment, and availability goals.



### Note

Only fully-trained personnel, on-site or field engineering resources should exchange the Field Replaceable Units (FRUs) listed below.

Based on industry-leading redundancy and failover features incorporated within the system, Cisco recommends that the following minimum spare parts levels for any ASR 5500 deployment.

**Table A-1** Recommended FRU Parts Sparing Quantities

Component Name	Min. Number of Spares	Per "n" components	Cisco PID
<b>Chassis</b>			
ASR 5500 Chassis, Base Components <sup>1</sup>	1	20	ASR55-CHS-SYS=
ASR 5500 Chassis with Midplane <sup>2</sup>	1	20	ASR55-CHS-SP=
Power Filter Unit (PFU)	1	30	ASR55-PFU=
Fan Tray Unit, Front	1	8	ASR55-FANT-F=
Fan Tray Unit, rear	1	8	ASR55-FANT-R=
Air Filters, Front and Rear Air	1	1	ASR55-FLTR-AIR-F=
<b>Rear Cards</b>			
Management Input/Output (MIO) with (2) 10X 10GBASE-LR daughter cards <sup>3</sup>	1	10	ASR55-MIO-10GL2K9=
Management Input/Output (MIO) with (2) 10X 10GBASE-SR daughter cards <sup>4</sup>	1	10	ASR55-MIO-10GS2K9=
Data Processing Card (DPC)	1	12	ASR55-DPC-K9=
<b>Front Cards</b>			
Fabric and Storage Card (FSC)	1	30	ASR55-FSC=
System Status Card (SSC)	1	30	ASR55-SSC=
<b>Miscellaneous</b>			
Lug Kit (power and ground)	1	30	ASR55-Lug=

**Notes:**

- 1.Includes: (2) PFUs, front upper and lower fan tray units, rear upper and lower fan tray units, front and rear air filters.
- 2.Does not include PFUs, fan tray units or air filters.
- 3.Includes 10GBASE-LR SFP+ modules.
- 4.Includes 10GBASE-SR SFP+ modules.





## APPENDIX **B**

# Cable Management System Installation

---

This appendix describes how to install the ASR 5500 Cable Management System (CMS) and route network cables to ports on the Management Input/Output (MIO) cards.



### Note

---

Installation of CMS components is optional.

---

This appendix contains the following sections:

- [Introduction](#)
- [Installing the Cable Management Tray](#)
- [Removing Cable Guides](#)
- [Installing the Cable Management Bracket on an MIO Card](#)
- [Routing and Securing Network Cables](#)
- [CMS Procedure for Replacing ASR 5500 Circuit Cards](#)

## Introduction

The ASR 5500 cable management system consists of two components. The first is a tray that mounts at the rear of the chassis immediately below the card cage. The second is a cable management bracket that mounts to the faceplate of each Management Input/Output (MIO) card.

Network cables are fed from the ends of the tray and are then routed to the MIO ports. The cables are secured to the cable management brackets on the MIOs via cable ties or hook-and-loop straps, and within the cable management tray via hook-and-loop straps. Placing the tray in the closed (upright) position protects the cables from damage.

# Installing the Cable Management Tray

The cable management tray is packaged in the accessory box that is included in the ASR 5500 chassis shipping container.

**Note**

When installed and closed, the cable management tray adds 4.5 in. (11.4 cm) to the depth of the chassis. When lowered, the tray adds 6.0 in. (15.2 cm) to the depth.

**Note**

Having two installers simplifies the installation process. One installer holds the tray in position while the other secures the swing arms to the sides of the chassis.

To install the tray:

- Step 1** Locate the pre-assembled tray and its mounting hardware (two shoulder screws and two nylon washers).
- Step 2** Position the tray below the rear card cage as shown in [Figure B-1](#).
- Step 3** Lift a swing arm upward and use it to locate the tapped hole in the side of the chassis to which the swing arm will be attached (see [Figure B-1](#)).
- Step 4** Insert the shoulder screw and nylon washer through the arm and into the tapped hole.
- Step 5** Use the supplied 3/32 in. Allen hex wrench to tighten the shoulder screw. The screw should be tightened to 6 in-lb (0.68 N-m).

**Note**

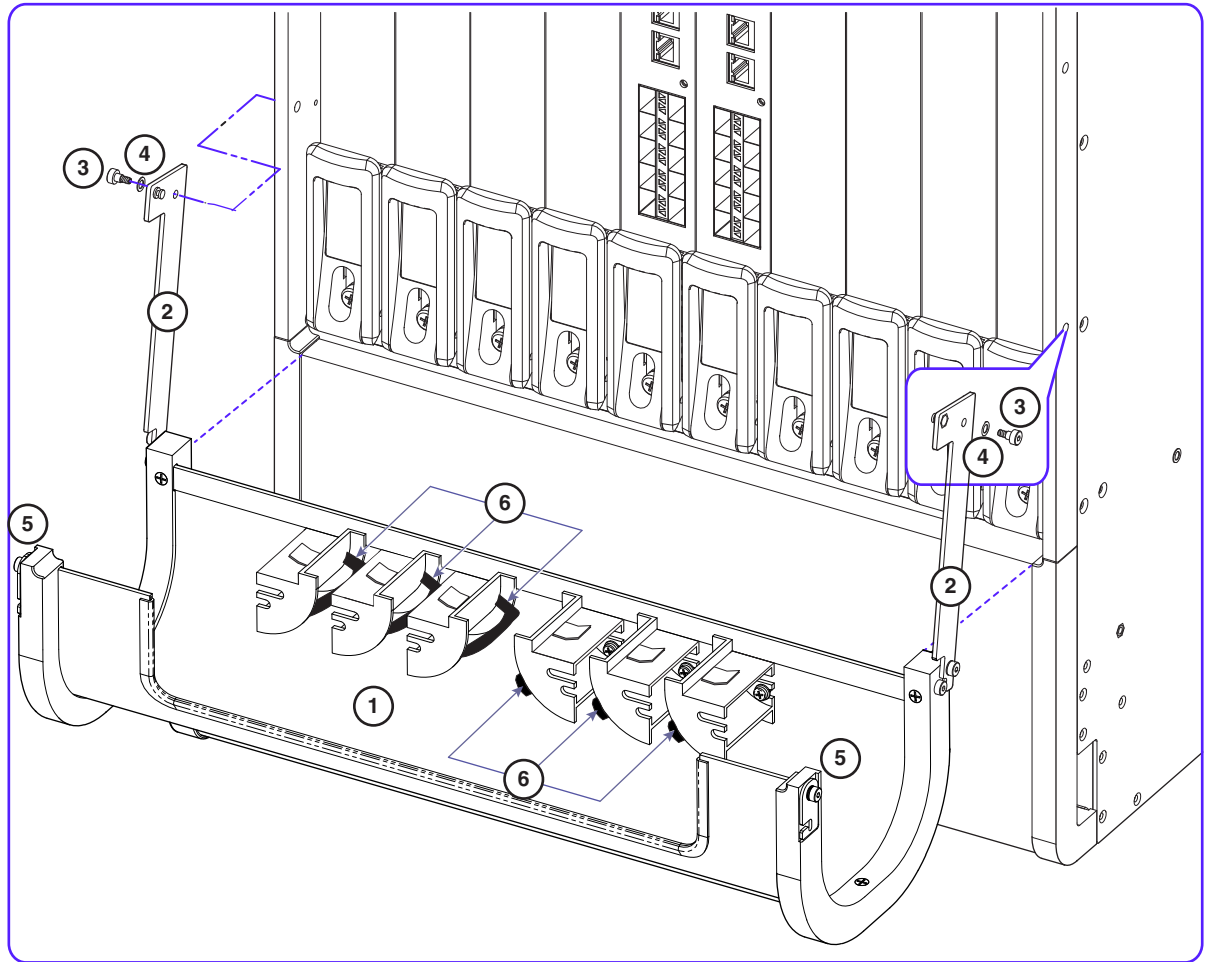
Do not overtighten the shoulder screw or the swing arm will bind.

- Step 6** Repeat [Step 3](#) through [Step 5](#) to secure the other swing arm.
- Step 7** Verify that the tray can be swung upward into its closed position. Test the latches by clipping them to the posts on the swing arms. You may need to apply slight inward pressure on the latches so they will clear the swing arms and rest on the posts. See [Figure B-2](#).

To lower the cable management tray, unlatch the swing arms and lift the base of the tray slightly upward before allowing it to swing downwards.

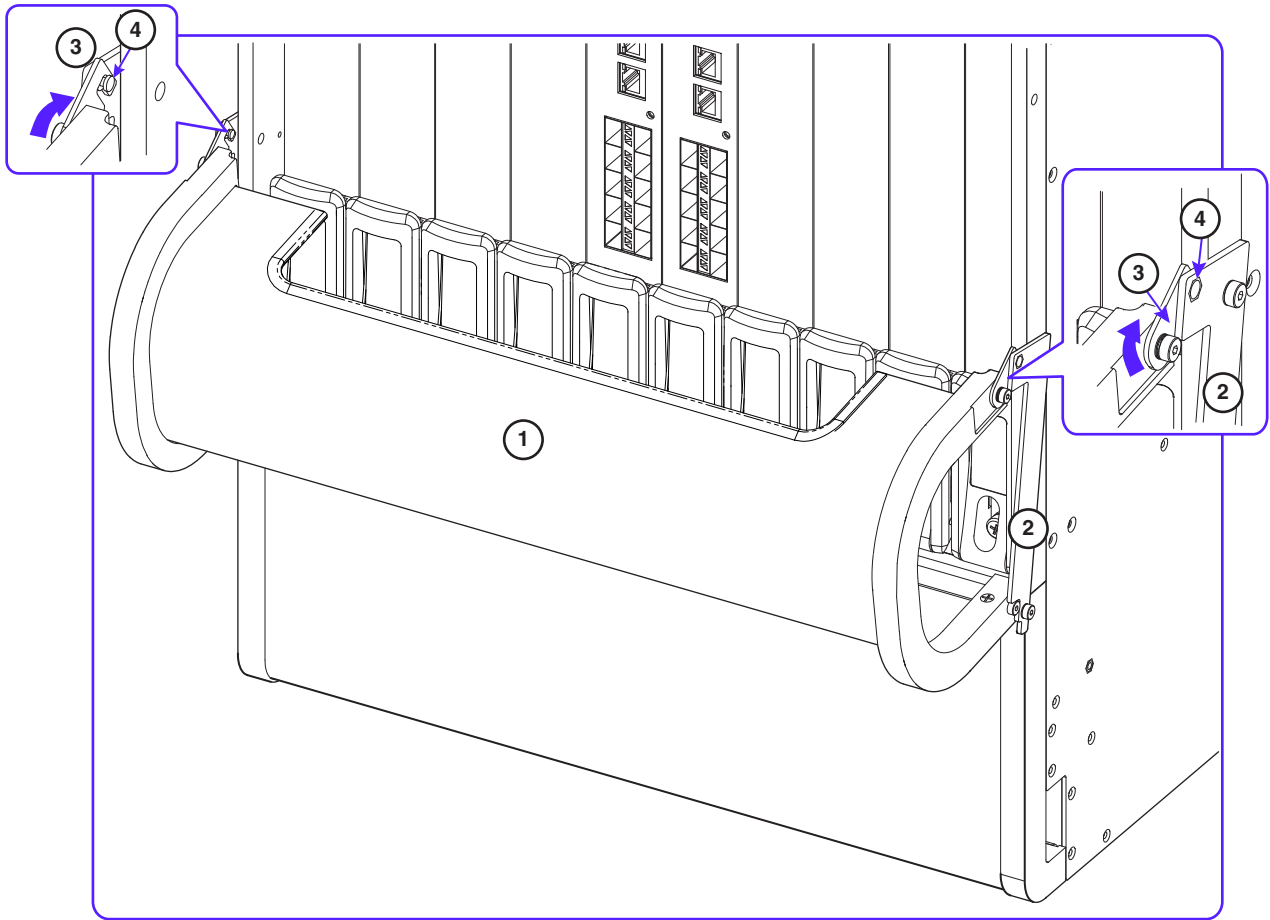
This completes the installation of the cable management tray. To gain improved access to the hook-and-loop straps on the cable guides, refer to [Removing Cable Guides](#).

You must install the cable management bracket on each MIO card before you can route and secure network cables. Refer to [Installing the Cable Management Bracket on an MIO Card](#) for additional information.

**Figure B-1** Cable Management Tray Installation

1	Cable management tray	2	Swing arm
3	Shoulder screw	4	Nylon washer
5	Tray latch	6	Hook-and-loop strap

Figure B-2 Cable Management Tray - Closed and Latched



1	Cable management tray	2	Swing arm
3	Latch	4	Post

# Removing Cable Guides

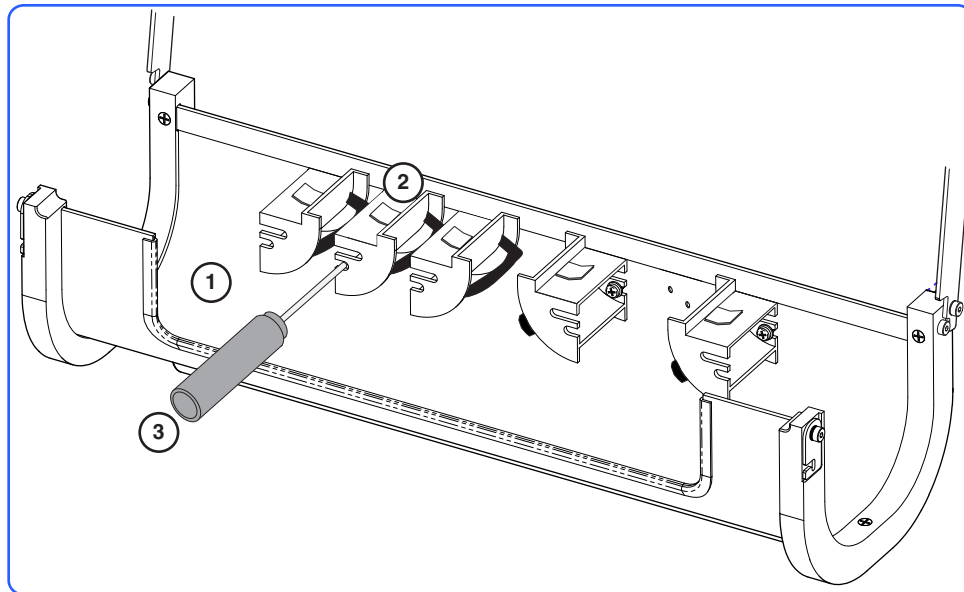
To gain additional space for accessing the hook-and-loop straps in the cable tray, you may remove the middle cable guides from the left and right side of the tray.

You will need a Phillips #1 screwdriver for this procedure.

To remove a cable guide:

- 
- Step 1** Locate the middle guide in the group of three as shown in [Figure B-3](#).
  - Step 2** Insert the screwdriver in the top slot of the cable guide.
  - Step 3** Turn the screw that secures the guide to the back of the tray counterclockwise until it drops free of the guide.
  - Step 4** Insert the screwdriver in the bottom slot of the guide.
  - Step 5** Turn the screw that secures the guide to the back of the tray counterclockwise until it drops free of the guide.
  - Step 6** Remove the guide.
  - Step 7** Locate and remove the screws and washers.
  - Step 8** Repeat [Step 1](#) through [Step 7](#) for the middle guide of the other group of three guides.
- 

**Figure B-3** Removing Cable Guides



<b>1</b>	Cable management tray	<b>2</b>	Cable guide
<b>3</b>	Phillips #1 screwdriver		

# Installing the Cable Management Bracket on an MIO Card

The cable management bracket is packaged in the MIO shipping box.

Ideally, the bracket should be installed on an MIO before it is installed in the ASR 5500 chassis. However, you can safely install the bracket on an MIO in a powered-up ASR 5500 chassis.

No tools are required to install the bracket.

**Caution**

Observe ESD precautions when handling the MIO. Wear a ground strap connected to the ESD jack located at the upper left corner of the chassis.

To install the bracket:

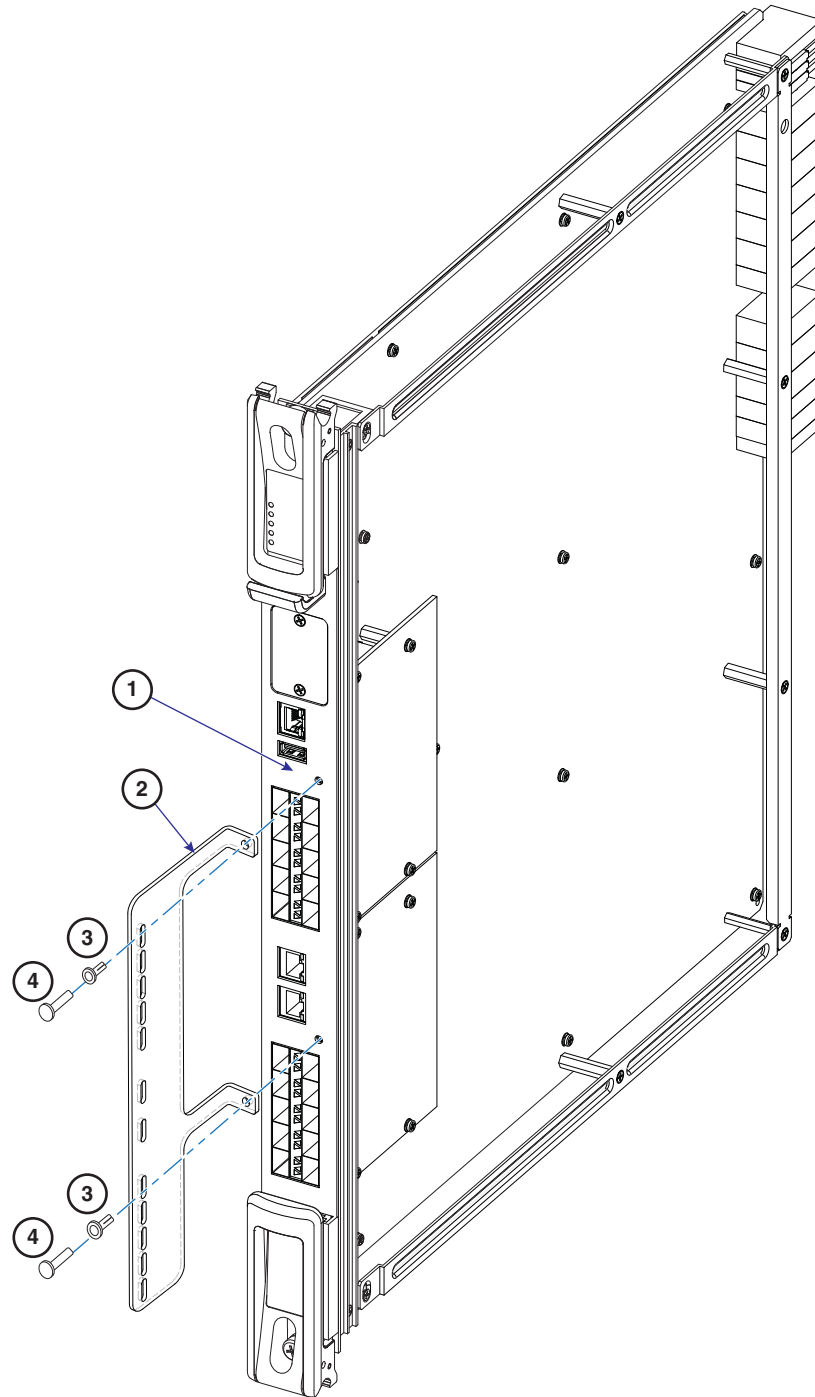
- 
- Step 1** Locate the bracket and its mounting hardware (two nylon pin-and-sleeve connectors).
  - Step 2** Position the bracket on the faceplate of the MIO as shown in [Figure B-4](#).
  - Step 3** Insert a nylon sleeve in both holes of the bracket and into the MIO faceplate (see [Figure B-4](#)).
  - Step 4** Use your thumb to firmly push a nylon pin into each sleeve to secure the bracket to the faceplate.
- 

**Caution**

The cable management bracket is not designed to be used as a handle for the MIO. Never attempt to lift an MIO or remove an MIO from the chassis by grasping the bracket.

This completes the installation of the cable management bracket. You can use cable ties or hook-and-loop straps to secure network cables to the slots in the bracket. Refer to [Routing and Securing Network Cables](#) for additional information.

**Figure B-4** Cable Management Bracket Installation



<b>1</b>	MIO faceplate	<b>2</b>	Cable management bracket
<b>3</b>	Nylon sleeve	<b>4</b>	Nylon pin

# Routing and Securing Network Cables

**Note**

This procedure assumes that the cable management tray has been installed on the ASR 5500 chassis, and cable management brackets have been installed on the MIO cards.

The general procedure for using the CMS is to route network cables, including twisted-pair copper 1 GbE (1000Base-TX) and fiber optic 10GbE, through either end of the cable management tray upwards toward the cable management brackets on the MIOs.

Observe the following guidelines when routing and securing network cables:

- Label each cable with its terminating slot/port number,
- Insert SFP+ transceivers in all 10GbE ports that will receive cables.
- Use the cable guides on the left side of the tray for cables going to the MIO in slot 5, and on the right side of the tray for the MIO in slot 6.
- Open the hook-and-loop straps on the cable guides nearest the MIOs before routing cables.
- Begin by routing cables that attach at the bottom of the MIO and proceed upward (DC-2 to 1GbE to DC-1).
- Slip the cables beneath the cable guides and loop them upward and within the straps along the curved edges of the guides.
- For 10GbE cables, keep cables going to even number ports to the left of the bracket, odd number ports to the right. Use cable guide A or D for the odd ports, and cable guide B/C or E/F for the even number ports (see [Figure B-5](#)).
- Firmly seat each cable connector into its port.
- Thread nylon cable ties or hook-and-loop straps through the slots in the cable management brackets. Use the ties/straps to secure the cables to the brackets.
- Complete the process of securing the cables by closing the hook-and-loop straps on the cable guides. Leave a little slack in the cables to allow the tray to close without pinching the cables.
- For additional support of cable bundles, slip a nylon cable tie or hook-and-loop strap under the clip at the top of a cable guide and wrap it around the bundle.

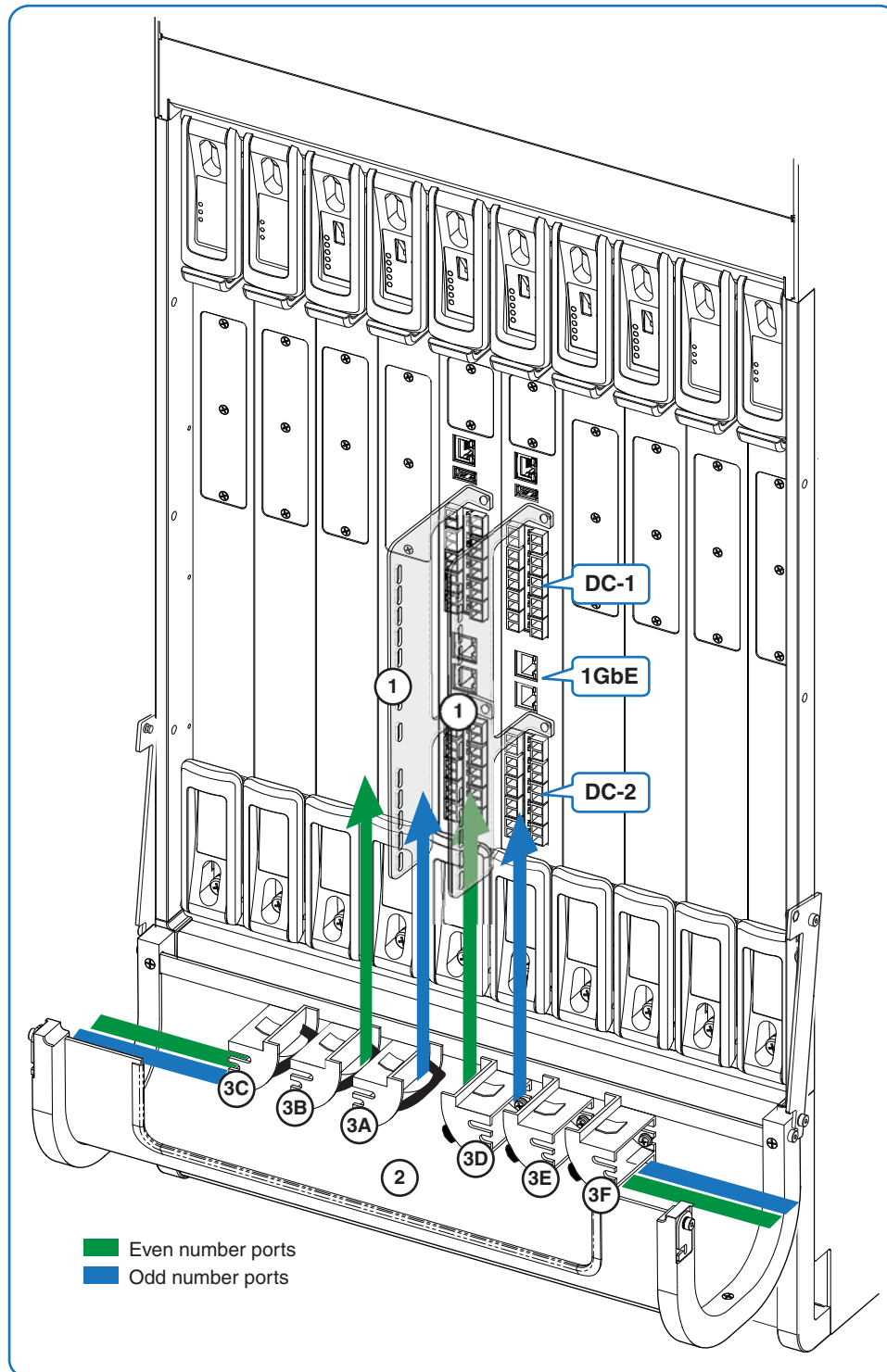
**Note**

Verify that the cable tray can be lifted upward and secured without pinching any of the network cables. If necessary increase the slack in a bundle to avoid damaging the cables.

[Figure B-5](#) and [Table B-1](#) show the recommended sequence for routing cables to the MIOs in slots 5 and 6.



**Figure B-5 CMS Cable Routing**



1	Cable management bracket	2	Cable management tray
3	Cable guides		

**Table B-1 CMS Routing Paths**

Card	Cable Guide	Destination
MIO, slot 5	3A	DC-2 (ports 20 to 29)
	3A	1GbE (ports 1 and 2)
	3B or 3C <sup>1</sup>	DC-1 (ports 10 to 19)
	3C	Future <sup>2</sup>
MIO slot 6	3D	DC-2 (ports 20 to 29)
	3D	1GbE (ports 1 and 2)
	3E or 3F <sup>1</sup>	DC-1 (ports 10 to 19)
	3F	Future <sup>2</sup>

.1.If cable guide has been removed.

.2.Already in use if cable guide has been removed.

## CMS Procedure for Replacing ASR 5500 Circuit Cards

When the cable management tray is installed, the procedure for removing circuit cards from the ASR 5500 chassis varies from that described in [Replaceable Components](#), [Circuit Cards](#).

### Lowering the Cable Management Tray

- 
- Step 1** At the rear of the chassis, apply slight upward pressure at the base of the cable management tray.
  - Step 2** Flip the latches on the swing arms upward and free of the posts.
  - Step 3** Lower the tray until it rests against the chassis.
  - Step 4** If you are removing an MIO card, refer to [Detaching Network Cables from an MIO Bracket](#) for additional instructions. Otherwise, remove the circuit card as described in [Remove and Replace the Circuit Card](#).
  - Step 5** Proceed to [Raising the Cable Management Tray](#).
- 

### Detaching Network Cables from an MIO Bracket

- 
- Step 1** Cut the nylon cable ties or open the hook-and-loop straps that secure network cables to the MIO card.
  - Step 2** Unplug the cable connectors starting from the top ports.



**Note**

The ends of all network cables should be labeled with their slot/port terminations. If this has not been done, you should label each cable as you disconnect it.

---

- Step 3** Move the cable bundles away from the MIO. You may have to re-open the hook-and-loop straps in the cable management tray to free the cables.
- Step 4** Remove the MIO card as described in [Remove and Replace the Circuit Card](#).

**Caution**

Never use the cable management bracket as a “handle” to remove or lift an MIO. The bracket is not designed to support the weight of an MIO.

---

## Reconnecting Network Cables to an MIO Bracket

- Step 1** The replacement MIO card should have a cable management bracket pre-installed as described in [Installing the Cable Management Bracket on an MIO Card](#).
- Step 2** Route the cables and secure them to the bracket as described in [Routing and Securing Network Cables](#).
- Step 3** Proceed to [Raising the Cable Management Tray](#).
- 

## Raising the Cable Management Tray

- Step 1** Grasp the base and slowly raise the cable management tray upward.
- Step 2** Verify that the cable tray can be lifted upward and secured without pinching any of the network cables. If necessary increase the slack in a bundle to avoid damaging the cables.
- Step 3** Flip the latches on the swing arms up and over the posts to secure the tray to the chassis.
-





# APPENDIX C

## MIO Console Port to Cisco Server Cabling

This appendix describes how to interconnect the Console port on the Management Input/Output (MIO) card to a Cisco communication server or router equipped with an asynchronous interface module. When so equipped these devices can be configured to function as terminal servers in management networks.

This appendix contains the following sections:

- [Introduction](#)
- [Cabling](#)
- [Configuration](#)

### Introduction

Cisco communication servers and routers can be equipped with asynchronous interface modules as shown in [Table C-1](#). These modules accept one of two types of serial RJ45 “octopus” cables.

- CAB-HD8-ASYNC – uses a single high-density VHDC168M connector at the interface module end,
- CAB-OCTAL-ASYNC – uses a single Micro-D68M connector at the interface module end.

Both cable assemblies source eight 10 ft. (3 meter) cables terminated with male RJ45 plugs.

**Table C-1** Cisco Asynchronous Hardware Interface Module Compatibility

Asynchronous Interface Module	Cisco Series									Async RJ45 Adapter Cable
	1900	2500	2600	2800	2900	3600	3700	3800	3900	
HWIC-8A/S	Yes	No	No	No	Yes	No	No	No	Yes	CAB-HD8-ASYNC
HWIC-16A/S	No	No	No	Yes	Yes	No	No	Yes	Yes	
NM-16A	No	Yes	Yes	No	No	Yes	Yes	Yes	No	CAB-OCTAL-ASYNC
NM-32A	No	Yes	Yes	No	No	Yes	Yes	Yes	No	

# Cabling

Figure C-1 and Table C-1 indicate how the MIO Console port connects to an interface module via the asynchronous RJ45 adapter cable and a Cisco rollover cable or coupler.

Figure C-1 MIO Console to Cisco CAB Assembly Cabling

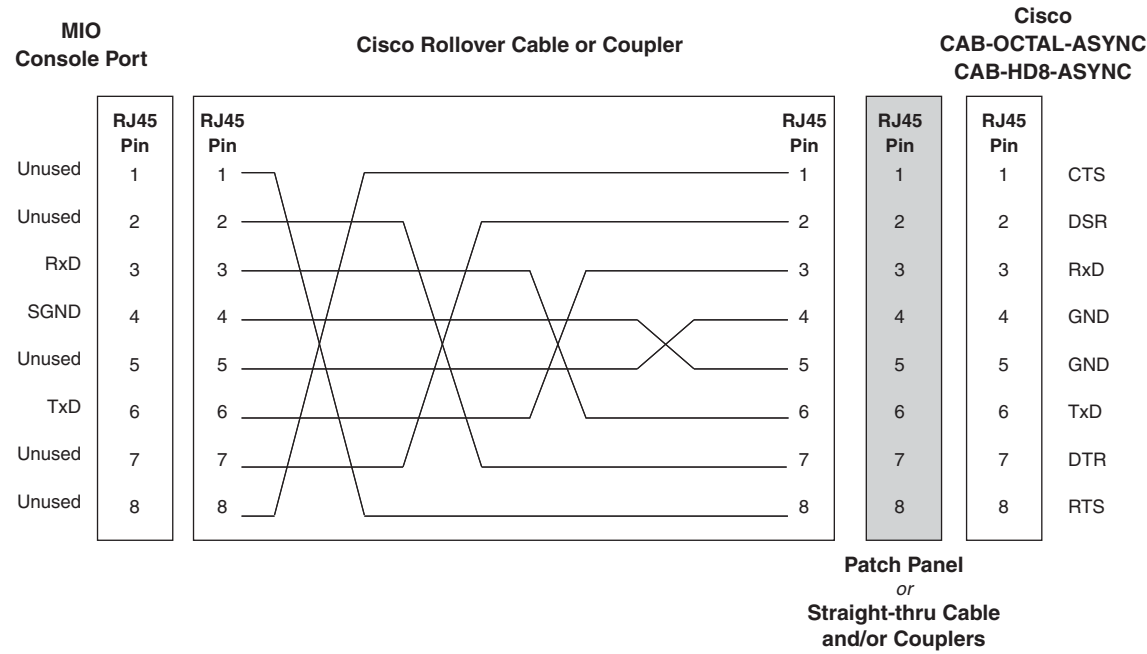


Table C-2 MIO Console Port to Cisco Terminal Server Pinouts

MIO Console Port	RJ45-to-RJ45 Rollover Cable/Coupler		CAB-OCTAL-ASYNC CAB-HD8-ASYNC	
	RJ45 Pin	RJ45 Pin	RJ45 Pin	Signal
Unused	1	8	8	RTC
Unused	2	7	7	DTR
RxD	3	6	6	TxD
SGND	4	5	5	GND
Unused	5	4	4	GND
TxD	6	3	3	RxD
Unused	7	2	2	DSR
Unused	8	1	1	CTS

# Configuration

The MIO facing interface of the Cisco server should be configured via IOS as shown in the following example:

```
line 0/0/0 0/0/14
  exec-timeout 0 0
  no exec
  transport input all
  speed 115200
```

For detailed information, refer to the Configuration guides supplied with the Cisco device and asynchronous interface module. Configuration guides are available at [www.Cisco.com](http://www.Cisco.com).







## APPENDIX **D**

# RMA Shipping Procedures

---

This appendix describes the procedures for packaging and returning ASR 5500 chassis components via the Cisco Return Material Authorization (RMA) process.

For detailed information on Cisco RMA policies (including detailed shipping instructions), go to the **Product Online Web Returns (POWR)** link on [www.cisco.com](http://www.cisco.com).



### Note

To ensure warranty coverage, these procedures also apply to shipments between customer sites or parts depots.

---

## RMA Overview

This section describes general requirements when packaging ASR 5500 components for shipment.



### Note

All components must be properly packaged to prevent damage in transit. Items should never be shipped without packaging foam, bubble wrap and a static bag. Crushed or damaged boxes/pallets should never be used for returning items.

---

The following general guidelines apply when packaging components:

- It is best to use the original Cisco box and packaging in which your equipment was sent and received. You can use a shipping carton saved when the system and its components were installed. You can also use the packaging for a replacement component to repackage the original component.
- If the original box is missing or damaged, you can request that Cisco send a suitable shipping carton when requesting an RMA.
- Items should be securely sealed and, if necessary, fixed onto pallets.
- Detailed ship-to instructions will be provided when you apply for the RMA from Cisco.

## Re-packaging Your RMA

If using the original Cisco box and packaging, properly place the item within the packaging material.

If using a non-Cisco shipping carton and packing material, be sure the item is properly surrounded with bubble wrap or packaging foam to ensure restriction in movement during transport.

**Note**

The use of anti-static packaging materials is highly recommended. At the very least, the item must be enclosed in a sealed anti-static envelope or bag to prevent damage to ESD sensitive devices.

## Shipping Multiple Components

The preferred method for RMA shipping requires that each component be properly packed in an individual box.

If you must ship multiple items within the same box, be sure each part is protected in its own anti-static bag and padded carton, and is separated from other cartons with packing foam or bubble wrap. The shipping carton must be sturdy enough to handle the weight and size of the items within it.

**Note**

Items should never be returned loosely packed and unprotected from ESD.

## Sealing the Shipment

The box or shipping container must be securely sealed using appropriately reinforced packaging tape. Do not use masking or transparent (light duty) tape to secure or seal packaging.

Chassis or other large units must be covered and securely strapped down to a pallet. An unstrapped or loosely strapped item can easily tip during transit, resulting in expensive damage and repair costs.

## Labeling the Shipment

All returned items must include the RMA number (and Quote Number for Trade-In Returns) on every box being returned.

For Trade-In Returns, a POWR tool label must be placed on the outside of each box.

These reference numbers should also be listed on the shipper's air bill.

**Note**

Mislabelled or unlabeled RMAs delay the receiving and crediting processes.

## Cisco Return Locations

For a list of authorized Cisco return centers, go to the **Authorized Return Locations** link on [www.cisco.com](http://www.cisco.com).

# Packaging ASR 5500 Cards

This section provides detailed instructions for packaging ASR 5500 front and rear cards using Cisco shipping cartons.

## Front Cards

The packing instructions in this section apply to the following cards:

- Fabric and Storage Card (FSC)
- System Status Card (SSC)

**Note**

Front cards use the smaller ESD bags and shipping cartons.

The packaging sequence is as follows:

- Step 1** Place the card inside the ESD bag; fold over and seal the bag with an ESD Label or invisible tape as shown in [Figure D-1](#).
- Step 2** Place the card in the carton as shown in [Figure D-1](#).
- Step 3** Place the top piece of foam over the card.
- Step 4** Close the carton and seal it with shipping tape. See [Sealing the Shipment](#) for additional information.
- Step 5** Place the shipping label on the outside of the carton. See [Labeling the Shipment](#) for additional information.

**Figure D-1** Front Card in Box (ESD Bag)



## Rear Cards

The packing instructions in this section apply to the following cards:

- Management Input/Output (MIO) card
- Data Processing Card (DPC)

**Note**

Rear cards use the larger ESD bags and shipping cartons. There are very slight differences in the cutouts at the rear of the MIO and DPC foam.

The packaging sequence is as follows:

- Step 1** Place the card inside the ESD bag; fold over and seal the bag with an ESD Label as shown in [Figure D-2](#).
- Step 2** Place the card in the carton as shown in the [Figure D-3](#).
- Step 3** Place the top piece of foam over the card.
- Step 4** Close the carton and seal it with shipping tape. See [Sealing the Shipment](#) for additional information.
- Step 5** Place the shipping label on the outside of the carton. See [Labeling the Shipment](#) for additional information.

**Figure D-2**      **Rear Card in ESD Bag**



**Figure D-3**      **Rear Card in Box (MIO Cutout)**



