

Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide

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Preface

This guide describes how to install a Cisco ASR 9000 Series Aggregation Services Router and its components.

- Audience, on page xi
- Related Documentation, on page xi
- Changes to This Document, on page xii
- Obtaining Documentation and Submitting a Service Request, on page xiii

Audience

This guide is written for hardware installers and system administrators of Cisco routers.

These users must have a substantial background in installing and configuring router and switch-based hardware. Also, they should be familiar with electronic circuitry and wiring practices, and have experience as an electronic or electromechanical technician.

Related Documentation

For complete installation, and configuration information, see the following documents that are available on Cisco.com at the following URL: http://www.cisco.com/c/en/us/support/routers/asr-9000-series-aggregation-services-routers/products-installation-guides-list.html.

- *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide*
- *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide*
- *Cisco ASR 9001 and Cisco ASR 9001-S Routers Hardware Installation Guide*
- *Cisco ASR 9000 Series Aggregated Services Router VSM (Virtualized Services Module) Card Installation Guide*
- *Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Hardware Installation Guide*
- *Cisco ASR 9000 Series Aggregation Services Router ISM Line Card Installation Guide*
- *Cisco ASR 9000 Series Aggregated Services Router Satellite Systems Installation Guide*
- *Regulatory Compliance and Safety Information for ASR 9000*

Changes to This Document

This table lists the technical changes made to this document since it was first created.

Table 1: Changes to This Document

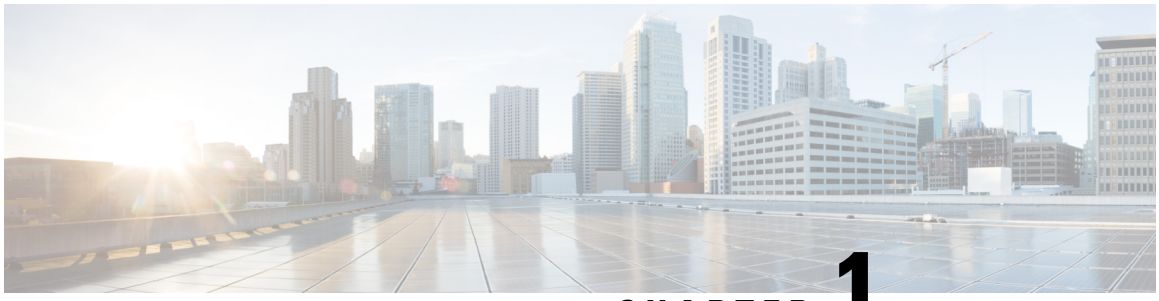
Date	Summary
September 2018	Added migration sections for RP3, A99-SFC3, A99-SFC3-S, A99-SFC3-T, and RSP5 cards.
March 2018	Added support for RSP880-LT on the Cisco ASR 9906 Aggregation Services Router.
September 2017	Information added about the Cisco ASR 9906 Aggregation Services Router.
July 2017	Information added about the new route processor card RSP880-LT.
May 2016	Information added about the Cisco ASR 9910 Aggregation Services Router.
January 2015	Added new route processor cards RSP-440 Lite and RSP-880, FC2 fabric card, Cisco ASR 9222 support for the version 2 air filter, support for the version 3 power system, and supported optics for Cisco IOS XR software release 5.3.0.
October 2014	Information added for Cisco ASR 9922 version 2 fan tray.
June 2014	Information added about installing optional air baffles on the Cisco ASR 9006 Aggregation Services Router.
September 2013	Information added about the Cisco ASR 9904 Aggregation Services Router.
August 2013	Information added about the Cisco ASR 9912 Aggregation Services Router.
May 2013	Information added about the Cisco ASR 9000v satellite shelf adding support for the Cisco CRS Line Card Chassis in either the 8-slot or 16-slot variation.
February 2013	Updates and corrections made to various portions of the document.

Date	Summary
December 2012	Information added about the Cisco ASR 9000v satellite shelf adding support for the Cisco ASR 9922 Aggregation Services Router and the Cisco ASR 9001 Aggregation Services Router. Also, information added about the Cisco ASR 901 Series Aggregation Services Router as a satellite shelf and the Cisco ASR 903 Series Aggregation Services Router as a satellite shelf.
September 2012	Information added about the new 1-port 40GE Modular Port Adapter (MPA), 36-port 10GE line card, 1-port 100GE line card, Cisco ASR 9922 Aggregation Services Router, RP card, FC card, and Cisco ASR 9000v satellite shelf (adding support for the A9K-36X10GE-TR [36-port 10GE line card, Packet Transport Optimized] and A9K-36X10GE-SE [36-port 10GE line card, Service Edge Optimized]).
May 2012	Information added about the new Cisco ASR 9000v (a satellite system with the Cisco ASR 9000). The Cisco ASR 9000v satellite shelf provides 44 1GE SFP ports and 4 10GE SFP+ ports.
December 2011	Information added about the new RSP-440 Route Processor card, the new 24-port 10GE fixed line card, the 2-port 100GE fixed line card, and the modular line card supporting the 20-port 1GE MPA, the 4-port 10GE MPA, and the 2-port 10GE MPA. Information added about the new version 2 power system. The Cisco ASR 9006 Router and Cisco ASR 9010 Router now support version 1 and version 2 power systems.
May 2010	Added power consumption specifications for the new 16-port 10GE SFP+ line card. Updates and corrections made to various portions of the document.
December 2009	Updates and corrections made to various portions of the document.
March 2009	Initial release of this document.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*, at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation as an RSS feed and delivers content directly to your desktop using a reader application. The RSS feeds are a free service, and Cisco currently supports RSS Version 2.0.



CHAPTER 1

Preparing for Installation

This chapter provides preinstallation information, such as recommendations and requirements you should be perform before installing your Cisco ASR 9000 Series Router.

The shipping package for the router is engineered to reduce the chances of product damage associated with routine material handling experienced during shipment:

- Always transport or store the router in its shipping package in the upright position.
- Keep the router in the shipping container until you have determined the installation site.

Inspect all items for shipping damage. If an item appears damaged, contact a Cisco customer service representative immediately.

- Safety Guidelines, on page 1
- Cautions and Regulatory Compliance Statements for NEBS, on page 8
- Site Requirement Guidelines, on page 9
- RSP and RP Port Connection Guidelines, on page 51

Safety Guidelines

Before you perform any procedure in this guide, you must review the safety guidelines in this section to avoid injuring yourself or damaging the equipment.

Note that this section contains *guidelines* and do not include every potentially hazardous situation. When you install a router, always use common sense and caution.

General Safety Guidelines

- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always disconnect the power source and unplug all power cables before lifting, moving, or working on the router.
- Keep the work area clear and dust free during and after the installation.
- Keep tools and router components away from walkways and equipment rack aisles.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the router.

- Fasten your tie or scarf and sleeves.
- Operate Cisco equipment safely by using it in accordance with its electrical ratings and product usage instructions.
- Do not work alone if potentially hazardous conditions exist.
- Always unplug the power cables when performing maintenance or working on the router, unless the replacement part is hot swappable and designed for online insertion and removal (OIR).
- Ensure that the installation of the router is in compliance with national and local electrical codes: in the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code; in Canada, Canadian Electrical Code, part I, CSA C22.1; in other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.

Compliance and Safety Information

The Cisco ASR 9000 Series Routers are designed to meet the regulatory compliance and safety approval requirements. For detailed safety information, see the Regulatory Compliance and Safety Information - Cisco ASR 9000 Series Aggregation Router.

Warning IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS



Laser Safety

Single-mode Cisco ASR 9000 Series line cards are equipped with lasers. The lasers emit invisible radiation. *Do not* stare into open line card ports.

Energy Hazard

The Cisco ASR 9000 Series Routers can be configured for a DC power source. Do not touch terminals while they are live. Observe the following warning to prevent injury.

Warning Hazardous voltage or energy may be present on power terminals. To reduce the risk of electric shock, make sure the power terminal cover is in place when the power terminal is not being serviced. Be sure uninsulated conductors are not accessible when the cover is in place.

Preventing Electrostatic Discharge Damage

Many router components can be damaged by static electricity. Not exercising the proper electrostatic discharge (ESD) precautions can result in intermittent or complete component failures. To minimize the potential for ESD damage, always use an ESD-preventive antistatic wrist strap (or ankle strap) and ensure that it makes good skin contact.

Note Check the resistance value of the ESD-preventive strap periodically. The measurement should be between 1 and 10 megohms.

Before you perform any of the procedures in this guide, attach an ESD-preventive strap to your wrist and connect the leash to the chassis as shown in the figures below.

Figure 1: ESD Label Information on Router Chassis

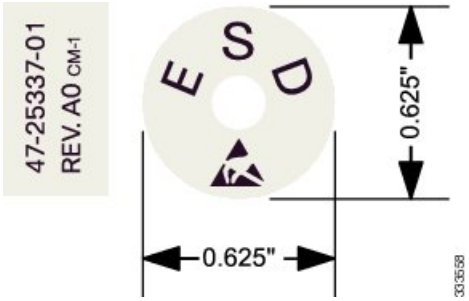


Figure 2: ESD Label Information on Cisco ASR 9910 Router Chassis

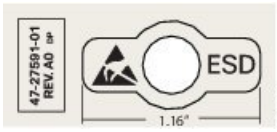


Figure 3: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9010 Router Chassis

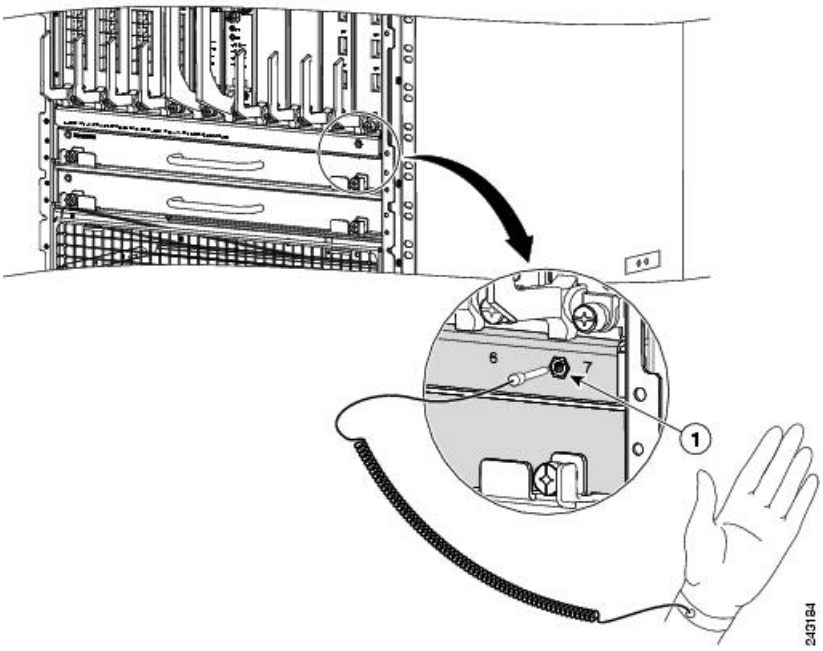


Figure 4: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9006 Router Chassis

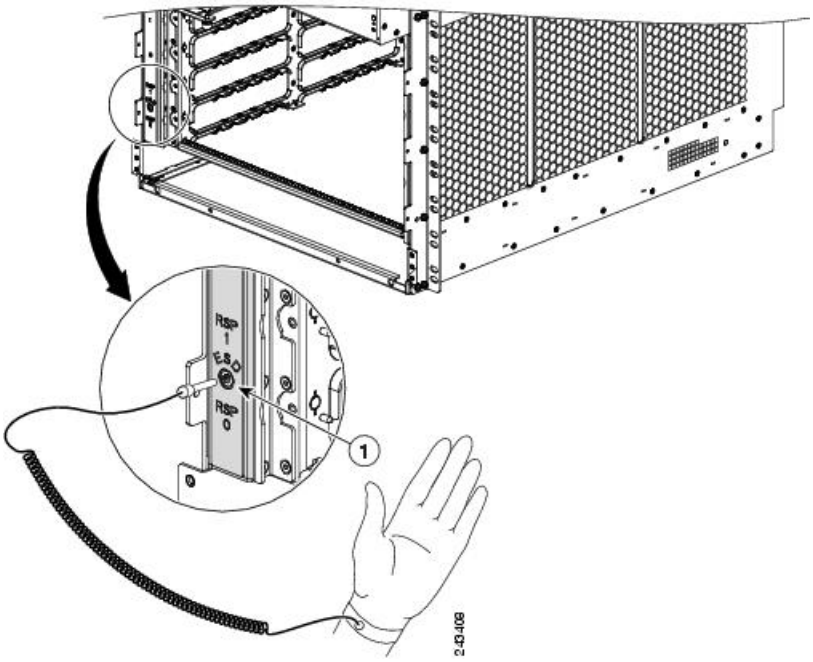


Figure 5: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9904 Router Chassis

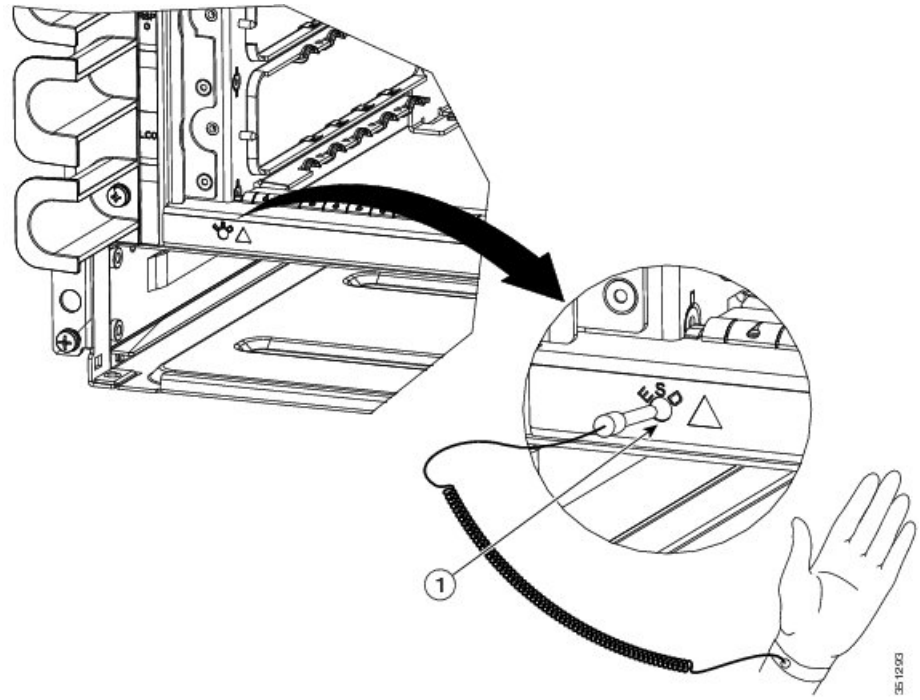


Figure 6: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9910 Router Chassis - Front

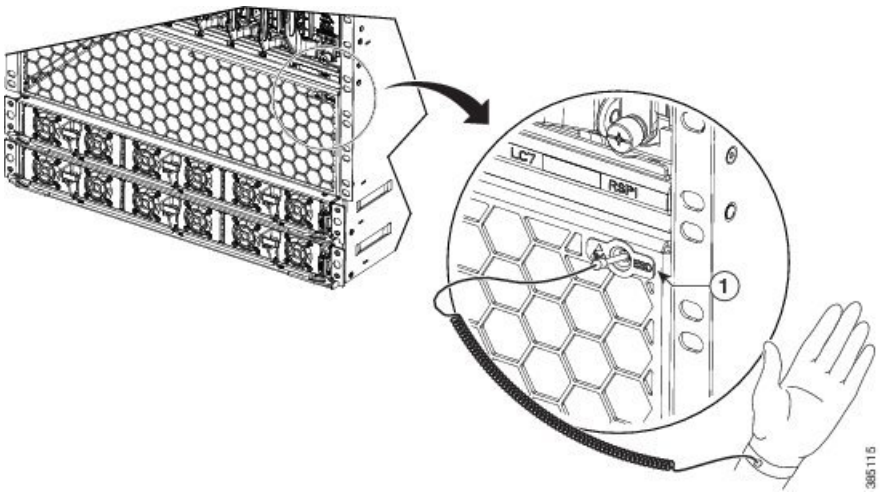


Figure 7: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9910 Router Chassis - Rear

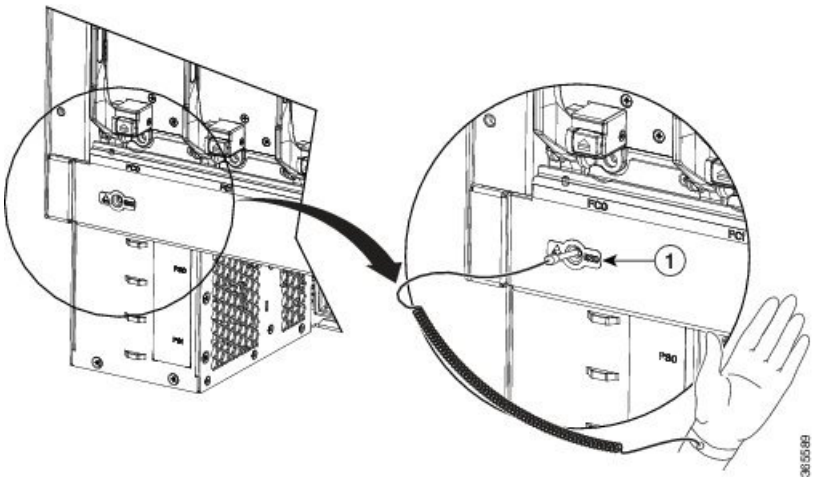


Figure 8: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9922 Router Chassis

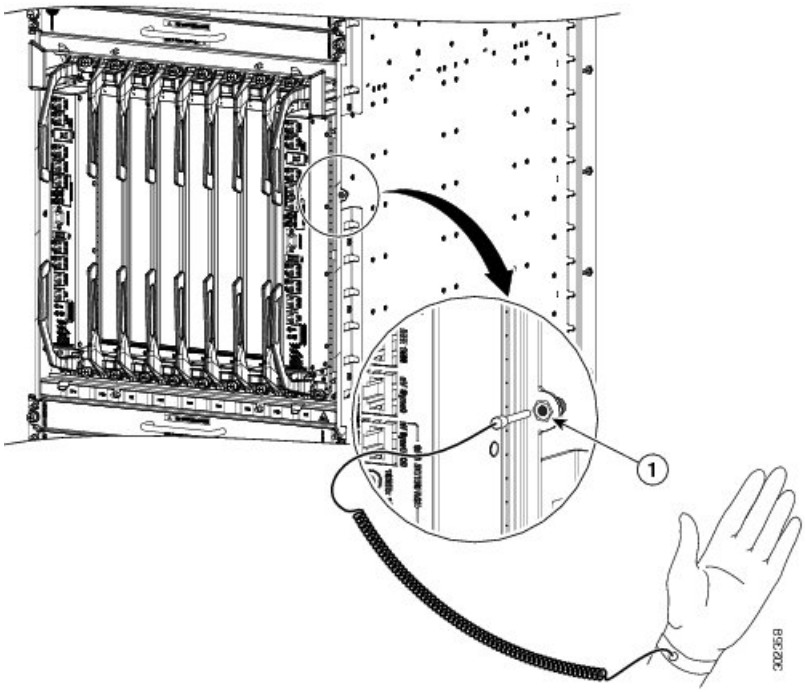
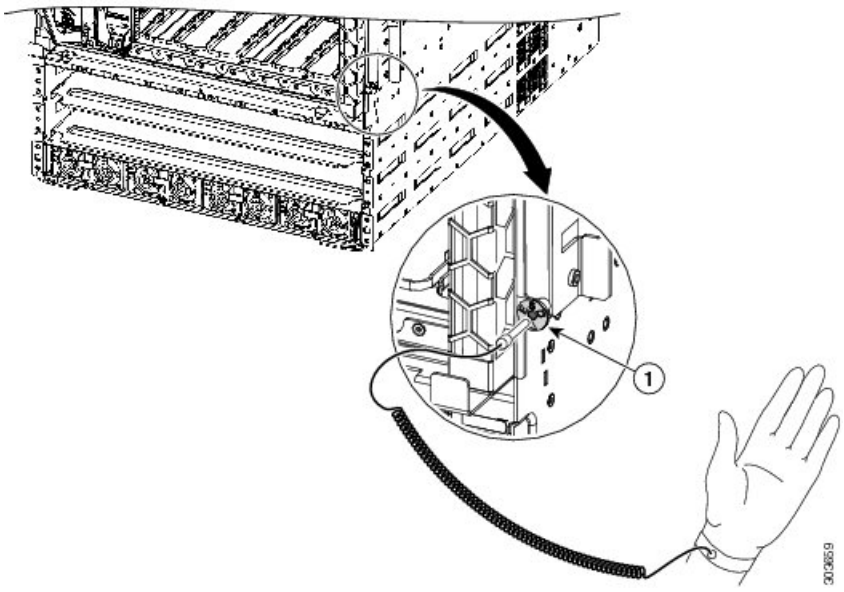


Figure 9: Connecting an ESD-Preventive Wrist Strap to the Cisco ASR 9912 Router Chassis



Lifting Guidelines

Fully configured Cisco ASR 9000 Series Routers can weigh as much as 1038 pounds (470.28 kg), and an empty chassis weighs up to 300 pounds (136 kg). These systems are not intended to be moved frequently. Before you install the router, ensure that your site is properly prepared to prevent moving the router later to accommodate power sources and network connections.

To move the pallet assembly, use a pallet jack or forklift. Do not top lift.

To remove the unpacked chassis from the pallet base and to insert the chassis into the rack, we strongly recommend that you use a forklift or scissor-lift, supporting the chassis by the base only.

If you are moving a smaller chassis, use the following lifting guidelines to avoid injury to yourself or damage to the equipment:

- Do not lift equipment alone; have another person help you to lift heavy equipment.
- Ensure that your footing is solid; balance the weight of the object between your feet.
- Lift the equipment slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. When bending down to lift equipment, bend at the knees (not at the waist), to reduce the strain on your lower back muscles.

Warning To prevent injury and equipment damage, never attempt to lift or tilt the router chassis using the handles on the fan tray or on line cards. These handles do not support the weight of the chassis.

Cautions and Regulatory Compliance Statements for NEBS

The following are NEBS GR-1089-CORE cautions, regulatory compliance statements, and requirements:

Note This equipment may be ESD sensitive. Always use an ESD ankle or wrist strap before handling equipment. Connect the equipment end of the ESD strap to an unfinished surface of the equipment chassis or to the ESD jack on the equipment if provided.

Warning The intrabuilding port(s) of the equipment or subassembly must use shielded intrabuilding cabling/wiring that is grounded at both ends.

The following port(s) are considered intrabuilding ports on this equipment:

Management ethernet port

Warning The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intrabuilding interfaces only (Type 2, 4, or 4a ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to an OSP wiring system.

The following ports are considered intrabuilding ports on the equipment:

Management ethernet port

Warning Connect this equipment to AC mains that are provided with a surge protective device (SPD) at the service equipment that complies with NFPA 70, the National Electrical Code (NEC).

Note This equipment is suitable for installations using the CBN.

Note Treat the battery return conductor of this equipment as DC-I.

Note The equipment is designed to boot up in less than 30 minutes provided the neighboring devices are fully operational.

Note This equipment is suitable for installation in network telecommunications facilities.

Note This equipment is suitable for installation in locations where the NEC applies.

Site Requirement Guidelines

The following sections contain the site requirement guidelines that you should be familiar with before installing the router:

Site Layout and Equipment Dimensions

Note Refer to the Rack-Mounting Specifications section in the *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide* for rack mounting specifications and chassis dimensions.

To help maintain trouble-free operation, adhere to the following precautions and guidelines when planning your rack installation:

- Install the system in a restrictive access location with means for a permanent ground.
- Ensure the site of the rack includes provisions for source AC or DC power, grounding, and network interface cables.
- Allow sufficient space to work around the rack during the installation. You need:
  - At least 3 ft (91.44 cm) adjacent to the rack to move, align, and insert the chassis.
  - At least 2 ft (60.96 cm) in front of the power tray to insert power modules.
- Maintain at least 24 inches (61 cm) of clearance in front of and behind the chassis for maintenance after installation.

Note

- For the Cisco ASR 9910 Router, maintain at least 30 inches (76.2 cm) of clearance behind the chassis for maintenance after installation (for removal and installation of the rear-mounted fan tray).
- For the Cisco ASR 9904 Router, maintain at least 26 inches (66.0 cm) of clearance behind the chassis for maintenance after installation (for removal and installation of the rear-mounted fan tray and air filter).
- For the Cisco ASR 9006 Router, maintain at least 25 inches (63.5 cm) of clearance behind the chassis for maintenance after installation (for removal and installation of the rear-mounted air filter).

- To mount the router between two posts or rails, the usable aperture (the width between the *inner* edges of the two mounting flanges) must be at least:
  - 17.50 inches (44.45 cm) for the Cisco ASR 9010 Router.
  - 17.75 inches (45.09 cm) for the Cisco ASR 9006 Router, Cisco ASR 9904 Router, and Cisco ASR 9906 Router.
  - 17.60 inches (44.70 cm) for the Cisco ASR 9910 Router.
- To mount the router in a 4-post rack, the usable aperture (the width between the *inner* edges of the two mounting flanges) must be at least 17.75 inches (45.09 cm) for the Cisco ASR 9922 Router or Cisco ASR 9912 Router.
- When fully populated with cards, the router can weigh up to 1038 pounds (470.28 kg). To maintain equipment rack stability and to ensure your safety, the rack is provided with stabilizing devices. Make sure you install the stabilizers before installing the router.
- If you use a telco-style rack, the weight of the chassis is cantilevered off of the two rack posts. Make sure that:
  - Weight of the router does not make the frame unstable.
  - Frame is bolted to the floor and is secured to the building structure using either wall brackets or overhead brackets.
- When mounting the router in a telco-style rack or 4-post rack, be sure to use all of the screws provided to secure the chassis to the rack posts.
- Install the cable-management brackets included with the router to keep cables organized. Be sure to:
  - Use appropriate strain-relief methods to protect cables and equipment connections.
  - Make sure that cables from other equipment installed in the rack do not restrict access to the card cages.
- To avoid noise interference in network interface cables, do not route them directly across or along power cables.

Site Wiring Guidelines

When planning the location of the router, consider distance limitations for signaling, electromagnetic interference (EMI), and connector compatibility. If the wiring is run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires. Poor wiring can cause:

- Radio interference emanating from the wires.
- Strong EMI, especially when caused by lightning or radio transmitters. EMI can destroy the signal drivers and receivers in the router, and can even create an electrical hazard by conducting power surges through lines and into equipment.

Note To predict and remedy strong EMI, you may need to consult with experts in radio frequency interference (RFI).

Site wiring is unlikely to emit radio interference if you use twisted-pair cable with a good distribution of grounding conductors. Use a high-quality twisted-pair cable with one ground conductor for each data signal, when applicable.

Give special consideration to the effect of a lightning strike in your vicinity, especially if the wiring exceeds the recommended distances, or if it passes between buildings. The electromagnetic pulse (EMP) caused by lightning or other high-energy phenomena can easily induce enough energy into unshielded conductors to destroy electronic devices. If you have experienced EMP problems in the past, you may want to consult experts in electrical surge suppression and shielding.

Most data centers cannot resolve infrequent but potentially catastrophic problems without pulse meters and other special equipment. In addition, these problems can take a great deal of time to identify and resolve. We recommend that you take the necessary precautions to avoid these problems by providing a properly grounded and shielded environment, with special attention to issues of electrical surge suppression.

Chassis Air Flow Guidelines

Refer to the Cooling System Functional Description section in the *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide* for information on fan tray and chassis air flow information.

When selecting a site to install the router, observe the following guidelines:

- Dust-free area—The site should be as dust-free as possible. Dusty environments can clog the air filter or power supply intake vents, reducing the cooling air flow through the router. Clogged filters and vents can cause an overtemperature condition in the router.
- Unrestricted air-flow—Allow sufficient air-flow by maintaining a minimum of 6 in (15.24 cm) of clearance at both the inlet and exhaust openings on the chassis and the power modules. If the air flow is blocked or restricted, or if the inlet air is too warm, an overtemperature condition can occur within the router. Under extreme conditions, the environmental monitoring system powers off the router to protect the components.

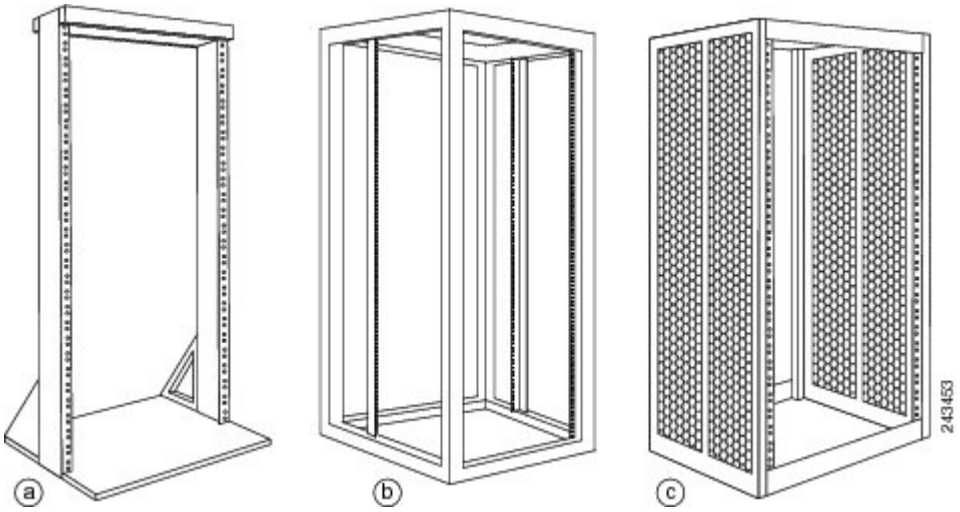
Rack-Mounting and Air Flow Clearance Guidelines

The Cisco ASR 9010 Router, Cisco ASR 9006 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router can be installed in most 2-post, 4-post, or telco-style 19-inch equipment racks that comply with the Electronics Industries Association (EIA) standard for equipment racks (EIA-310-D).

Note The Cisco ASR 9922 Router and Cisco ASR 9912 Router can be mounted only in a 4-post rack. The rack must have at least two posts with mounting flanges to mount the router chassis. The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inches ± 0.06 inch (46.50 cm ± 0.15 cm).

This figure shows an examples of typical 2-post and 4-post telco-type equipment racks.

Figure 10: Telco-Type Equipment Racks



a	Telco-style rack	b	Free-standing, 4-post open rack with two mounting posts in the front, two mounting posts in the back or along each side.	c	Free-standing sides and two

Telco 2-Post Rack

Item a in Figure 10: Telco-Type Equipment Racks, on page 12 shows a telco-style rack. The *telco-style rack* is an open frame consisting of two posts tied together by a cross-bar at the top and a floor stand at the bottom.

This type of rack is usually secured to the floor and sometimes to an overhead structure or wall for additional stability. The router chassis can be installed in the telco-style rack only in a front-mounted position.

In the front-mounted position, you secure the chassis rack-mounting brackets directly to the rack posts (see below figures). Two rear mounting brackets are provided for mounting the Cisco ASR 9010 Router in a 2-post rack.

Use 2 post rack-mounting brackets and associated hardware to secure rear mounting bracket to sides of chassis and back of 2 post rack.

Note The mounting brackets on the Cisco ASR 9006 Router chassis have a pair of holes at the top and bottom of each bracket; the remaining openings in the brackets are slots. When mounting the router in a 2-post rack, you must first use the holes to locate and position the brackets on the rack. Insert the screws through the bracket holes into the rack before inserting screws through the bracket slots.

Figure 11: Cisco ASR 9010 Router Mounted in a 2-Post Rack

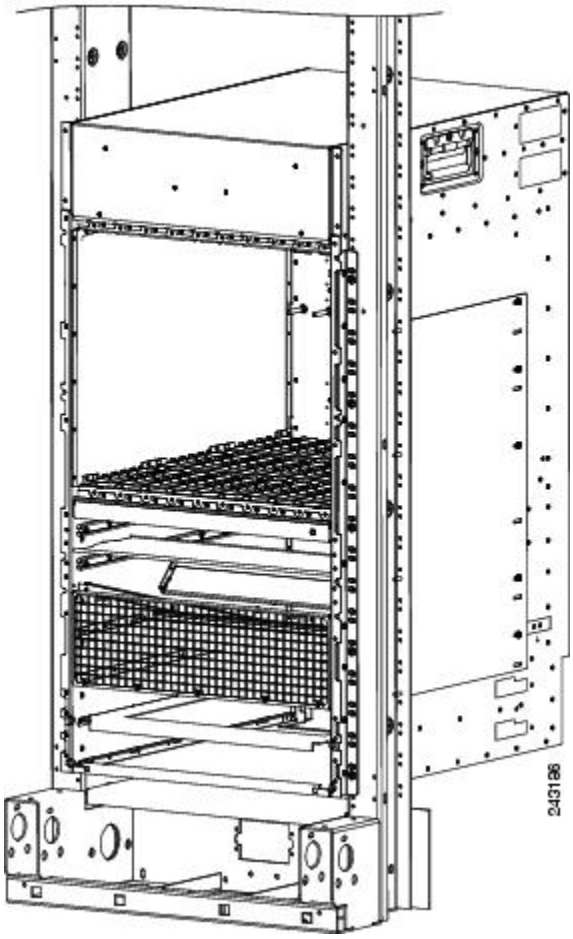


Figure 12: Cisco ASR 9006 Router Mounted in a 2-Post Rack

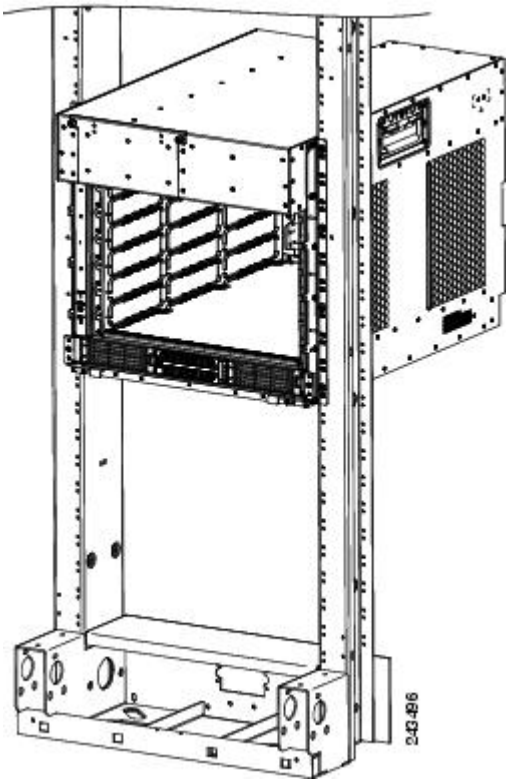


Figure 13: Cisco ASR 9904 Router Mounted in a 2-Post Rack

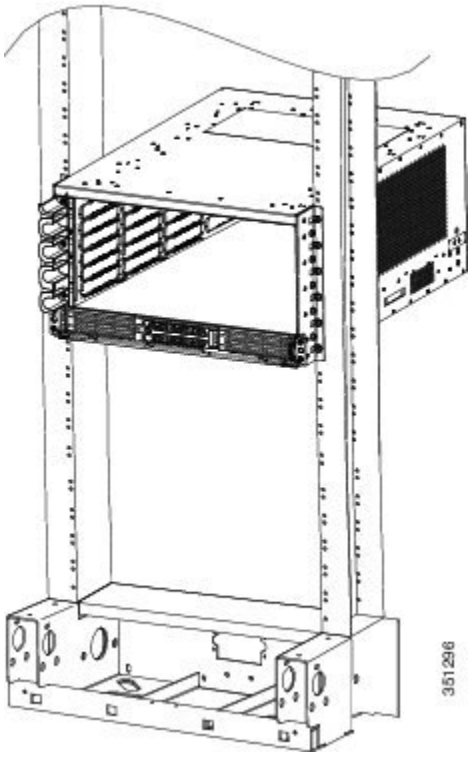


Figure 14: Cisco ASR 9906 Router Mounted in a Seismic 2-Post Rack

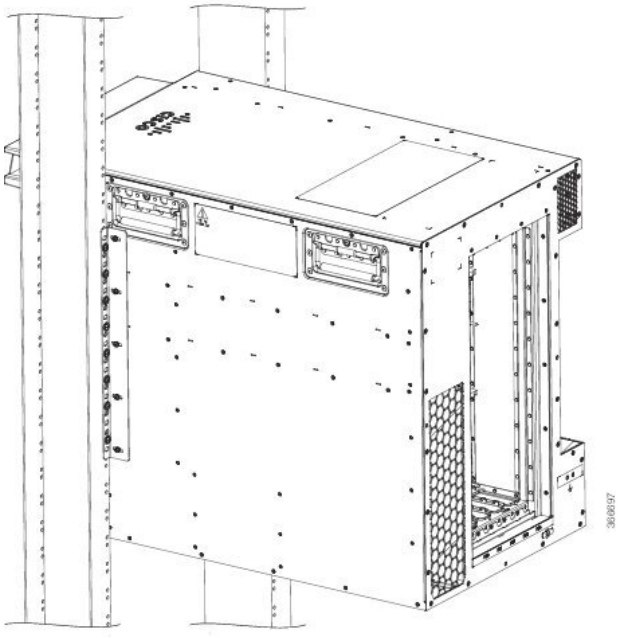


Figure 15: Cisco ASR 9906 Router Mounted in a Standard 2-Post Rack

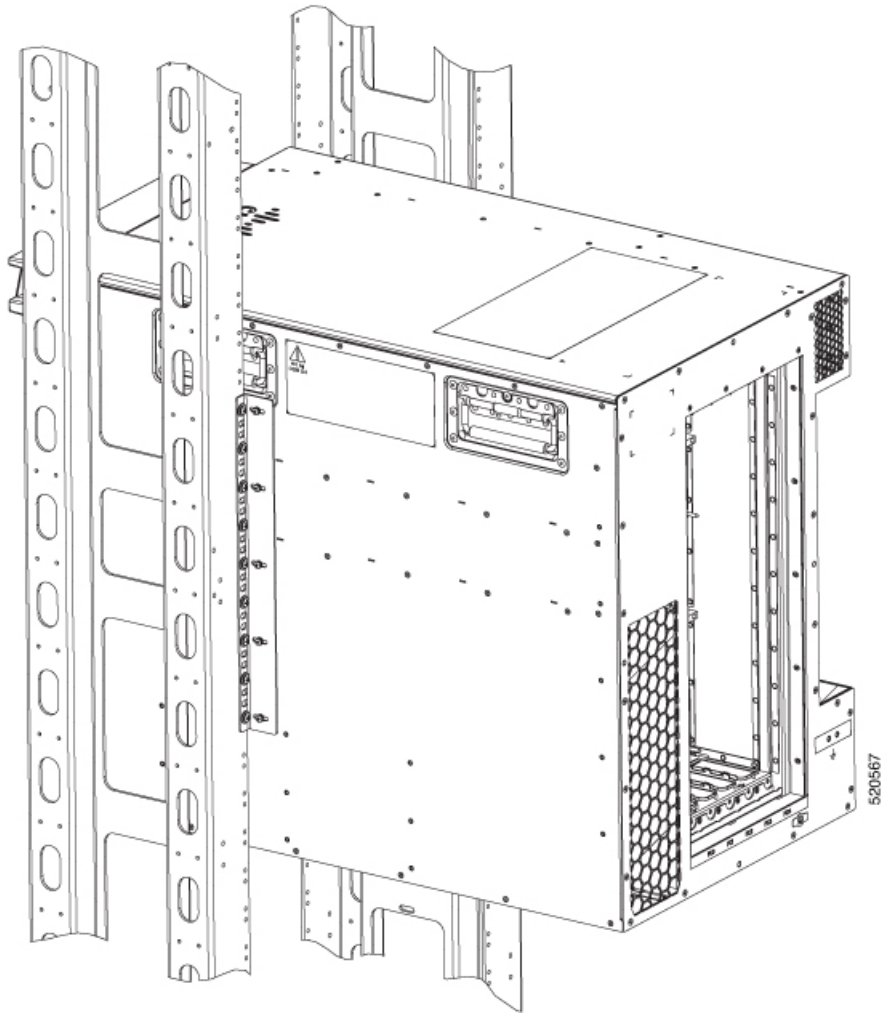
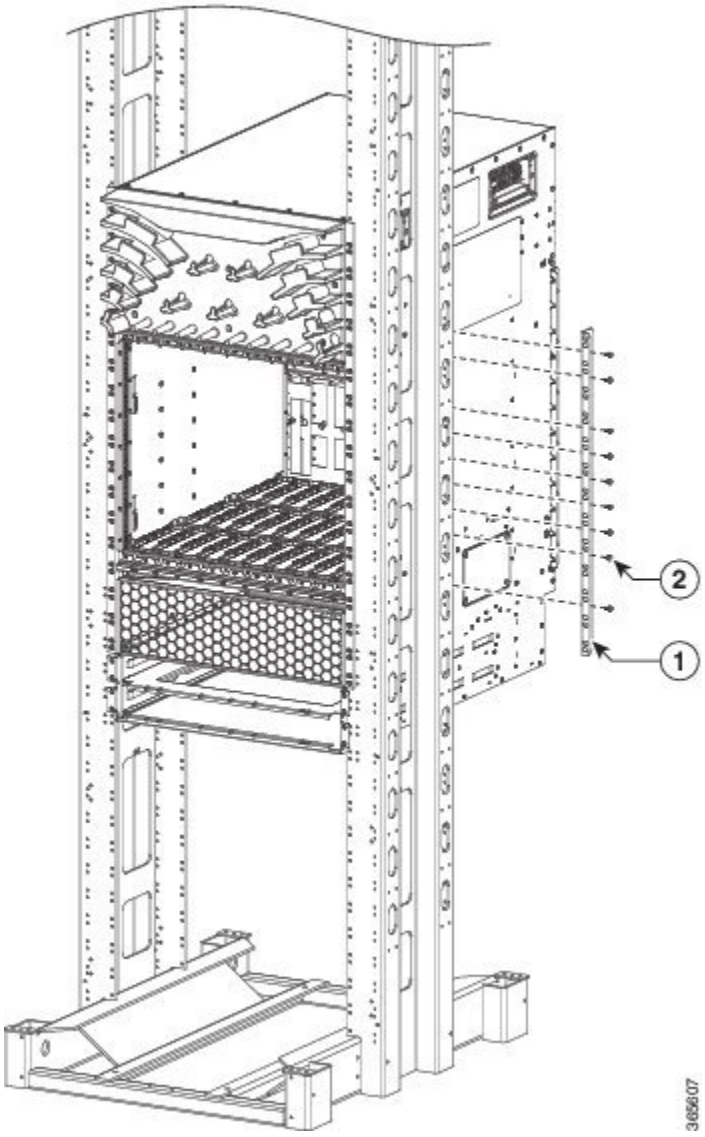


Figure 16: Cisco ASR 9910 Router Mounted in a 2-Post Rack



Open 4-Post Rack

Item b in Figure 10: Telco-Type Equipment Racks, on page 12 shows a free-standing, 4-post open rack with two mounting posts in the front and two mounting posts in the back or along the side. The mounting posts in this type of rack are often adjustable so that you can position the rack-mounted unit within the depth of the rack rather than flush-mount it with the front of the rack.

- Two rear mounting brackets are provided for mounting the Cisco ASR 9906 Router and Cisco ASR 9010 Router in a 4-post rack.
- Two rear mounting brackets and two bottom guide rails are provided for mounting the Cisco ASR 9922 Router and Cisco ASR 9912 Router in a 4-post rack.

- Rear brackets are not provided for mounting the Cisco ASR 9904 Router in a 4-post rack.

Figure 17: Cisco ASR 9906 Router Side View showing vertical Rack Rail Locations.

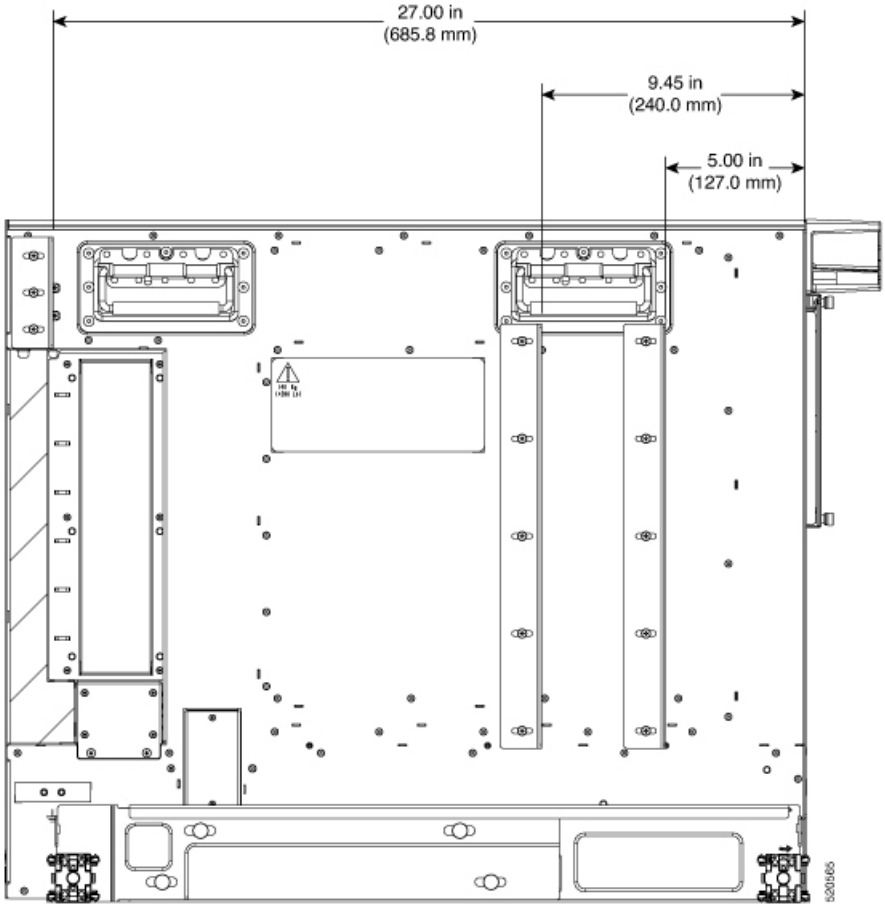


Figure 18: Mounting the Cisco ASR 9906 Router in an Open 4-Post Rack -Left View

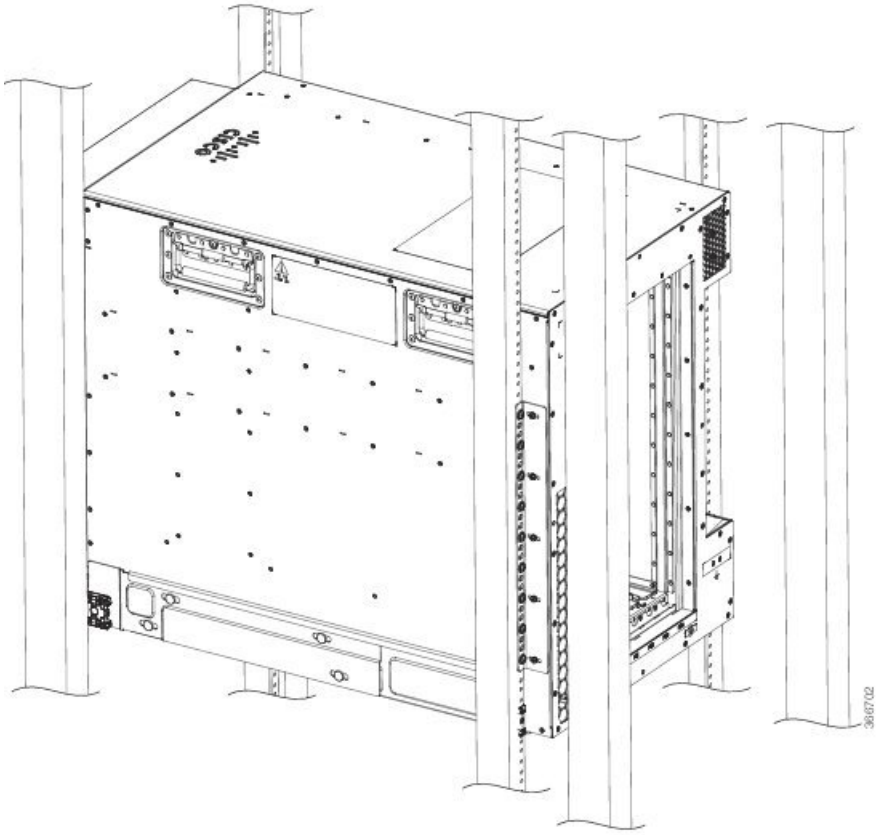


Figure 19: Mounting the Cisco ASR 9906 Router in an Open 4-Post Rack -Right View

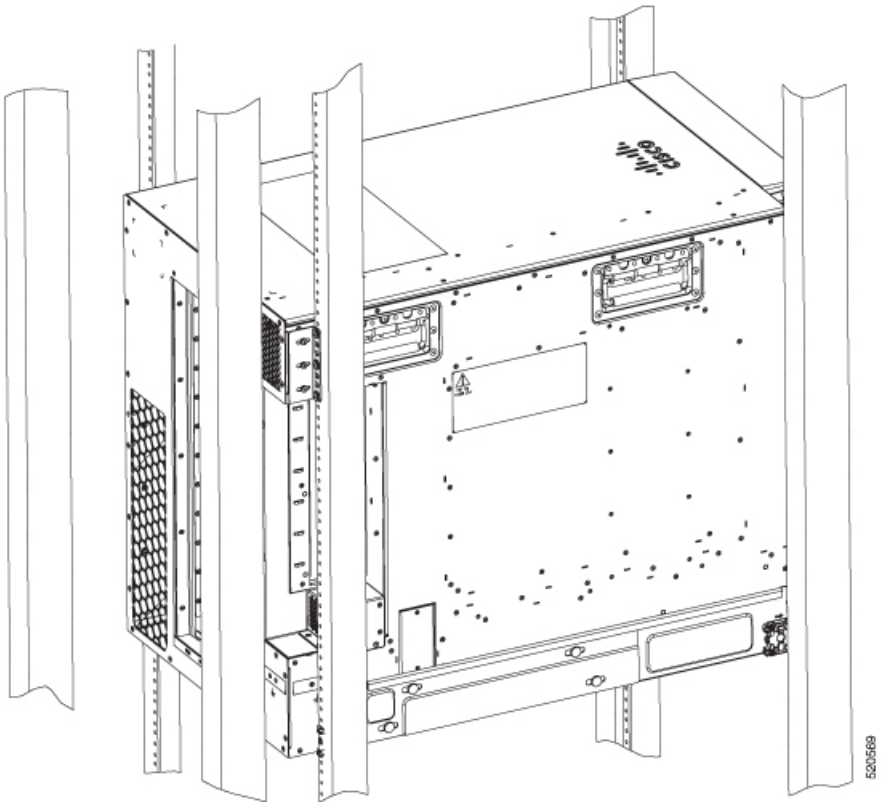


Figure 20: Mounting the Cisco ASR 9910 Router in an Open 4-Post Rack

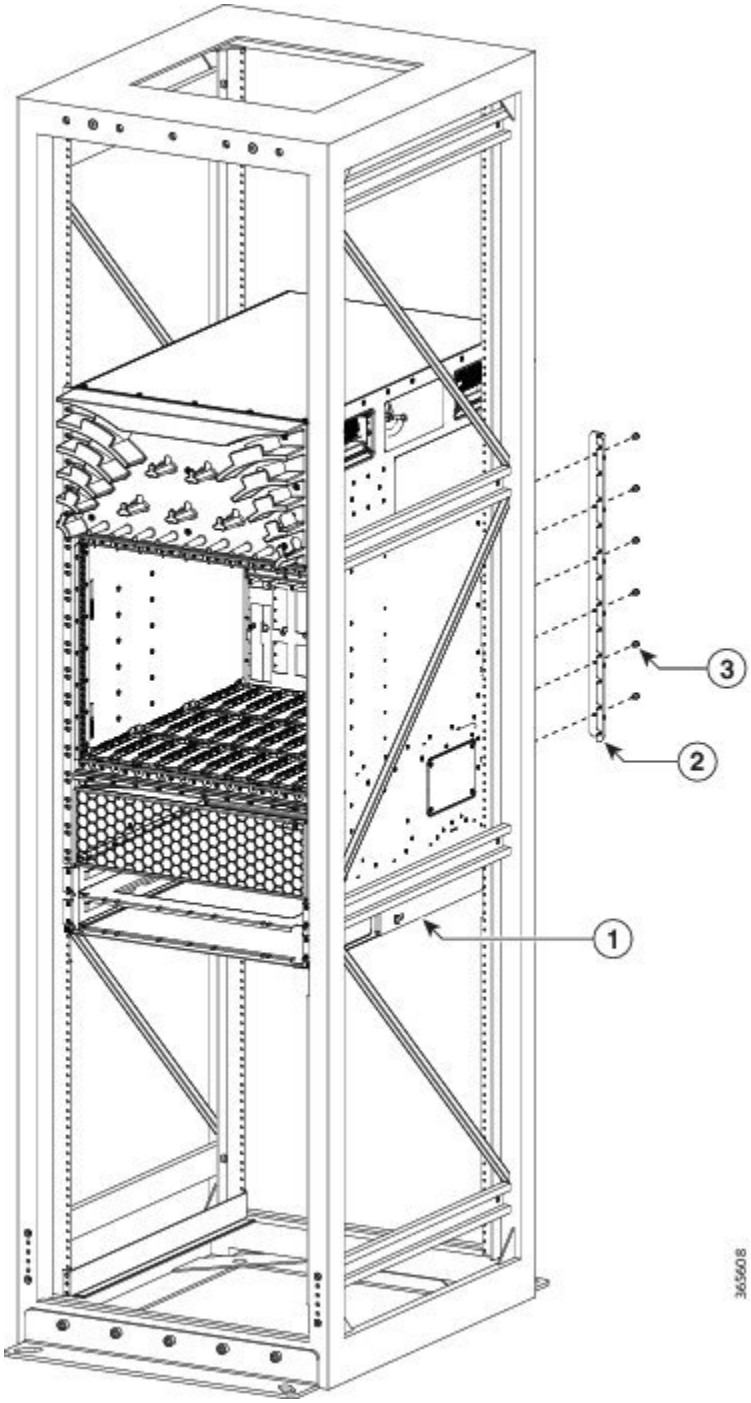


Figure 21: Mounting the Cisco ASR 9912 Router in an Open 4-Post Rack

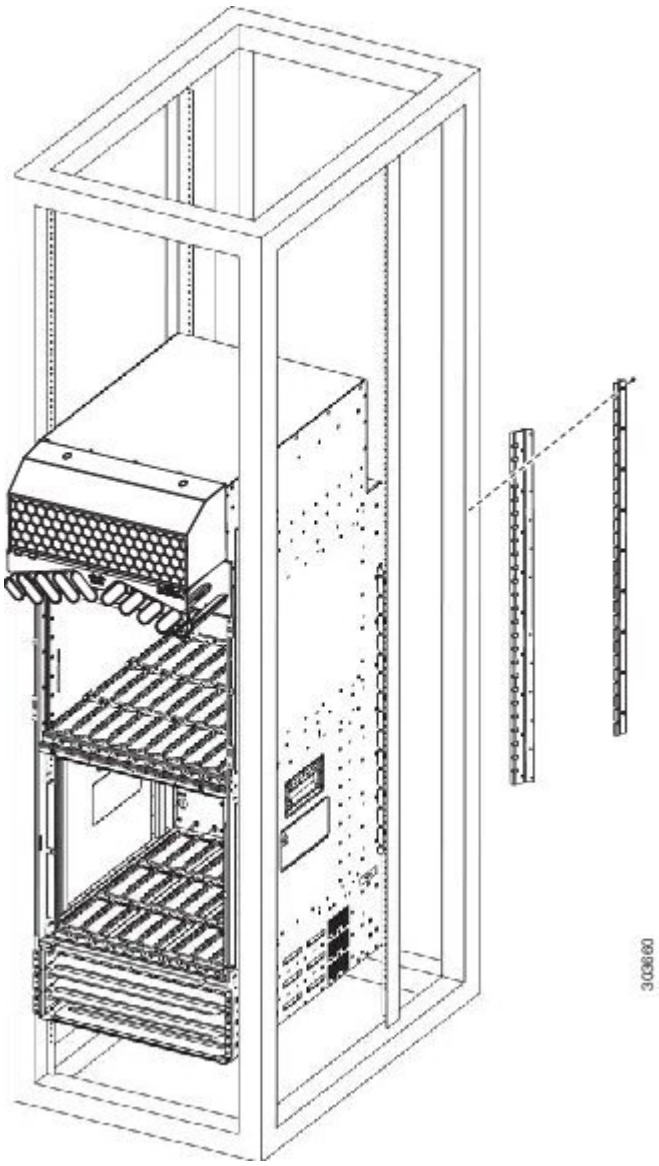
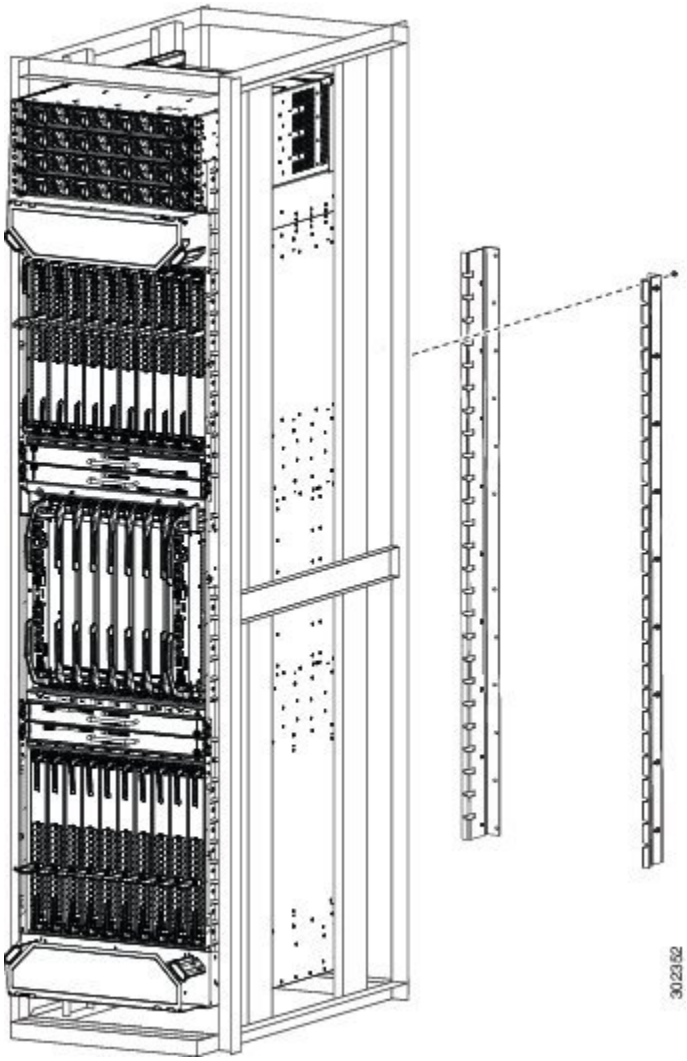


Figure 22: Mounting the Cisco ASR 9922 Router in an Open 4-Post Rack



4-Post Enclosed Rack with Perforated Sides

Item c in Figure 10: Telco-Type Equipment Racks, on page 12 shows a free-standing 4-post enclosed rack with perforated sides and two mounting posts in the front.

Caution Do not install the Cisco ASR 9000 Series Router in any type of fully enclosed rack that does not have the required perforated sides or doors; the router requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of fully enclosed rack without proper perforation could disrupt the air-flow, trap heat next to the chassis, and cause an overtemperature condition inside the router.

Air Flow Guidelines for Enclosed Rack Installation

Follow these guidelines when installing the Cisco ASR 9000 Series Routers in a 4-post enclosed rack.

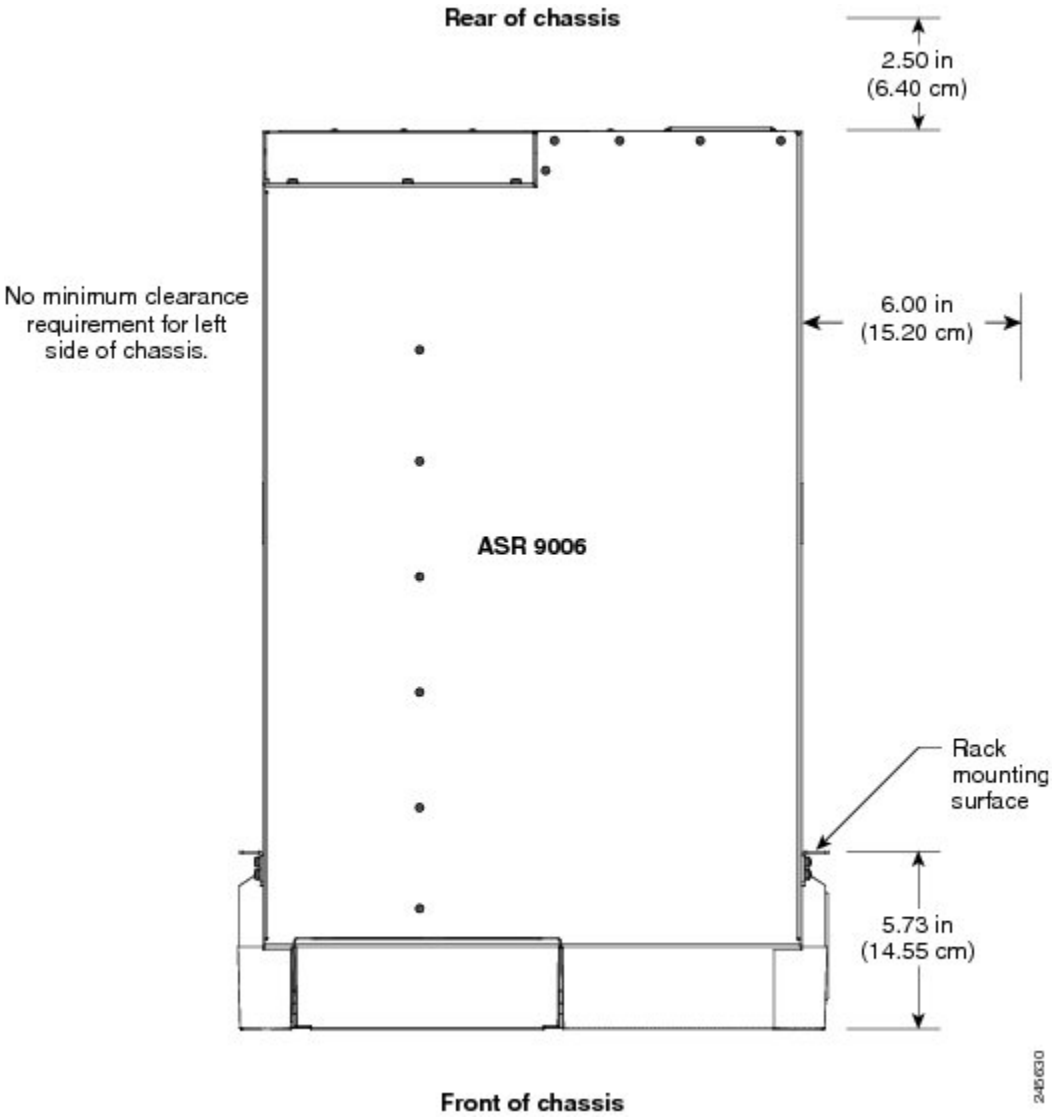
Cisco ASR 9006 Clearance Requirements

To install a Cisco ASR 9006 Router in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 70 percent. In addition, the right side panel must be removed or perforated with a minimum of 65 percent open area (70 percent for 800-mm racks).
- There must be a minimum unobstructed space of 6 inches (15.24 cm) between the router's right side air inlet and the adjacent wall or cabinet side panel, and a minimum unobstructed space of 6 inches (15.24 cm) between adjacent cabinets. In addition, there should be no exhaust from any source blowing into the right side panel of the cabinet.
    - Rear chassis clearance: Minimum of 2.50 inches (6.40 cm) of clearance.
    - Sides chassis clearance: Minimum of 6 inches (15.24 cm) of clearance on the right side of the chassis (as viewed from the front). There is no clearance requirement for the left side of the chassis.

This figure shows the side and rear chassis air-flow clearance requirements for mounting the Cisco ASR 9006 Router in a 4-post enclosed rack.

Figure 23: Cisco ASR 9006 Router Clearance Requirements for an Enclosed 4-Post Rack Installation



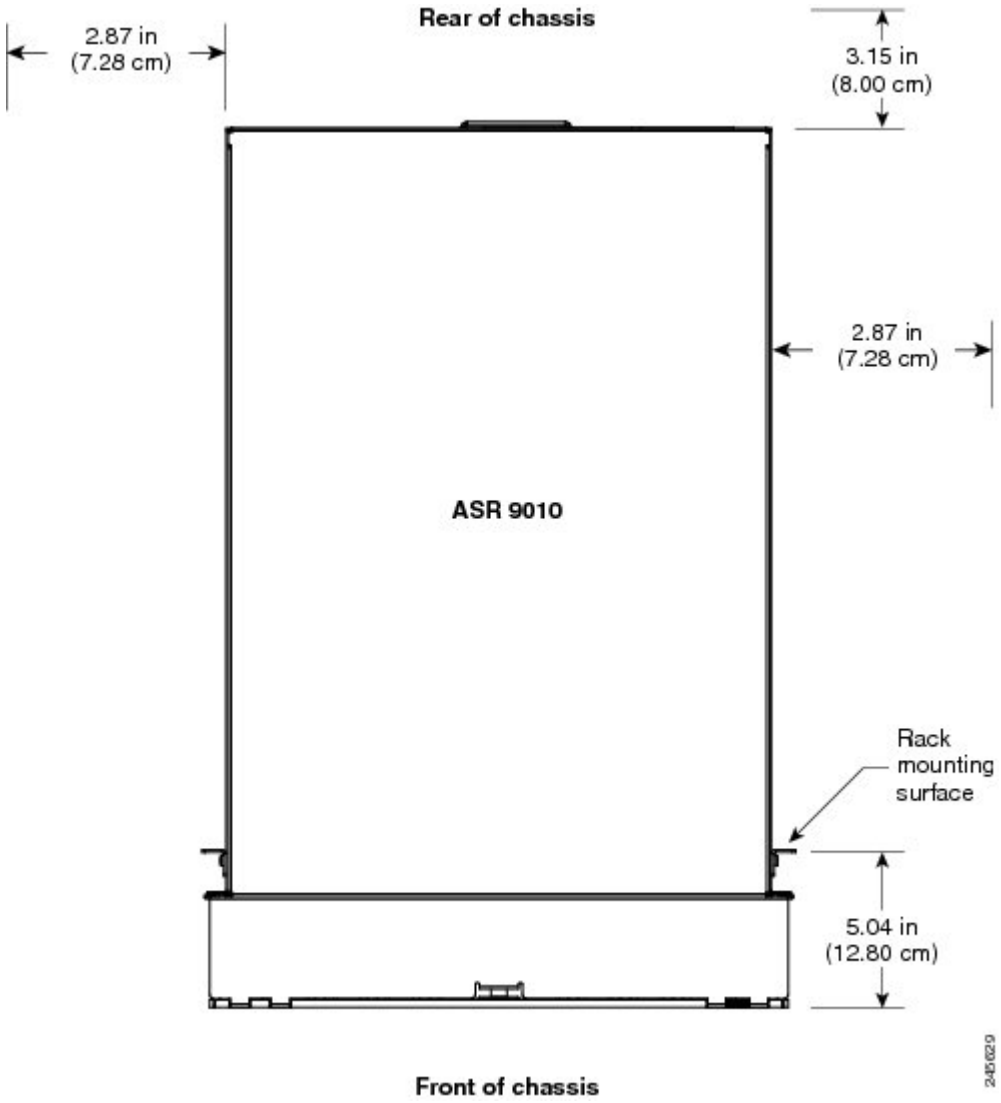
Cisco ASR 9010 Router Clearance Requirements

To install a Cisco ASR 9010 Router in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 65 percent (70 percent for 800-mm racks).
- Ensure that you have the following clearances around the chassis:
  - Rear: Minimum of 3.15 inches (8.00 cm) of clearance.
  - Sides: Minimum of 2.87 inches (7.28 cm) of clearance on each side of the chassis.

This figure shows the side and rear chassis air-flow clearance requirements for mounting the Cisco ASR 9010 Router in a 4-post enclosed rack.

Figure 24: Cisco ASR 9010 Router Clearance Requirements for an Enclosed 4-Post Rack Installation



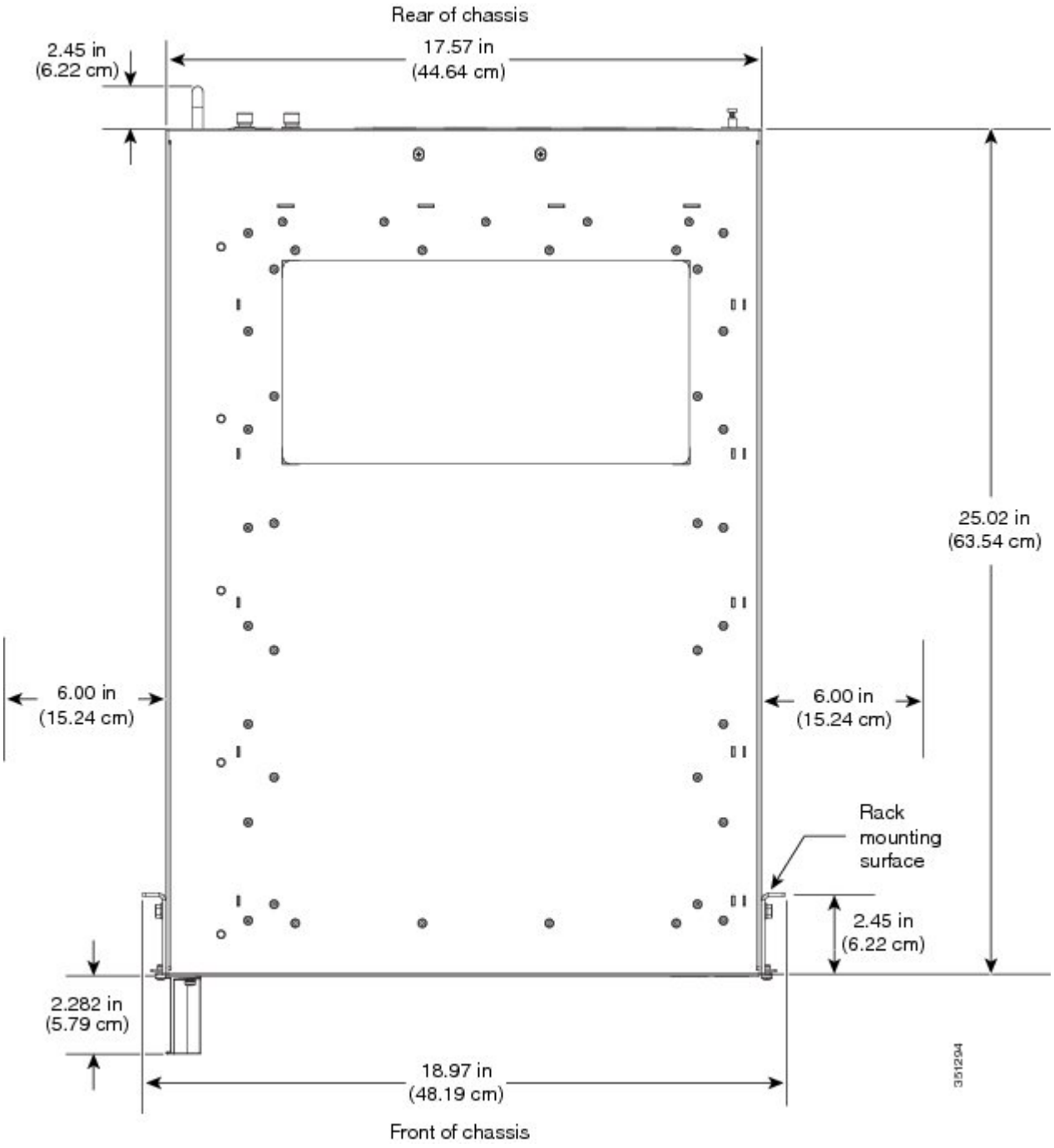
Cisco ASR 9904 Clearance Requirements

To install the Cisco ASR 9904 Router in a 4-post enclosed cabinet:

- Ensure that you have the following clearances around the chassis:
  - Rear: Minimum of 2.45 inches (6.22 cm) of clearance.
  - Sides: Minimum of 6.00 inches (15.24 cm) of clearance on each side of the chassis.

This figure shows the side and rear chassis air-flow clearance requirements for mounting the Cisco ASR 9904 Router in a 4-post enclosed rack.

Figure 25: Cisco ASR 9904 Router Clearance Requirements in a 4-Post Rack Installation



Cisco ASR 9906 Router Clearance Requirements

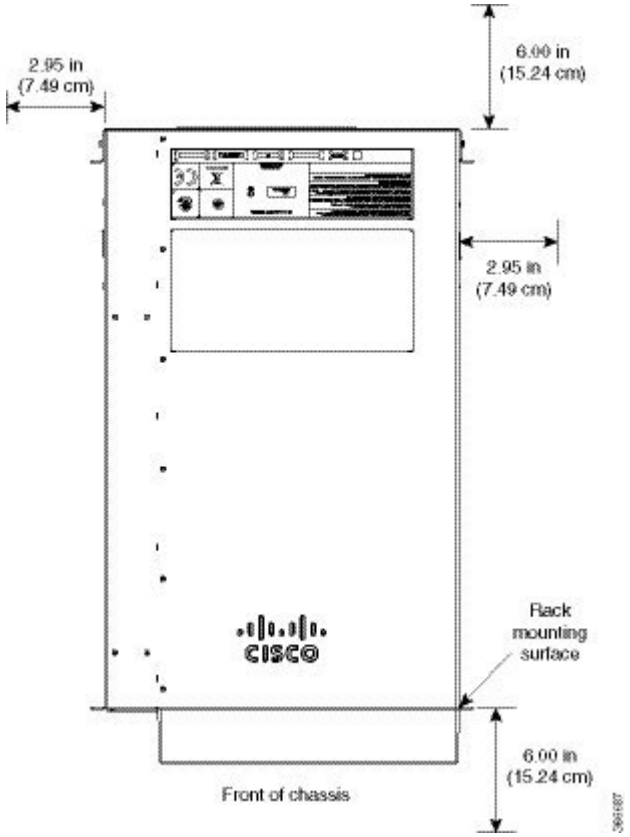
To install the Cisco ASR 9906 Router in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 65 percent (70 percent for 800-mm racks).

- Ensure that you have the following clearances around the chassis:
  - Rear and front: Minimum of 6.00 inches (15.24 cm) of clearance.
  - Sides: Minimum of 2.95 inches (7.49 cm) of clearance on each side of the chassis.

This figure shows the side, front, and rear chassis air-flow clearance requirements for mounting the Cisco ASR 9906 Router in a 4-post enclosed rack.

Figure 26: Cisco ASR 9906 Router Clearance Requirements in a 4-Post Rack Installation



Cisco ASR 9910 Router Clearance Requirements

To install the Cisco ASR 9910 in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 70 percent open area (80 percent for 800-mm racks).
- Ensure that you have the following clearances around the chassis:
  - Rear: Minimum of 6 inches (15.24 cm) of clearance.
  - Sides: Minimum of 2.87 inches (7.28 cm) of clearance on each side of the chassis.

This figure shows the side and rear chassis air-flow clearance requirements for mounting the router in a 4-post enclosed rack.

Cisco ASR 9912 Clearance Requirements

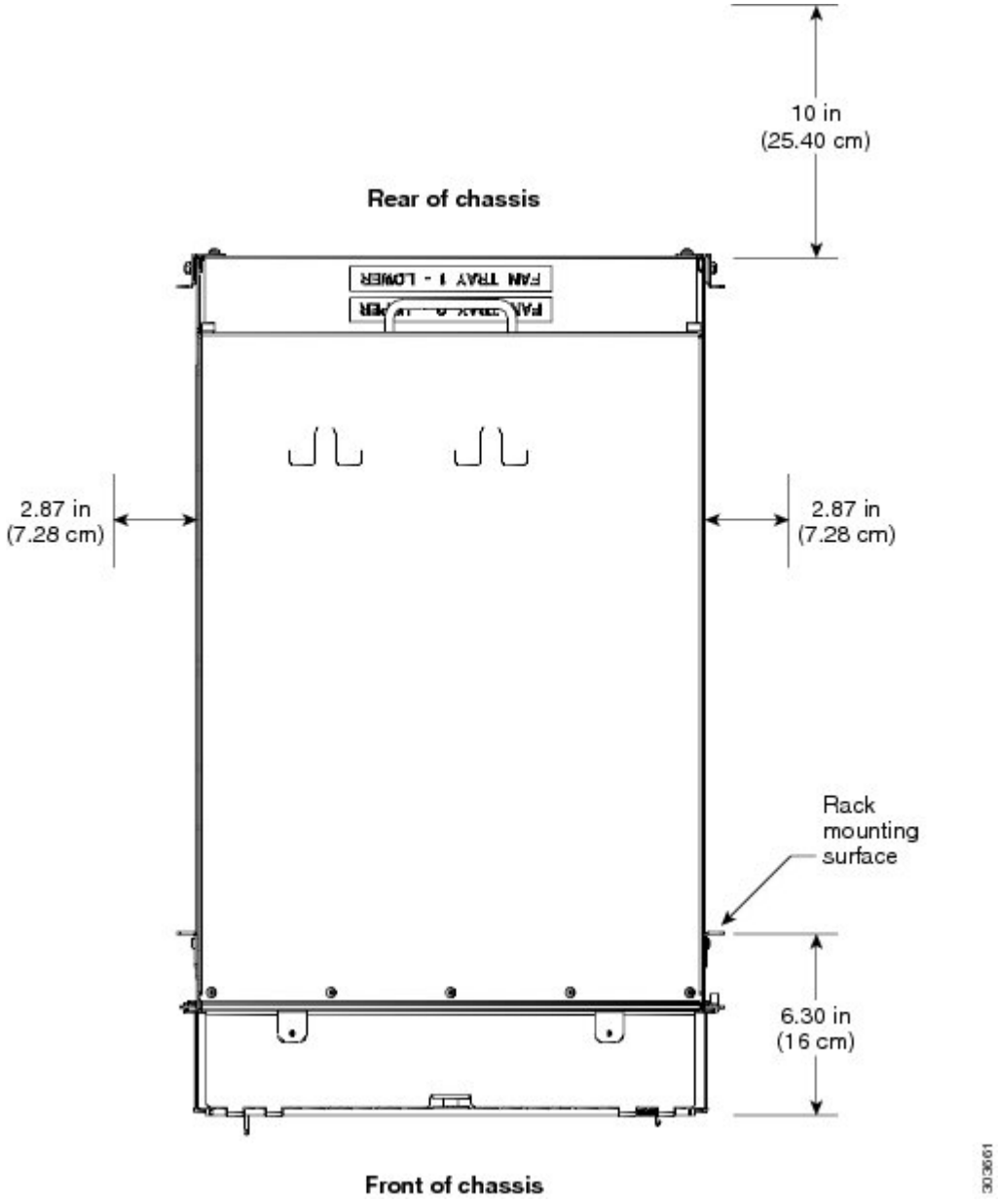
To install the Cisco ASR 9912 Router in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 70 percent open area (80 percent for 800-mm racks)

  .
- Ensure that you have the following clearances around the chassis:
  - Rear: Minimum of 10 inches (25.4 cm) of clearance.
  - Sides: Minimum of 2.87 inches (7.28 cm) of clearance on each side of the chassis.

This figure shows the side and rear chassis air-flow clearance requirements for mounting the router in a 4-post enclosed rack.

Figure 27: Cisco ASR 9912 Router Clearance Requirements in a 4-Post Rack Installation



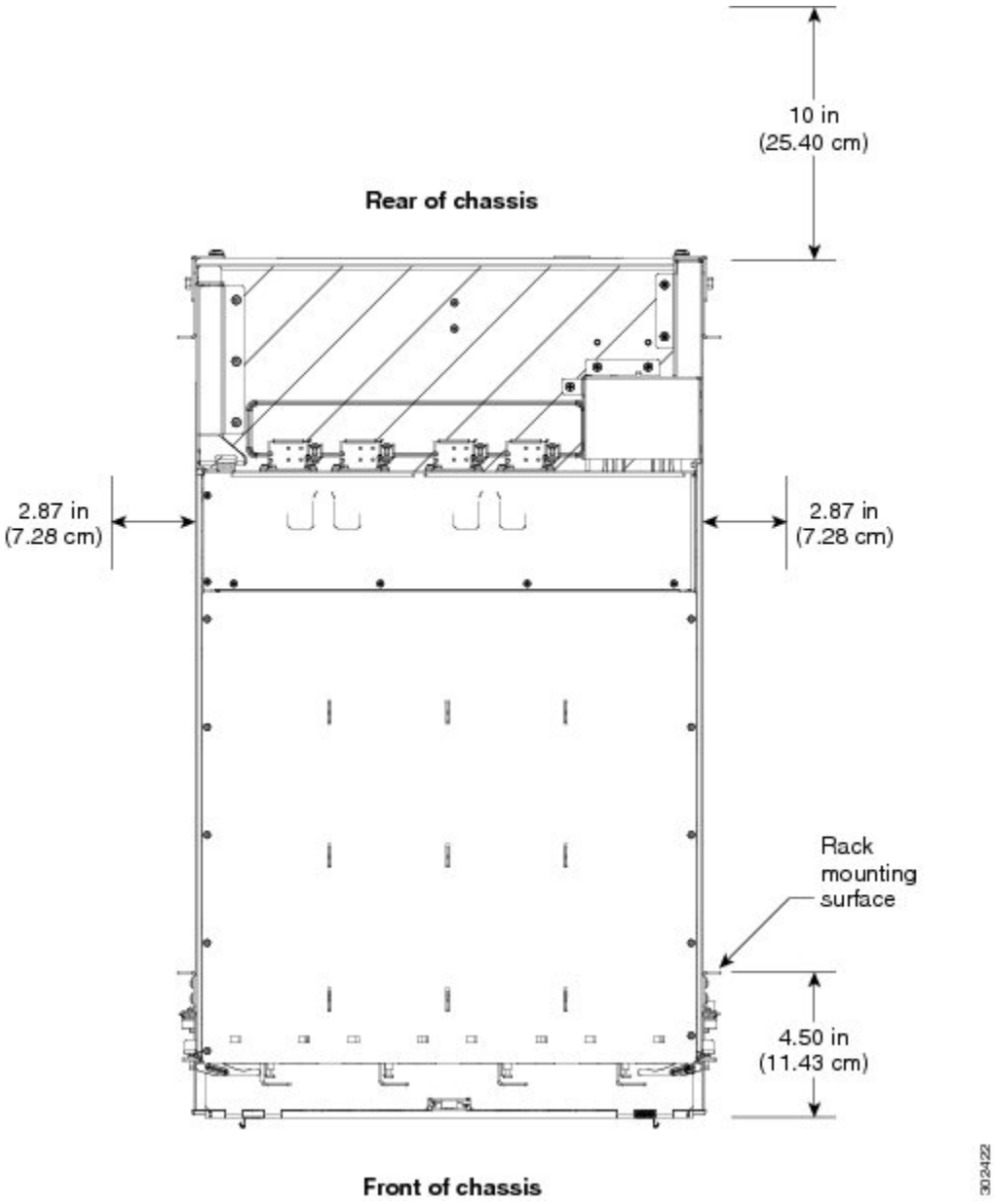
Cisco ASR 9922 Clearance Requirements

To install the Cisco ASR 9922 Router in a 4-post enclosed cabinet:

- The front and rear doors of the cabinet must be removed or be perforated with a minimum open area of 70 percent (80 percent for 800-mm racks).
- Ensure that you have the following clearances around the chassis:
  - Rear: Minimum of 10 inches (25.4 cm) of clearance.
  - Sides: Minimum of 2.87 inches (7.28 cm) clearance on each side of the chassis.

This figure shows the clearance requirements for mounting the Cisco ASR 9922 Router in a 4-post enclosed rack.

Figure 28: Cisco ASR 9922 Router Clearance Requirements in a 4-Post Rack Installation



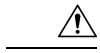
Temperature and Humidity Guidelines

The operating and nonoperating environmental site requirements are listed in *Cisco ASR 9000 Series Routers Environmental Specifications* section of *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide.*

The router normally operates within the ranges listed in the table; however, if a temperature measurement is approaching a minimum or maximum parameter, it indicates a potential problem. Maintain normal operation by anticipating and correcting environmental anomalies before they approach critical values by properly planning and preparing your site before you install the router.

Power Connection Guidelines

You can configure the router with either an AC input or DC input power subsystem, so the site power source requirements differ depending on the power subsystem in your router. Ensure all power connection wiring conforms to the rules and regulations in the National Electrical Code (NEC) as well as local codes.



Caution Each Cisco ASR 9000 Series Router is powered by only one type of input: AC or DC. A hybrid (AC+DC) power configuration is not supported.

Table 2: Cisco ASR 9000 Series Routers Supported Power Systems

Router	Supported Power Systems
Cisco ASR 9006	Version 1: Supports up to three power modules in the power tray. Version 2: Supports up to four power modules in the power tray Compatible only with Cisco IOS XR Software Release 4 and later Cisco IOS XR software releases. Version 3: Compatible only with Cisco IOS XR Software Release 6.5.3 and later Cisco IOS XR software releases.
Cisco ASR 9010	Version 1: Supports up to three power modules in the power tray. Version 2: Supports up to four power modules in the power tray Compatible only with Cisco IOS XR Software Release 4 and later Cisco IOS XR software releases. Version 3: Supports up to four DC power modules in the DC power tray and up to three AC power modules in the AC power tray. Compatible only with Cisco IOS XR Software Release 5.3.0 and later Cisco IOS XR software releases.
Cisco ASR 9904	Version 2: Supports up to four power modules in the power tray. Compatible only with Cisco IOS XR Software Release 4 and later Cisco IOS XR software releases. Version 3: Compatible only with Cisco IOS XR Software Release 6.5.3 and later Cisco IOS XR software releases.
Cisco ASR 9906	Version 3: Supports up to three AC power modules in the AC power tray and up to four DC power modules in the DC power tray.
Cisco ASR 9910	Version 3: Supports up to three AC power modules in the AC power tray and up to four DC power modules in the DC power tray.
Cisco ASR 9912 Cisco ASR 9922	Version 2: Supports up to four power modules in the power tray. Version 3: Supports up to four DC power modules in the DC power tray and up to three AC power modules in the AC power tray. Compatible only with Cisco IOS XR Software Release 5.3.0 and later Cisco IOS XR software releases.

Caution Proper grounding is necessary to avoid damage from lightning and power surges. See NEBS Supplemental Unit Bonding and Grounding Guidelines, on page 48 for grounding requirements.

AC-Powered Routers

AC power modules operate in the input range of 180 VAC to 264 VAC, 47 to 63 Hz (nominal input level of 200 to 240 VAC). Refer the below tables for the minimum required AC service for version 1 and version 2 power modules.

Power redundancy requirements vary based on the system configuration (number and type of line cards, etc.). AC-powered systems are 2N protected. A minimum of two power supplies are required for redundant operation.

Each of the AC power inputs requires a separate dedicated branch circuit. Note that the circuit breaker and fuse lockout procedures should follow the rules and regulations in the National Electrical Code (NEC) and any local codes. For a list of the nominal and acceptable value ranges for source AC power, see *Cisco ASR 9000 Series Routers AC Electrical Specifications* section of *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide*.

This table lists the AC input power cord options, specifications, and Cisco product numbers for the AC input version 1 power supply modules. lists the AC input power cord options, specifications, and Cisco product numbers for the AC input version 2 power and version 3 supply modules.

Note Before connecting AC input power cords to the power system, make sure that the power cords are not energized.

Table 3: AC Input Power Cord Options for Version 1 Power System

Locale	Part Number	Length	Plug Rating	Power Cord Reference Illustration
Australia, New Zealand	CAB-7513ACA=	14 ft (4.3 m)	15 A, 250 VAC	Figure 29: AC Power Cord CAB-7513ACA=, on page 35
Australia, New Zealand	CAB-AC-16A-AUS=	14 ft (4.3 m)	16A, 250 VAC	Figure 30: AC Power Cord CAB-AC-16A-AUS, on page 35
China	CAB-AC16A-CH=	14 ft (4.3 m)	16 A, 250 VAC	Figure 31: AC Power Cord CAB-AC16A-CH=, on page 36
Continental Europe	CAB-7513ACE= CAB-2500W-EU= CAB-AC-2500W-EU=	14 ft (4.3 m)	16 A, 250 VAC 16 A, 250 VAC 16 A, 250 VAC	Figure 32: AC Power Cord CAB-7513ACE=, on page 36 Figure 33: AC Power Cord CAB-2500W-EU=, on page 36 Figure 34: AC Power Cord CAB-AC-2500W-EU=, on page 37
International	CAB-AC-2500W-INT=	14 ft (4.3 m)	16 A, 250 VAC	Figure 35: AC Power Cord CAB-AC-2500W-INT=, on page 37

Locale	Part Number	Length	Plug Rating	Power Cord Reference Illustration
Israel	CAB-AC-2500W-ISRL=	14 ft (4.3 m)	16 A, 250 VAC	Figure 36: AC Power Cord CAB-AC-2500W-ISRL=, on page 37
Italy	CAB-7513ACI=	14 ft (4.3 m)	16 A, 250 VAC	Figure 37: AC Power Cord CAB-7513ACI=, on page 38
Japan, North America (nonlocking plug) 200–240VAC operation	CAB-AC-2500W-US1=	14 ft (4.3 m)	20 A, 250 VAC	Figure 38: AC Power Cord CAB-AC-2500W-US1=, on page 38
Japan, North America (locking plug) 200–240VAC operation	CAB-AC-C6K-TWLK=	14 ft (4.3 m)	20 A, 250 VAC	Figure 39: AC Power Cord CAB-AC-C6K-TWLK=, on page 38
South Africa	CAB-7513ACSA=	14 ft (4.3 m)	16 A, 250 VAC	Figure 40: AC Power Cord CAB-7513ACSA=, on page 39
Switzerland	CAB-ACS-16=	14 ft (4.3 m)	16 A, 250 VAC	Figure 41: AC Power Cord CAB-ACS-16=, on page 39

Table 4: AC Input Power Cord Options for Version 2 and Version 3 Power System

Locale	Part Number	Length	Plug Rating	Reference Illustration
China	PWR-CAB-AC-CHN=	13.9 ft (4.3 m)	16 A, 250 V	Figure 42: AC Power Cord PWR-CAB-AC-CHN=, on page 39
Europe	PWR-CAB-AC-EU=	13.9 ft (4.3 m)	16 A, 250 V	Figure 43: AC Power Cord PWR-CAB-AC-EU=, on page 40
Israel	PWR-CAB-AC-ISRL=	13.9 ft (4.3 m)	16 A, 250 V	Figure 44: AC Power Cord PWR-CAB-AC-ISRL=, on page 40
USA	PWR-CAB-AC-USA=	13.9 ft (4.3 m)	20 A, 250 V	Figure 45: AC Power Cord PWR-CAB-AC-USA=, on page 40
Australia	PWR-CAB-AC-AUS=	13.9 ft (4.3 m)	16 A, 250 V	Figure 46: AC Power Cord PWR-CAB-AC-AUS=, on page 41
Italy	PWR-CAB-AC-ITA=	13.9 ft (4.3 m)	16 A, 250 V	Figure 47: AC Power Cord PWR-CAB-AC-ITA=, on page 41
Brazil	PWR-CAB-AC-BRA=	13.9 ft (4.3 m)	16 A, 250 V	Figure 48: AC Power Cord PWR-CAB-AC-BRA=, on page 41

Locale	Part Number	Length	Plug Rating	Reference Illustration
South Africa	PWR-CAB-AC-SA=	13.9 ft (4.3 m)	16 A, 250 V	Figure 49: AC Power Cord PWR-CAB-AC-SA=, on page 42
UK	PWR-CAB-AC-UK=	13.9 ft (4.3 m)	16 A, 250 V	Figure 50: AC Power Cord PWR-CAB-AC-UK=, on page 42
Switzerland	PWR-CAB-AC-SUI=	13.9 ft (4.3 m)	16 A, 250 V	Figure 51: AC Power Cord PWR-CAB-AC-SUI= , on page 42
Japan	PWR-CAB-AC-JPN=	13.9 ft (4.3 m)	20 A, 250 V	Figure 52: AC Power Cord PWR-CAB-AC-JPN= , on page 43

AC Power Cord Illustrations (Version 1 Power)

This section contains the AC power cord illustrations for version 1 power, as described in Table 3: AC Input Power Cord Options for Version 1 Power System, on page 33. Note that an AC power cord may be used with several power supplies.

Figure 29: AC Power Cord CAB-7513ACA=

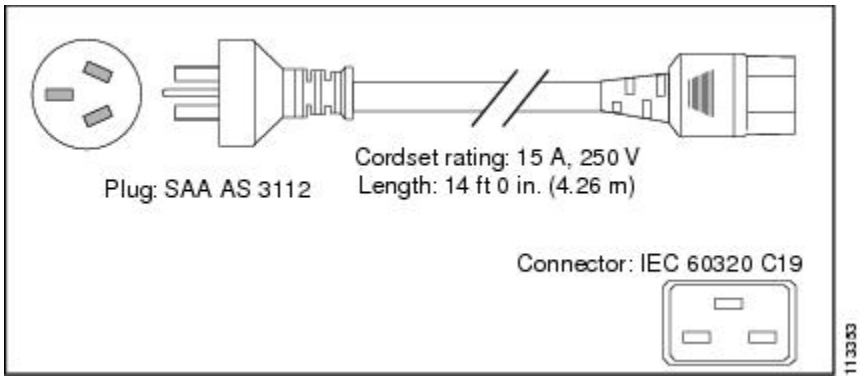


Figure 30: AC Power Cord CAB-AC-16A-AUS

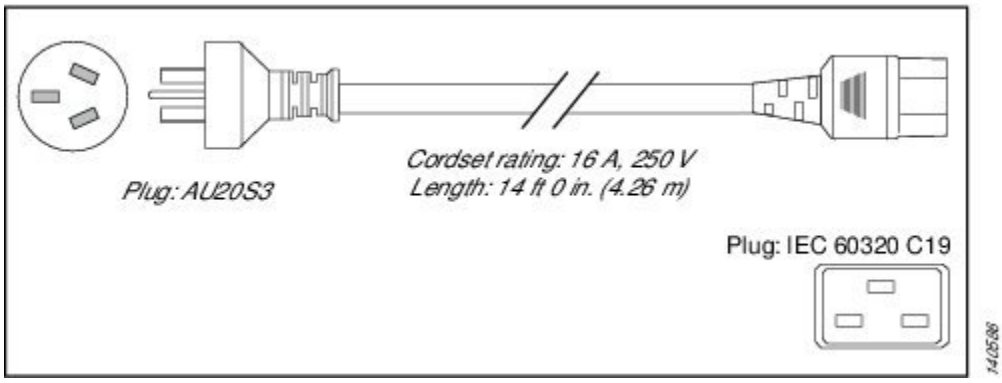


Figure 31: AC Power Cord CAB-AC16A-CH=

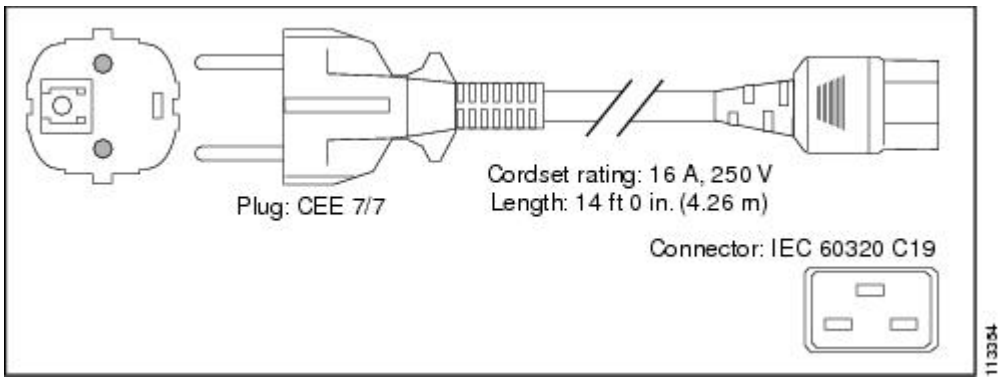


Figure 32: AC Power Cord CAB-7513ACE=

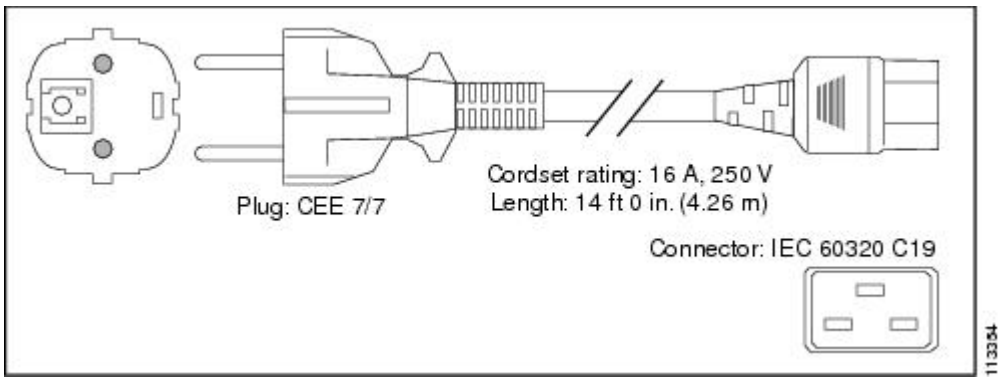


Figure 33: AC Power Cord CAB-2500W-EU=

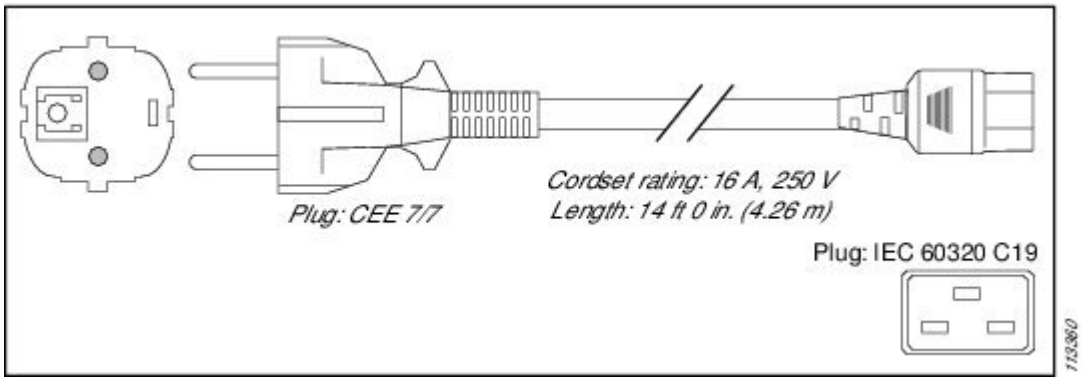


Figure 34: AC Power Cord CAB-AC-2500W-EU=

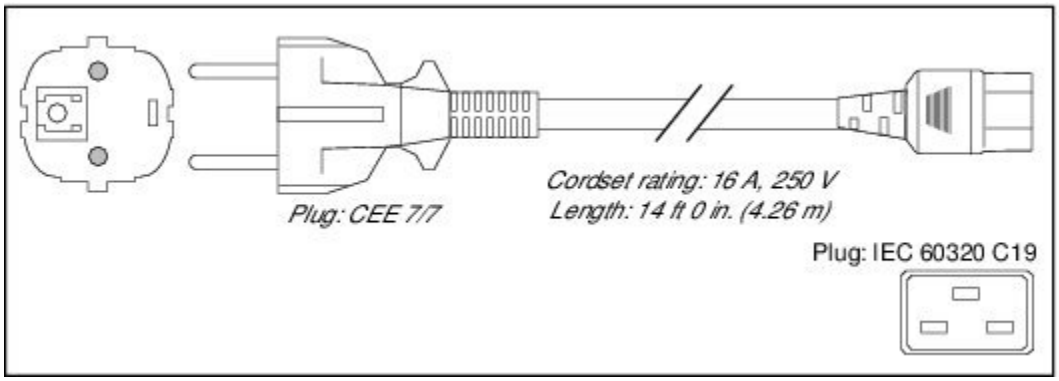


Figure 35: AC Power Cord CAB-AC-2500W-INT=

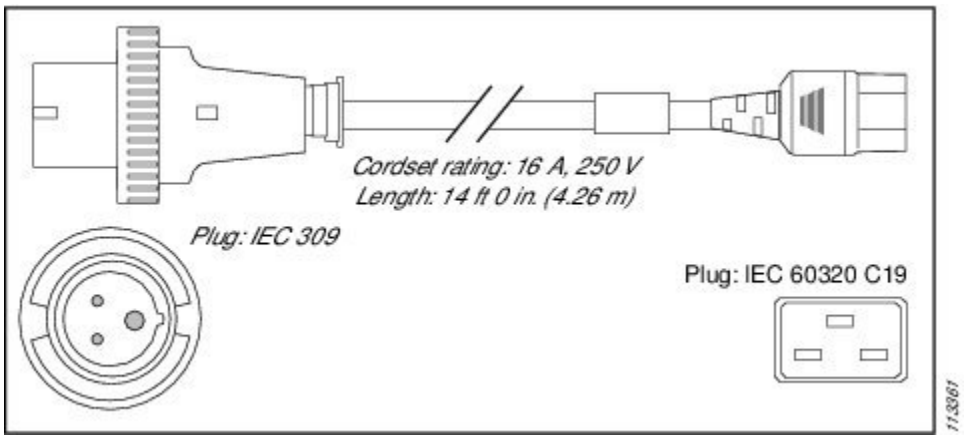


Figure 36: AC Power Cord CAB-AC-2500W-ISRL=

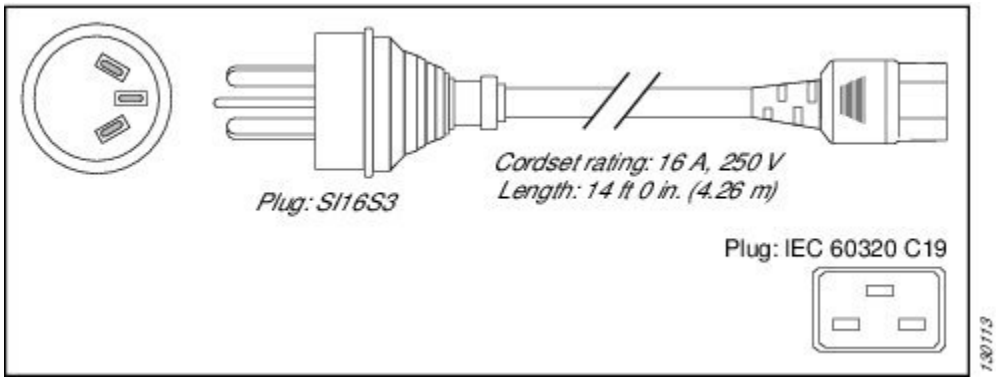


Figure 37: AC Power Cord CAB-7513ACI=

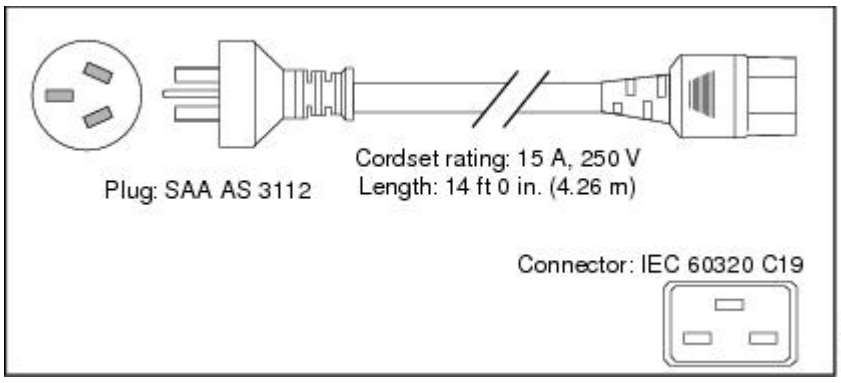


Figure 38: AC Power Cord CAB-AC-2500W-US1=

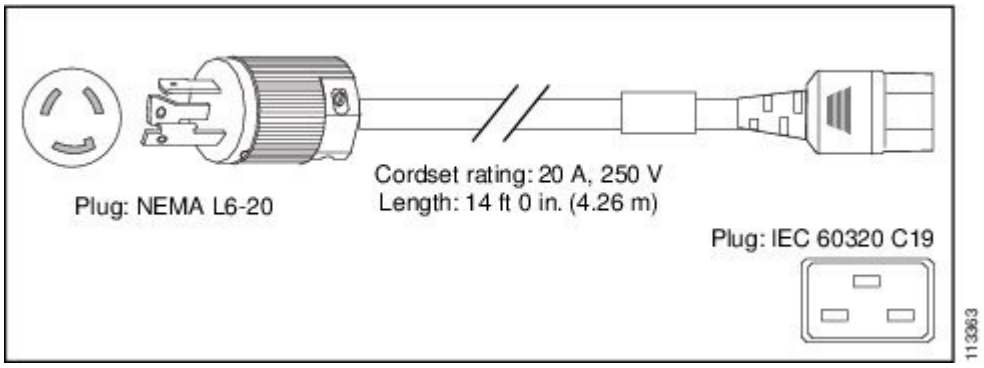


Figure 39: AC Power Cord CAB-AC-C6K-TWLK=

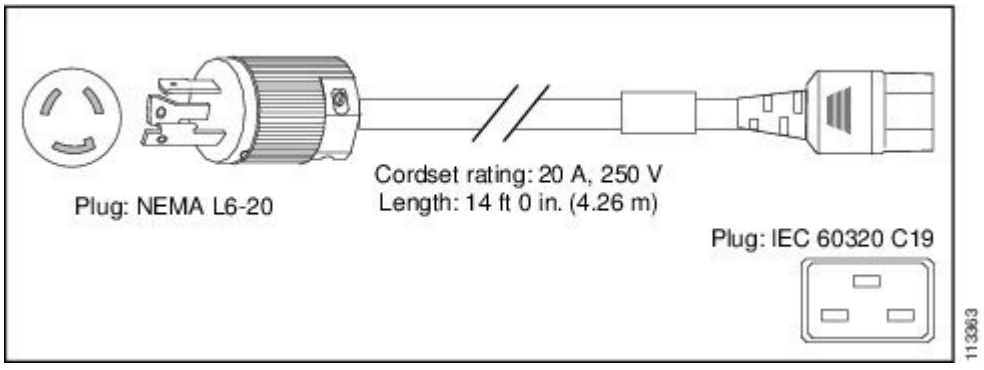


Figure 40: AC Power Cord CAB-7513ACSA=

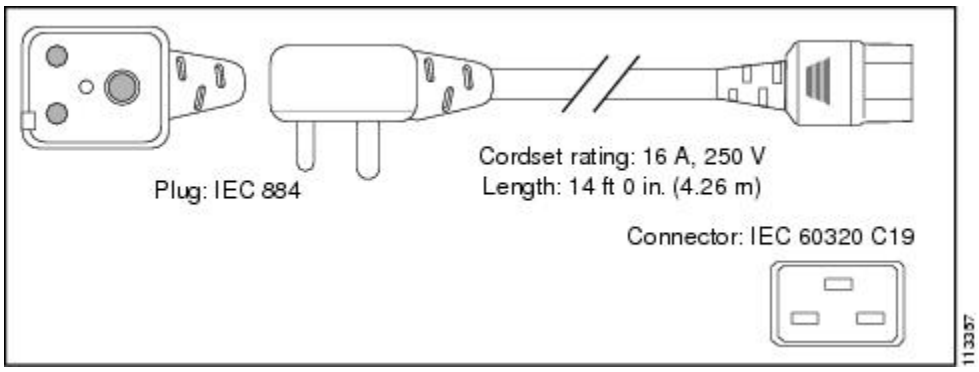
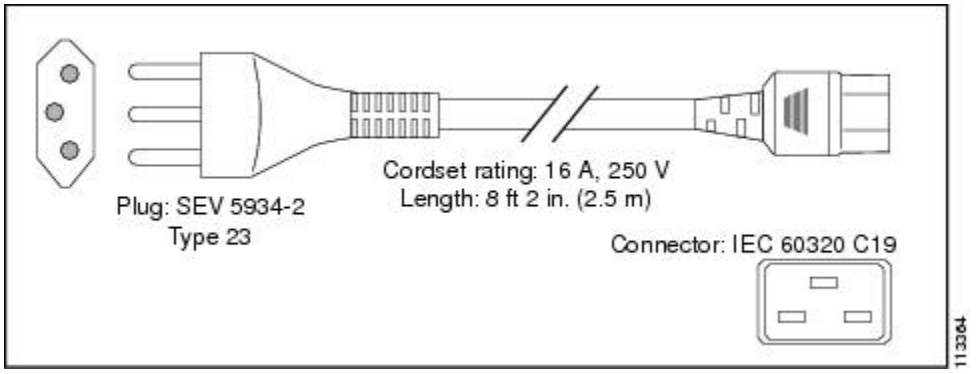


Figure 41: AC Power Cord CAB-ACS-16=



AC Power Cord Illustrations (Version 2 and Version 3 Power)

This section contains the AC power cord illustrations for version 2 power, as described in Table 4: AC Input Power Cord Options for Version 2 and Version 3 Power System , on page 34.

Figure 42: AC Power Cord PWR-CAB-AC-CHN=

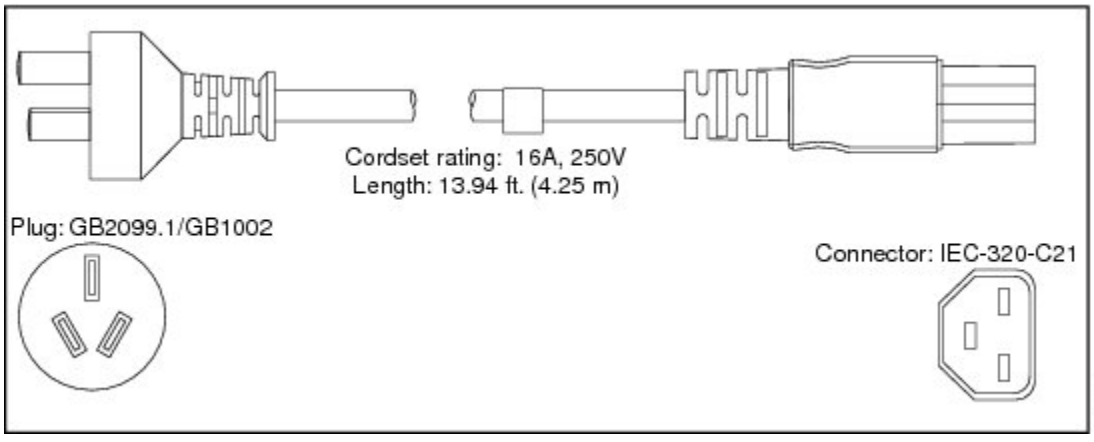


Figure 43: AC Power Cord PWR-CAB-AC-EU=

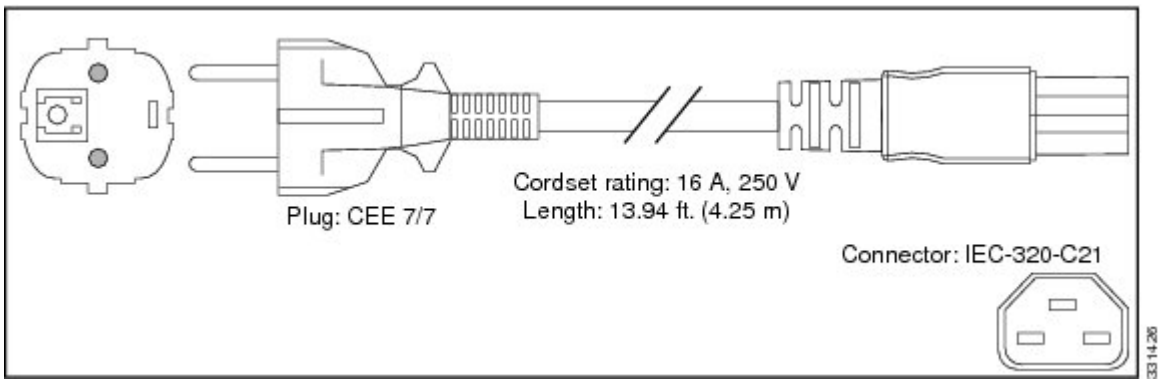


Figure 44: AC Power Cord PWR-CAB-AC-ISRL=

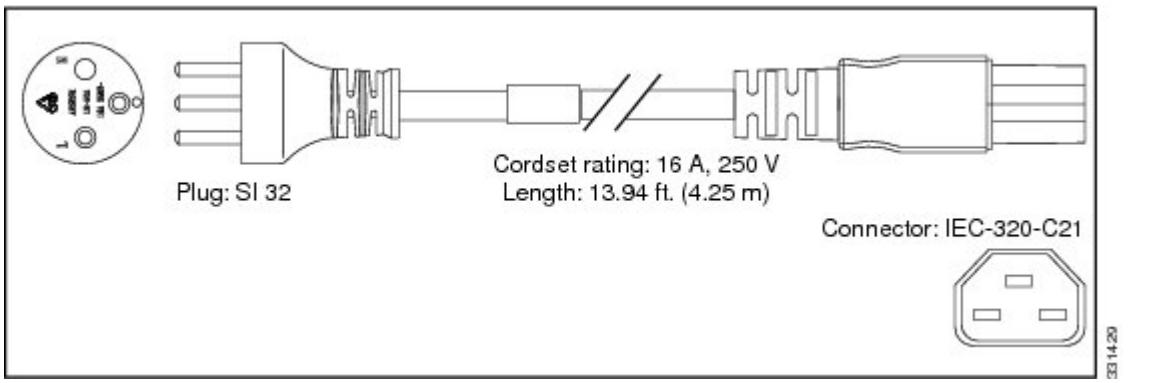


Figure 45: AC Power Cord PWR-CAB-AC-USA=

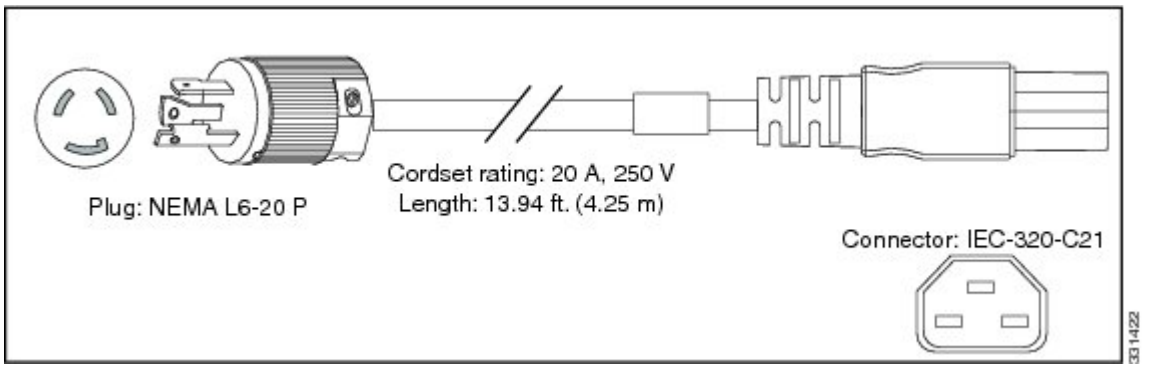


Figure 46: AC Power Cord PWR-CAB-AC-AUS=

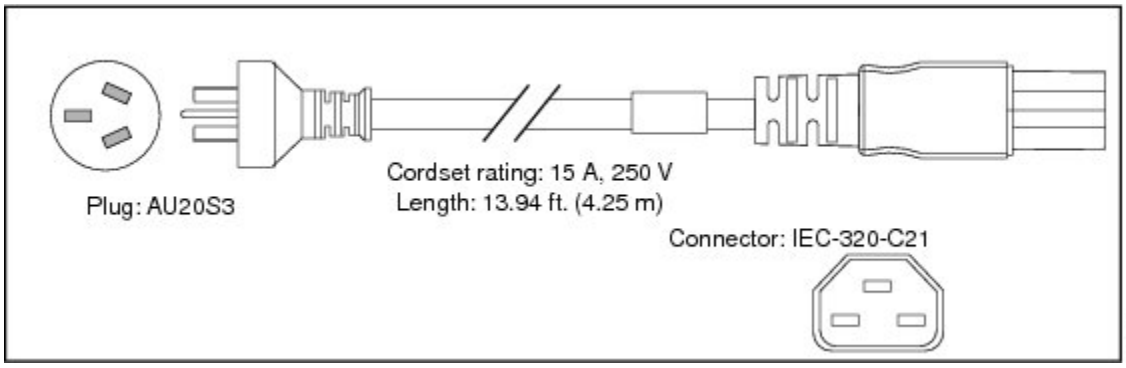


Figure 47: AC Power Cord PWR-CAB-AC-ITA=

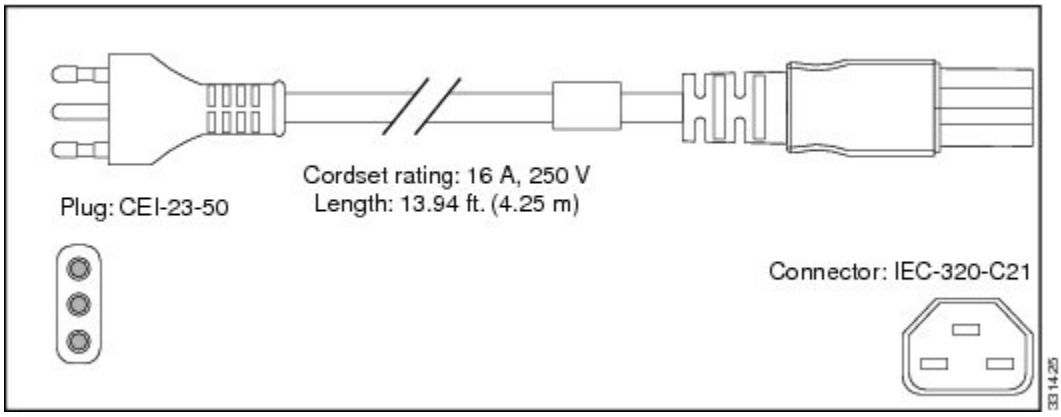


Figure 48: AC Power Cord PWR-CAB-AC-BRA=

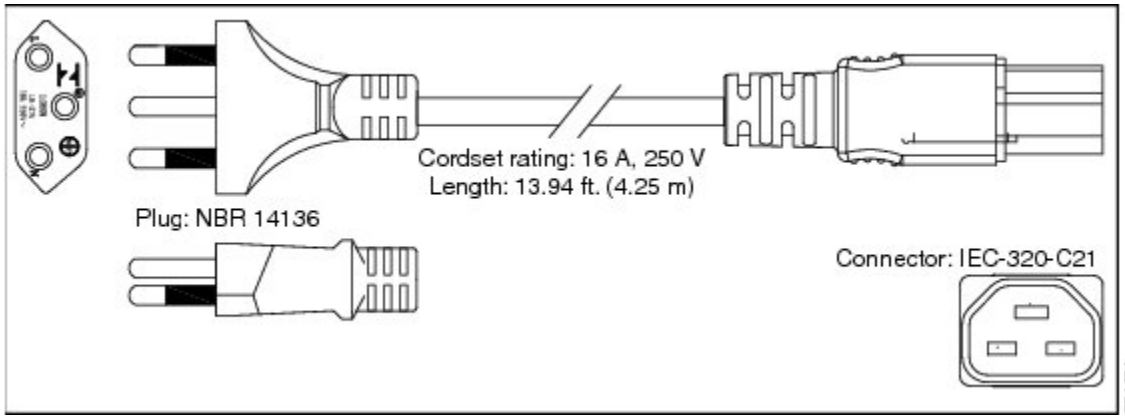


Figure 49: AC Power Cord PWR-CAB-AC-SA=

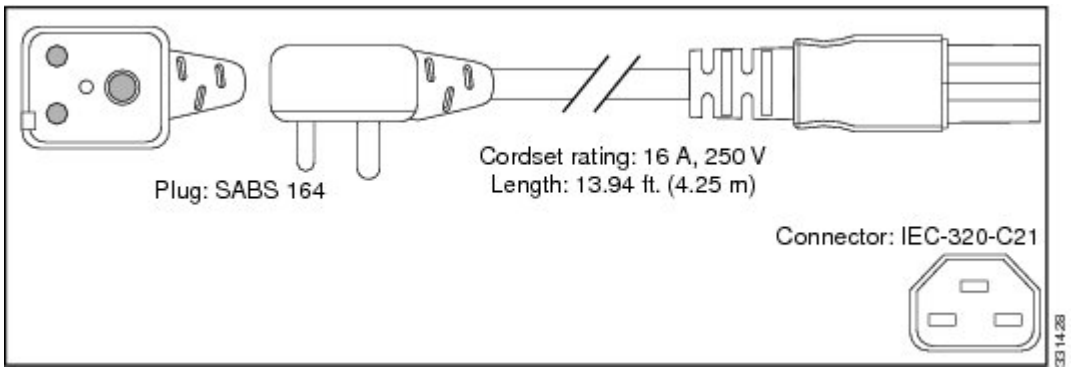


Figure 50: AC Power Cord PWR-CAB-AC-UK=

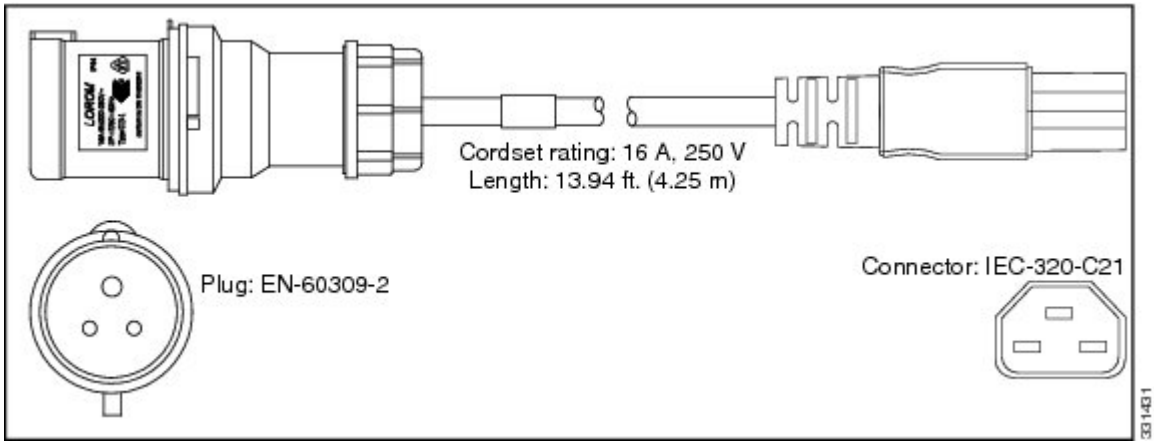


Figure 51: AC Power Cord PWR-CAB-AC-SUI=

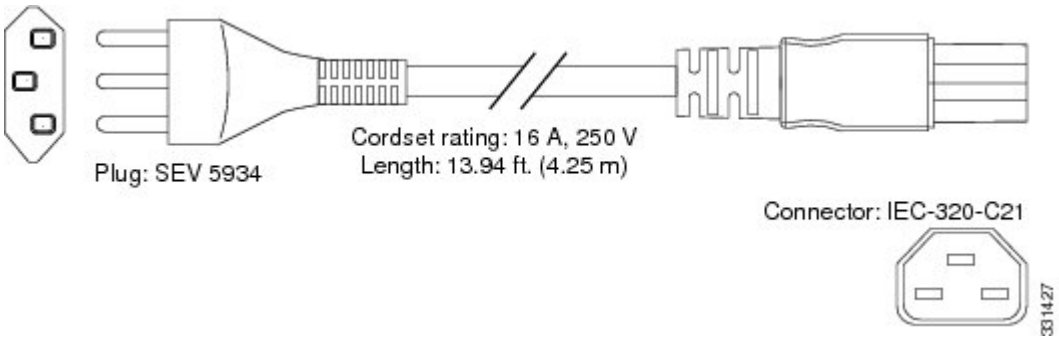
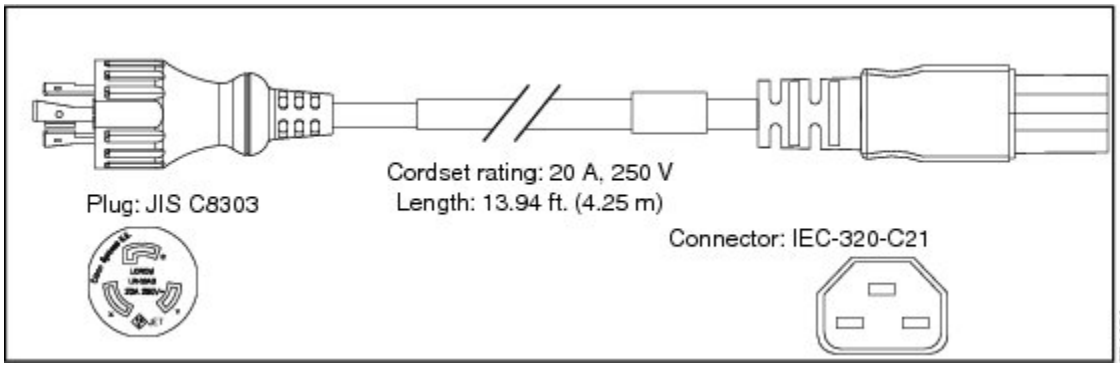


Figure 52: AC Power Cord PWR-CAB-AC-JPN=



DC-Powered Router

Connections to DC power modules are rated at 60 A maximum. The system accepts a nominal input voltage of –48 VDC with an operational tolerance range of –40 VDC to –72 VDC. One dedicated, commensurately rated DC power source is required for each power module connection.

Power redundancy requirements vary based on the system configuration (number and type of line cards, etc.). DC-powered systems are N+1 protected. A minimum of two power supplies are required for redundant operation.

Power connections to the power tray for each DC power module requires four cables: two source cables and two return cables. In addition, each DC power tray requires one earth ground, so the minimum number of cables for connecting a single DC power module in a power tray is five (two source, two return, one ground).

Note A separate ground connection is not required for the version 2 and version 3 power systems. For more information see NEBS Supplemental Unit Bonding and Grounding Guidelines, on page 48.

For DC power cables, we recommend that you use 60-A-rated, high-strand-count copper wire cables. The length of the cables depends on your router location from the source power. DC power cables are not available from Cisco, but they are available from any commercial cable vendor.

You must terminate DC power cables using cable lugs at the power tray end. Ensure that the lugs are dual-hole and that they fit over M6 terminal studs at 0.625-inch (15.88-mm) centers. For #4 AWG cable, use Panduit part number LCD4-14AF-L or equivalent; for #6 AWG, use Panduit part number LCD6-14AF-L or equivalent.

Warning Hazardous voltage or energy may be present on power terminals. To reduce the risk of electric shock, make sure the power terminal cover is in place when the power terminal is not being serviced. Be sure uninsulated conductors are not accessible when the cover is in place.

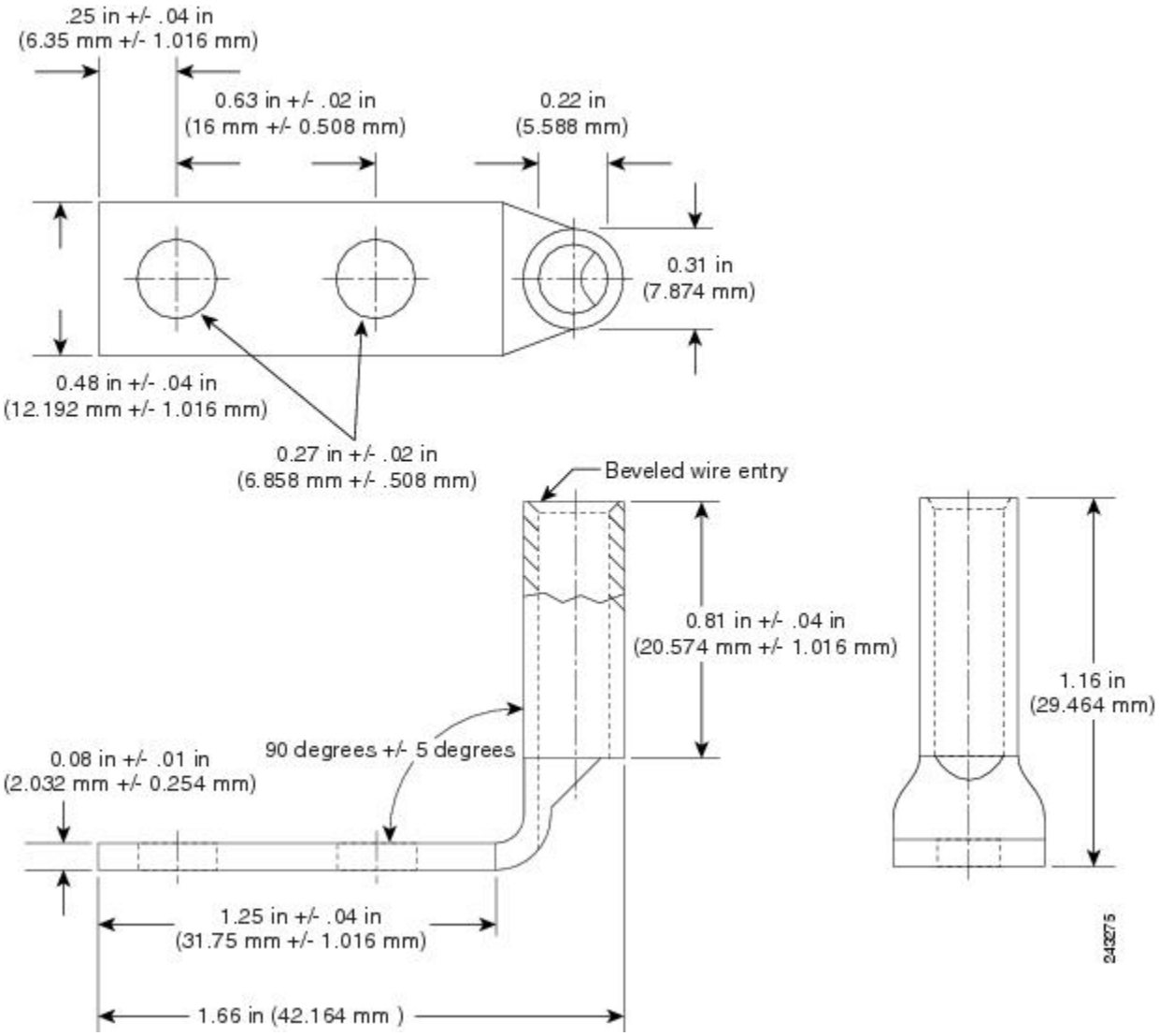
Note Before connecting DC power cords to the power system, make sure that the input power cords are not energized.

Note Ensure that there is a readily accessible disconnect device incorporated in the building's installation wiring.

Note Circuit breaker and fuse lockout procedures should follow the rules and regulations in the National Electrical Code (NEC) and any local codes.

This figure shows the lug type required for DC input cable connections.

Figure 53: Typical DC Power Cable Lug



- Figure 54: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 1 Power System, on page 45 shows typical DC power source cable connections for a version 1 single DC power module, in this case, a module installed in slot M2 of the power tray.

- Figure 55: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 2 Power System, on page 46 shows typical DC power source cable connections for a version 2 single DC power module, in this case, a module installed in slot M3 of the power tray.
- Figure 56: Typical Plastic Safety Cover over the Power Tray Connection Terminals—Version 2 and Version 3 Power System, on page 46 shows the plastic safety cover for the version 2 and version 3 DC power tray connection terminals.
- Figure 57: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 3 Power System, on page 47 shows typical DC power source cable connections for a version 3 single DC power module, in this case, a module installed in slot M3 of the power tray.

Note The DC power trays and power modules for the Cisco ASR 9000 Series Routers are identical, so the examples shown in the below figures apply to all of these routers.

Warning To avoid shock hazard, be sure to apply shrink wrap tubing around the wire entry area of the lug.

Figure 54: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 1 Power System

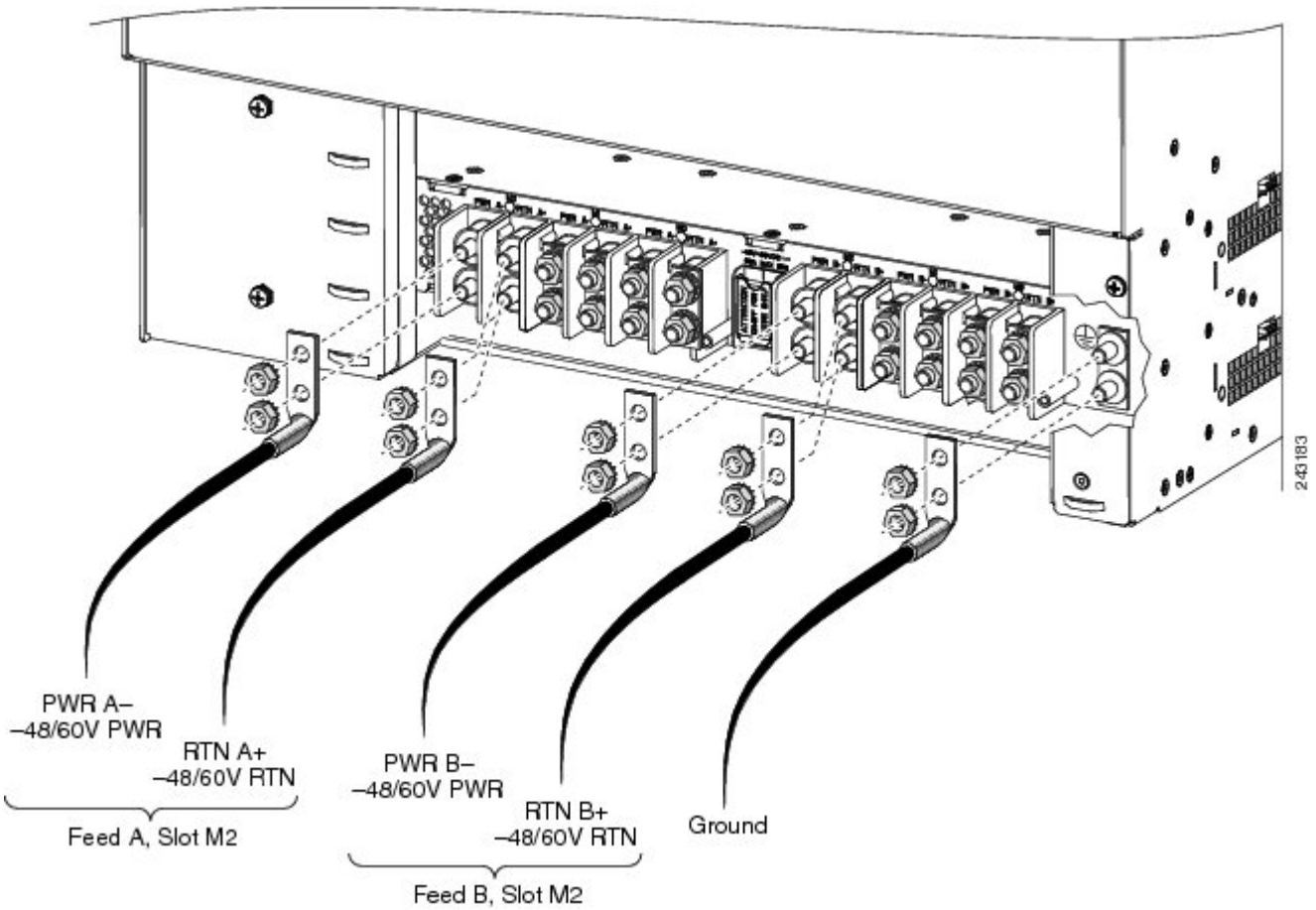


Figure 55: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 2 Power System

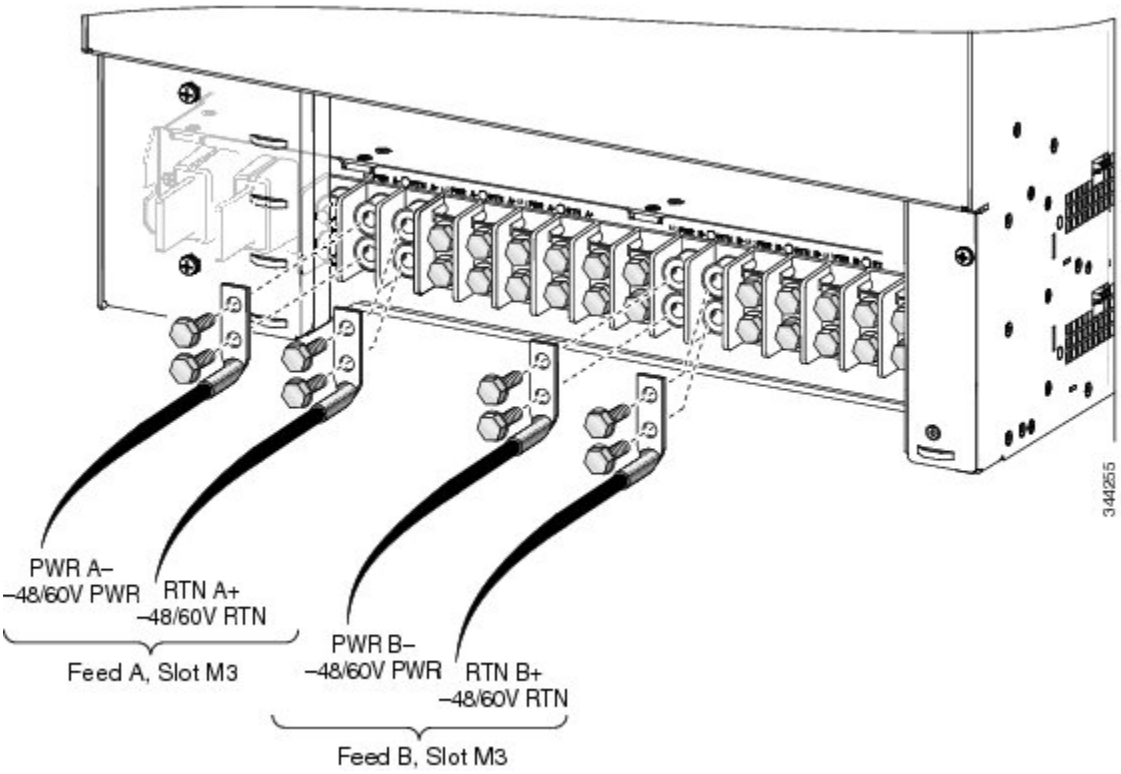


Figure 56: Typical Plastic Safety Cover over the Power Tray Connection Terminals—Version 2 and Version 3 Power System

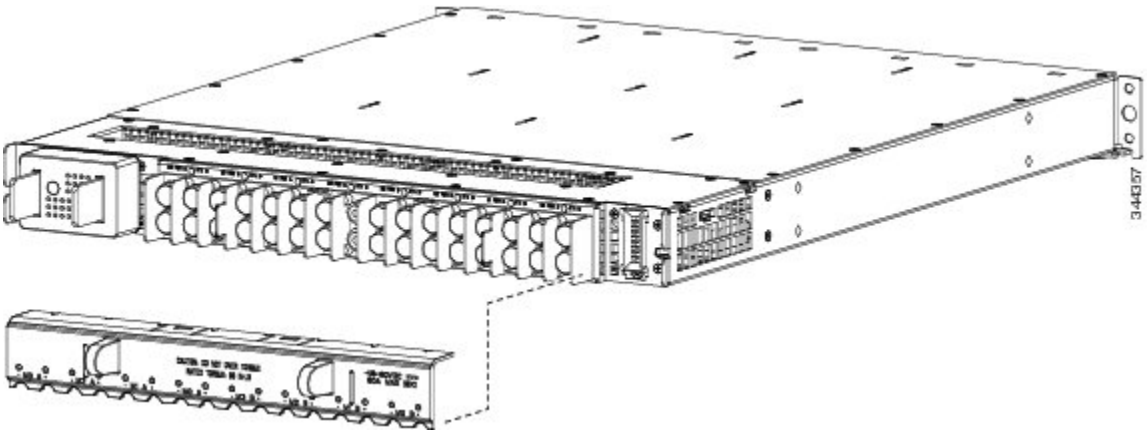
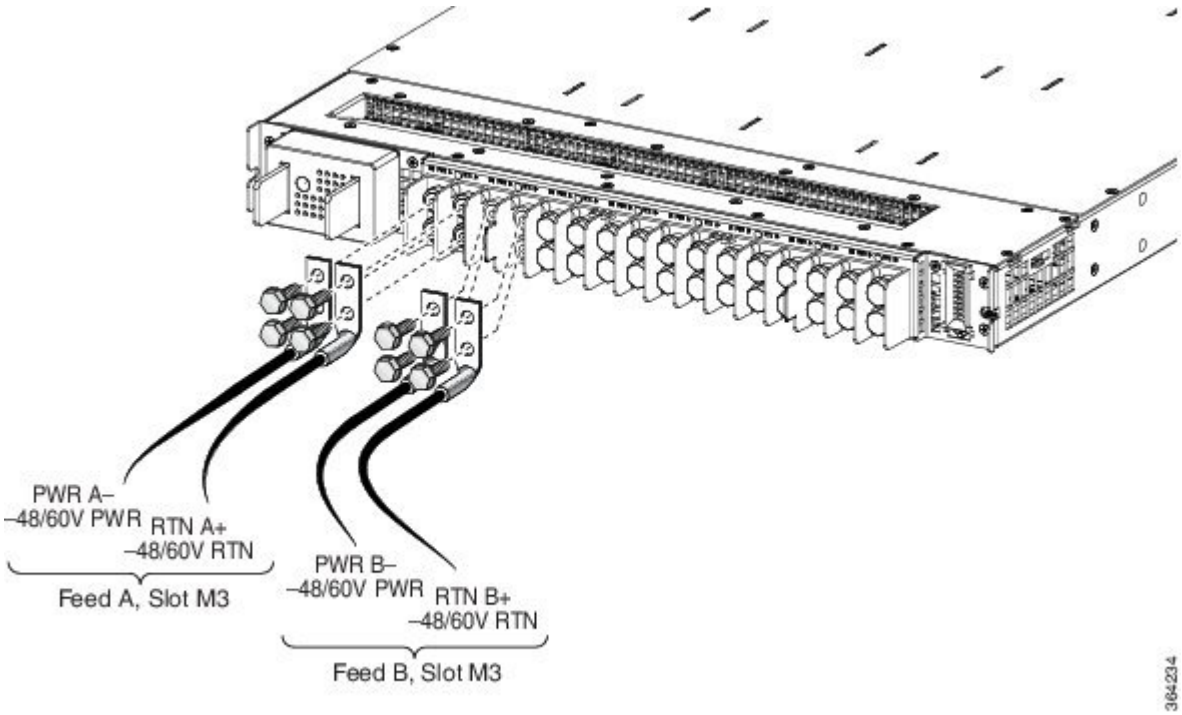


Figure 57: Typical Source DC Power Cabling Scheme for a Single DC Power Module—Version 3 Power System



Note A separate ground connection is not required for the version 2 or version 3 power systems. For more information see the NEBS Supplemental Unit Bonding and Grounding Guidelines, on page 48.

The color coding of source DC power cable leads depends on the color coding of the site DC power source. Because there is no color code standard for source DC wiring, be sure that power source cables are connected to the power modules using the proper positive (+) and negative (–) polarity:

- In some cases, the source DC cable leads might have a positive (+) or a negative (–) label. This is a relatively safe indication of the polarity, *but you must verify the polarity by measuring the voltage between the DC cable leads* . Be sure that the positive (+) and negative (–) cable leads match the positive (+) and negative (–) labels on the power module when making the measurement.
- Green (or green and yellow) cable typically indicates that it is a ground cable.

Caution DC power modules contain reverse voltage protection circuitry to prevent damage to the power module if it detects a reverse polarity condition. No damage should occur from reverse polarity, but you should correct a reverse polarity condition immediately.

For a list of the nominal and acceptable value ranges for source DC power, see *Technical Specifications* chapter from *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide*

NEBS Supplemental Unit Bonding and Grounding Guidelines

The router is sensitive to variations in voltage supplied by the power sources. Overvoltage, undervoltage, and transients (or spikes) can erase data from memory or cause components to fail. To protect against these types of problems, ensure that there is an earth-ground connection for the router. You can connect the grounding pad on the router either directly to the earth-ground connection or to a fully bonded and grounded rack.

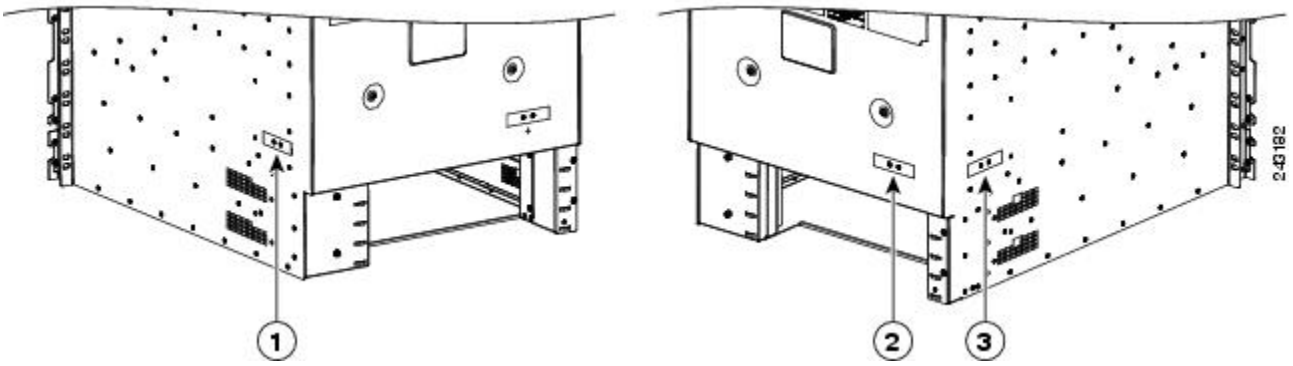
When you properly install the chassis in a grounded rack, the router is grounded because it has a metal-to-metal connection to the rack. Alternatively, you can ground the chassis by using a customer-supplied grounding cable that meets your local and national installation requirements (we recommend 6-AWG wire for U.S. installations). One end of the grounding cable is connected to the chassis with a grounding receptacle (provided in the router accessory kit) and the other end to the appropriate grounding point at your site.

Although the router chassis requires a safety earth ground connection as part of the power cabling to power modules, you must permanently connect the central office ground system or interior equipment grounding system to one of the three supplemental bonding and grounding connections on the back or side of the router chassis to meet Network Equipment Building System (NEBS) requirements as well as safety compliance requirements. These grounding points are referred to as the NEBS bonding and grounding points.

Note You automatically ground the chassis with AC power modules when you connect them to AC power sources. However, it is still strongly recommended to provide an additional direct earth-ground connection for the chassis.

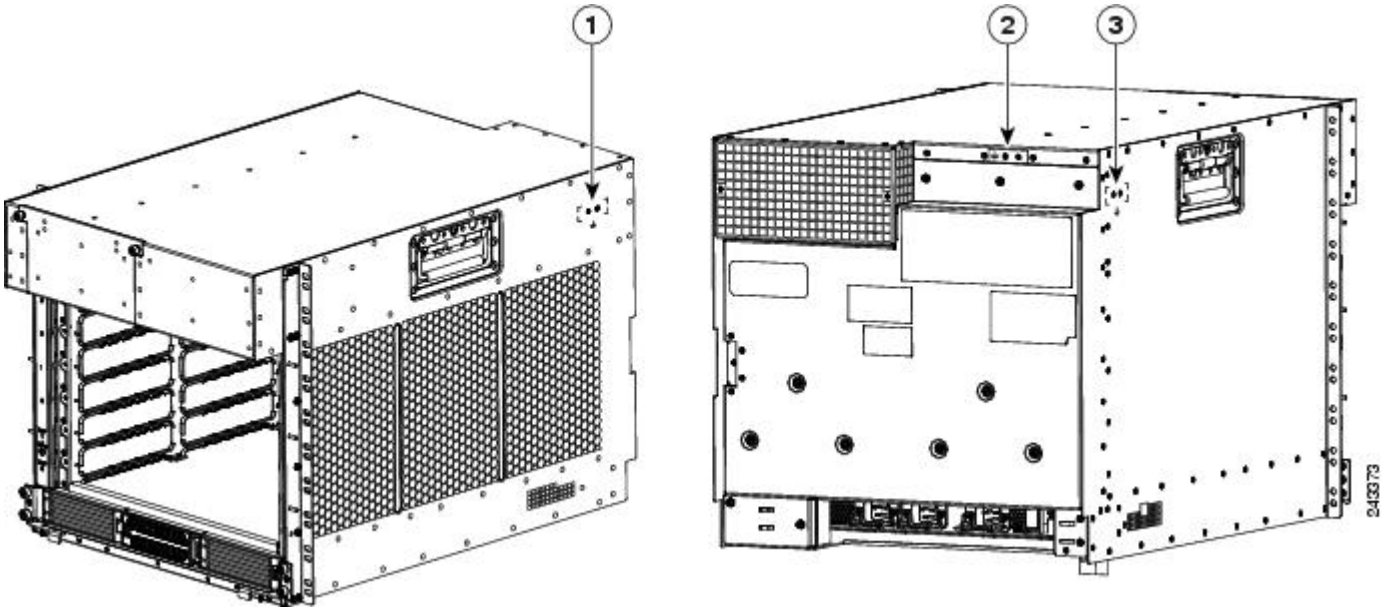
For DC power supplies, it is mandatory to connect a grounding wire when wiring the power supply to the DC power source.

Figure 58: NEBS Bonding and Grounding Points on the Cisco ASR 9006 Router Chassis



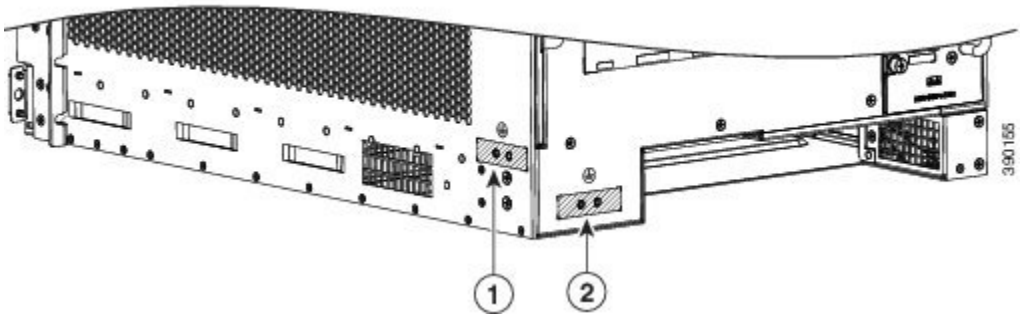
1	NEBS grounding point on right side of the chassis	2	NEBS grounding point on rear of the chassis	3	NEBS grounding point on left side of chassis

Figure 59: NEBS Bonding and Grounding Point on the Cisco ASR 9006 Router Chassis



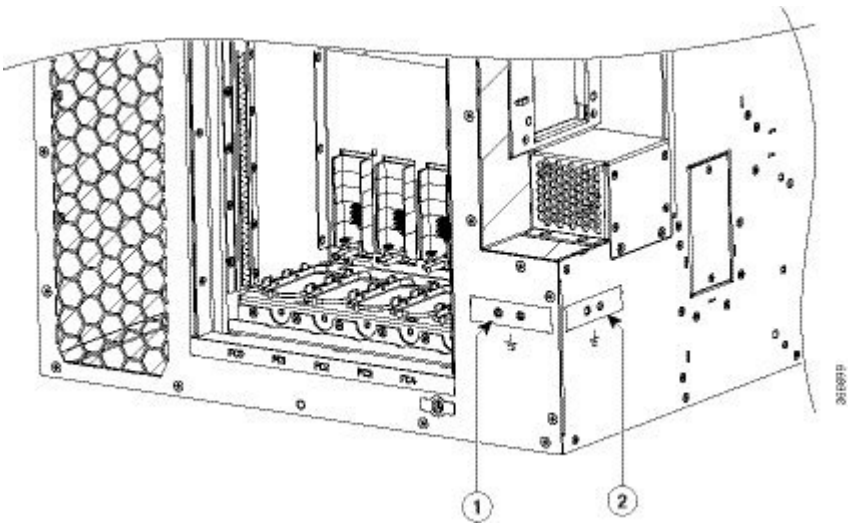
1	NEBS grounding point on right side of chassis	2	NEBS grounding point on rear of the chassis	3	NEBS grounding point on left sid chassis

Figure 60: NEBS Bonding and Grounding Point on the Cisco ASR 9904 Router Chassis



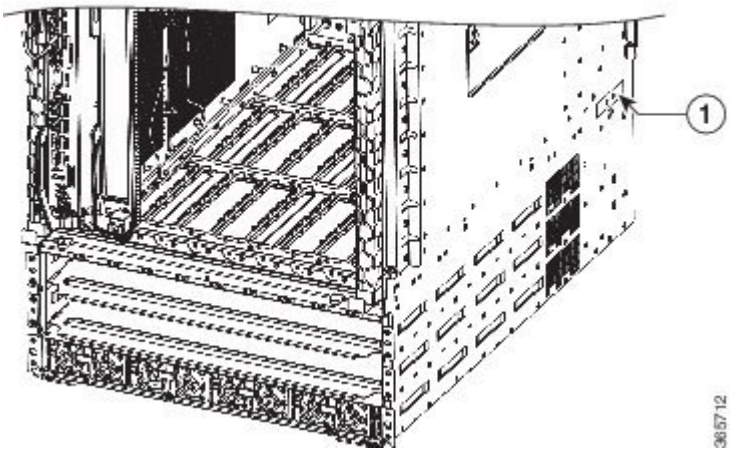
1	NEBS grounding point on right side of chassis	2	NEBS grounding point on rear of the cha

Figure 61: NEBS Bonding and Grounding Point on the Cisco ASR 9906 Router Chassis



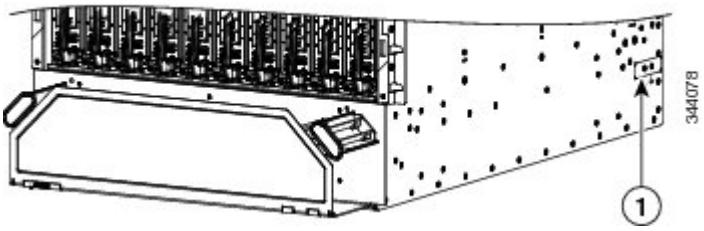
1	NEBS grounding point on rear of the chassis	2	NEBS grounding point on left side of chassis

Figure 62: NEBS Bonding and Grounding Point on the Cisco ASR 9912 Router



1	NEBS grounding point near bottom, rear, right side of the chassis

Figure 63: NEBS Bonding and Grounding Point on the Cisco ASR 9922 Router



1	NEBS grounding point near bottom, rear, right side of the chassis

To ensure a satisfactory supplemental ground connection to the router, use the following parts:

- One grounding lug, which has two holes with 0.625- to 0.75-inch (15.86- to 19.05-mm) spacing between them, and a wire receptacle able to accept a #6 AWG or larger, multistrand copper wire.
- Two 10-32 x 0.25-inch round-head screws and two locking washers (nickel-plated brass is ideal).

Note The chassis ground wire connectors have a torque value of 30 in-lb.

- One grounding wire. Although we recommend at least #6 AWG multistrand copper wire, the wire diameter and length depend on your router location and site environment.

Note These parts are not available from Cisco, but they are available from commercial vendors.

RSP and RP Port Connection Guidelines

Refer to the Route Switch Processor and Route Processor Cards section in the *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide* for detailed information about the Route System Processor (RSP) or Route Processor (RP) cards interface and port connections.

Note The generic term RSP card refers to the RSP-440, RSP-440 Lite, RSP-880, RSP880-LT, RSP4-S, and A99-RSP-TR/SE cards unless otherwise specified.

Caution Ports labeled Ethernet, SYNC, CONSOLE, and AUX are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits.

Console Port and Auxiliary Port Connection Guidelines

Each RSP/RP card has two EIA/TIA-232 (formerly RS232) serial RJ-45 connection ports:

- Console port—RJ-45 interface for connecting a data terminal device to the router, which you need to perform the initial configuration of the router.
- Auxiliary port—RJ-45 interface for connecting a modem.

Note The console and auxiliary ports are asynchronous serial ports. Ensure that devices connected to these ports are capable of asynchronous transmission.

Console Port Signals

The *console port* is an RJ-45 interface for connecting a terminal to the router. The console port does not support modem control or hardware flow control and requires a straight-through RJ-45 cable.

Before connecting a terminal to the console port, check the terminal setting for the data transmission rate, in bits per second (bps). The terminal transmission rate setting must match the default rate of the console port, which is 9600 bps. Set the terminal to these operational values:

- For ASR 9000 64-bit: 9600bps, 8 data bits, no parity, 1 stop bits (9600 8N1)
- For ASR 9000 32-bit: 9600bps, 8 data bits, no parity, 2 stop bits (9600 8N2)

This table lists the signals used on the console port.

Table 5: RSP/RP Console Port Signals

Console Port Pin	Signal	Input/Output	Description
1	—	—	—
2	DTR	Output	Data Terminal Ready
3	TxD	Output	Transmit data
4	GND	—	Signal ground
5	GND	—	Signal ground
6	RxD	Input	Receive data
7	DSR	Input	Data Set Ready
8	—	—	—

Auxiliary Port Signals

The *Auxiliary (AUX) port* is an RJ-45 interface for connecting a modem or other data communication equipment (DCE) device (such as another router) to the RSP/RP. The AUX port supports hardware flow control and modem control.

This table lists the signals used on the auxiliary port.

Table 6: RSP/RP AUX Port Signals

AUX Port Pin	Signal	Input/Output	Description
1	RTS	Output	Request to send
2	DTR	Output	Data terminal ready
3	TxD	Output	Transmit data
4	GND	—	Signal ground

AUX Port Pin	Signal	Input/Output	Description
5	GND	—	Signal ground
6	RxD	Input	Receive data
7	DSR	Input	Data set ready
8	CTS	Input	Clear to send

Management LAN Ports Connection Guidelines

Each RSP/RP card has two RJ-45 media-dependent interface (MDI) Ethernet management LAN ports: MGT LAN 0 and MGT LAN 1. These ports are used for IEEE 802.3u 100BASE-TX (100 Mbps), or 1000BASE-T (1000 Mbps) Ethernet connections. .

The transmission speed of the management LAN ports is not user-configurable. The transmission speed is set through an autosensing scheme on the RSP/RP; the speed is determined by the network that the Ethernet port is connected to. The combined total input rate of both MGT LAN 0 and MGT LAN 1 is about 12 Mbps.

Management port characteristics are:

- Maximum transmission unit (MTU) is fixed at 1514 and cannot be configured.
- Flow control is disabled and cannot be configured.
- Input unicast packets with an unknown destination address are filtered and dropped.
- Autonegotiation of port speed (100/1000) and duplex (full/half) is supported. Autonegotiation cannot be disabled.

This table lists the signals used on the Management LAN ports.

Table 7: RSP/RP Management LAN Port Signals

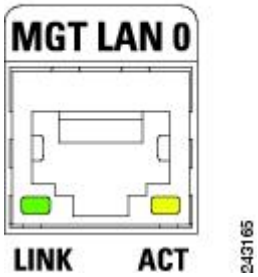
MGT LAN Port Pin	100Base-TX Signal	1000Base-T Signal
1	Transmit+	BI_DA+
2	Transmit–	BI_DA–
3	Receive+	BI_DB+
4	Unused	BI_DC+
5	Unused	BI_DC–
6	Receive–	BI_DB–
7	Unused	BI_DD+
8	Unused	BI_DD–

Management LAN Port LED Indicators

The Management LAN connectors have integral LED indicators. When lit, these LEDs indicate:

- Green (LINK)—Connection is alive.
- Amber (ACT)—Connection is active.

Figure 64: RSP/RP Management LAN Port LED Indicators



Management LAN RJ-45 Cabling

When connecting the RJ-45 port to a hub, repeater, or switch, use the straight-through cable pinout as shown in the below figure.

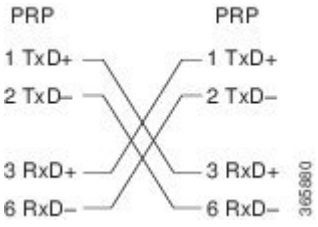
Note To comply with the intrabuilding lightning surge requirements of Telecordia GR-1089-CORE, Issue II, Revision 01, February 1999, you must use a shielded cable when connecting to the management LAN ports on the RSP/RP card. The shielded cable is terminated by shielded connectors on both ends, with the cable shield material tied to both connectors.

Figure 65: Straight-Through Cable Pinout to a Hub, Repeater or Switch



When connecting the RJ-45 port to a router, use the crossover cable pinout as shown in the below figure.

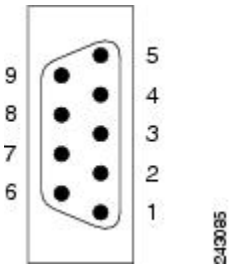
Figure 66: Crossover Cable Pinout Between RSPs/RPs



Alarm Connection Guidelines

The RSP/RP card has an alarm connector on its front panel. This 9-pin D-subconnectors (ALARM OUT) connects the router to an external site alarm maintenance system. When a critical, major, or minor alarm is generated, it energizes the alarm relays on the RSP/RP card to activate the external site alarm.

Figure 67: Alarm Connector on the RSP/RP Card Front Panel



The alarm relay contacts on the RSP/RP card consist of standard *common* , *normally open* , and *normally closed* relay contacts that are wired to the pins on the connectors.

Caution Only safety extra-low voltage (SELV) circuits can be connected to the alarm connector. Maximum rating for the alarm circuit is 100 mA, 50 V.

Note To comply with the intrabuilding lightning surge requirements of Telecordia GR-1089-CORE, Issue II, Revision 01, February 1999, you must use a shielded cable when connecting to the external alarm port on the RSP/RP card. The shielded cable is terminated by shielded connectors on both ends, with the cable shield material tied to both connectors.

This table lists the pin-to-signal correspondence between the cable connector pins and the alarm connector relay contacts.

Table 8: Alarm Connector Pinout

Pin	Signal	Note
1	Critical alarm NC	NC (normally closed) connected to CM (common) when there is no Critical alarm
2	Critical alarm CM	Common
3	Critical alarm NO	NO (normally open) connected to CM (common) during a Critical alarm
4	Major alarm NC	NC (normally closed) connected to CM (common) when there is no Major alarm
5	Major alarm CM	Common
6	Major alarm NO	NO (normally open) connected to CM (common) during a Major alarm

Pin	Signal	Note
7	Minor alarm NC	NC (normally closed) connected to CM (common) when there is no Minor alarm
8	Minor alarm CM	Common
9	Minor alarm NO	NO (normally open) connected to CM (common) during a Minor alarm

Sync Port Connection Guidelines

The SYNC 0 and SYNC 1 ports are timing synchronization ports. They can be configured as Building Integrated Timing Supply (BITS) ports or J.211 ports.



Note Both ports must be configured to be the same mode. It is not possible to use external BITS and J.211 sources at the same time.

When configured as BITS ports, they provide connections for an external synchronization source for establishing precise frequency control at multiple network nodes, if required for your application. The RSP/RP card contains a synchronous equipment timing source (SETS) that can receive a frequency reference from an external BITS timing interface or from a clock signal recovered from any incoming Gigabit Ethernet or 10-Gigabit Ethernet interface. The RSP/RP SETS circuit filters the received timing signal and uses it to drive outgoing Ethernet interfaces.

The BITS input can be T1, E1 or 64K 4/. The BITS output can be T1, E1 or 6.312M 5/.

When configured as J.211 ports, they can be used as Universal Timing Interface (UTI) ports to synchronize timing across multiple routers by connecting to an external timing source.

When lit, these LEDs indicate for BITS:

- Green (LINK)—Connection is alive.
- Amber (FAULT)—A fault has occurred.

When lit, these LEDs indicate for UTI:

- Green (NORMAL)—UTI is operating in normal mode.
- Amber (FAST)—UTI is operating in fast mode.

Figure 68: SYNC Port Connector

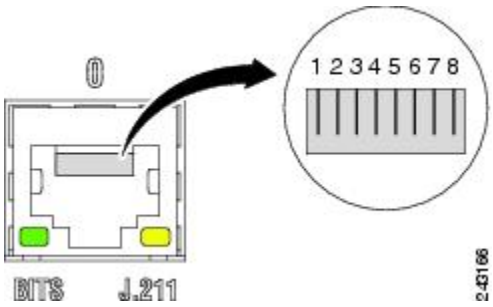
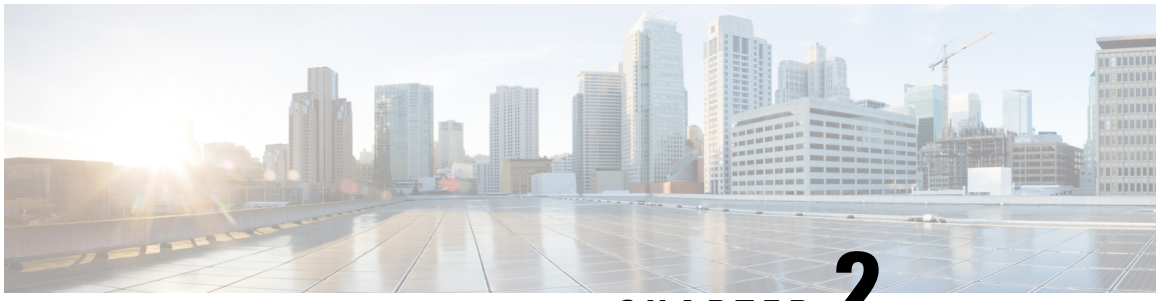


Table 9: BITS/J.211 Connector Pinout

Pin	Signal	Note
1	DTI_P/BITS_RX_P	Bi-direction for DTI, T1/E1/64K Input
2	DTI_P/BITS_RX_N	Bi-direction for DTI, T1/E1/64K Input
3	—	—
4	BITS_TX_P*	T1/E1/6.321M Output
5	BITS_TX_N*	T1/E1/6.321M Output
6	—	—
7	—	—
8	—	—



CHAPTER 2

Unpacking and Installing the Chassis

This chapter describes how to unpack and install the chassis into a rack.

- Pre-Installation Considerations and Requirements, on page 59
- Installation Overview, on page 59
- Unpacking the Router, on page 61
- Removing Components Before Installing the Chassis, on page 78
- Rack-Mounting the Router Chassis, on page 107
- Supplemental Bonding and Grounding Connections, on page 126
- Installing Chassis Accessories, on page 130

Pre-Installation Considerations and Requirements

Before you perform any procedures in this chapter, review the following sections:

Observe the guidelines for preventing electrostatic discharge (ESD) damage described in Preventing Electrostatic Discharge Damage, on page 3.

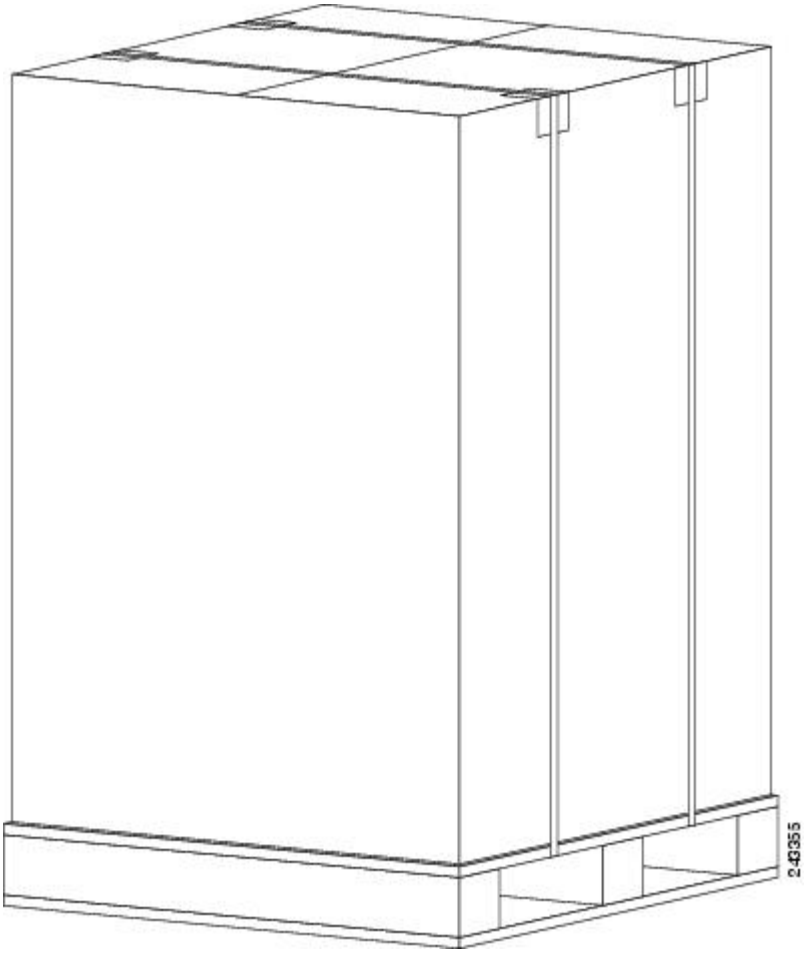
See the Regulatory Compliance and Safety Information for the Cisco ASR 9000 Series Router document for additional safety and compliance information,

Caution This router is not designed to be installed as a shelf-mounted or a free-standing router. The router must be installed in a rack that is secured to the building structure. You must install the router in either a telco-style frame or a 4-post equipment rack.

Installation Overview

The following figure shows how the Cisco ASR 9010 Router is shipped and strapped to a shipping pallet.

Figure 69: Cisco ASR 9010 Router Packaged on a Shipping Pallet



A fully equipped router with six power modules can weigh as much as 375 lbs (170.5 kg); an empty chassis weighs 150 lbs (67.8 kg). The chassis is designed to be lifted by two persons *after* you remove some of the components, such as line cards, power supplies, and the fan tray, to reduce the weight before lifting the chassis. See Removing Components Before Installing the Chassis, on page 78 for procedures to remove these components.

Required Tools and Equipment

Before you begin the rack-mount installation, you must read and understand the information in the Rack-Mounting and Air Flow Clearance Guidelines, page 1-24 , and have the following tools and equipment:

- ESD-preventive wrist strap
- Number 1 and number 2 Phillips screwdrivers
- 1/4-inch (6.35-mm) and 3/16-inch (4.5-mm) flat-blade screwdrivers
- Tape measure
- Level (optional)

- Minimum of 10 slotted binderhead screws (usually provided with the rack) to secure the chassis to the mounting flanges (also called *rails*) in the rack. Five screws should be installed on each side of the chassis.
- 11/16-inch (17.46-mm) wrench (for chassis hold-down bolts and pallet hold-down bracket bolts)
- 3/4-inch (19-mm) socket and ratchet wrench

Unpacking the Router

The following instructions describe how to unpack the Cisco ASR 9000 Series Router from its shipping container.

Unpacking the Cisco ASR 9006 Router

Follow these steps to unpack the Cisco ASR 9006 Router from its shipping container (see the figure below).

Procedure

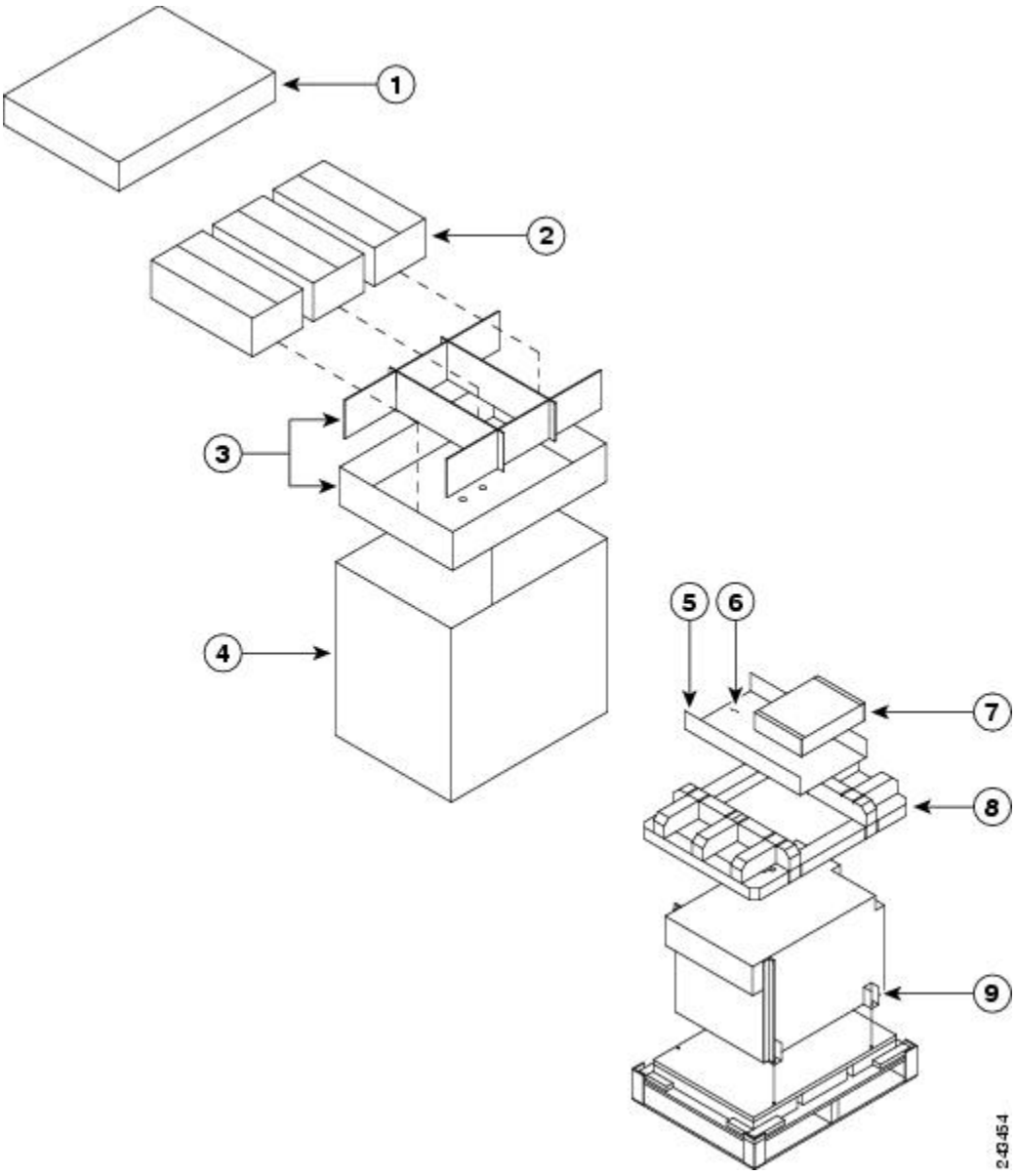
Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the cardboard shipping container.

Step 3 Remove the packaging material (see the figure below).

a) Remove the foam packaging material from the top of the router.
b) Remove all screws that secure the four hold-down brackets to the router chassis. The forward hold-down brackets are secured to the router mounting brackets by two screws. The rear hold-down brackets are secured to the chassis by four screws.
c) Remove two bolts per hold-down bracket that secure the brackets to the pallet.

Figure 70: Unpacking the Cisco ASR 9006 Router from the Shipping Container and Pallet



1	Top cardboard packaging cap	4	Cardboard packaging container	7	Chassis accessories
2	Three packaged power modules	5	Cardboard accessory tray	8	Foam packaging material- top cap
3	Cardboard packaging dividers	6	Accessories and power cables	9	Hold-down brackets (four places)

Step 4 Remove components, such as line cards, power supplies, and the fan tray, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for more information.

Step 5 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9010 Router

Follow these steps to unpack the Cisco ASR 9010 Router from its shipping container.

Procedure

Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the cardboard shipping container.

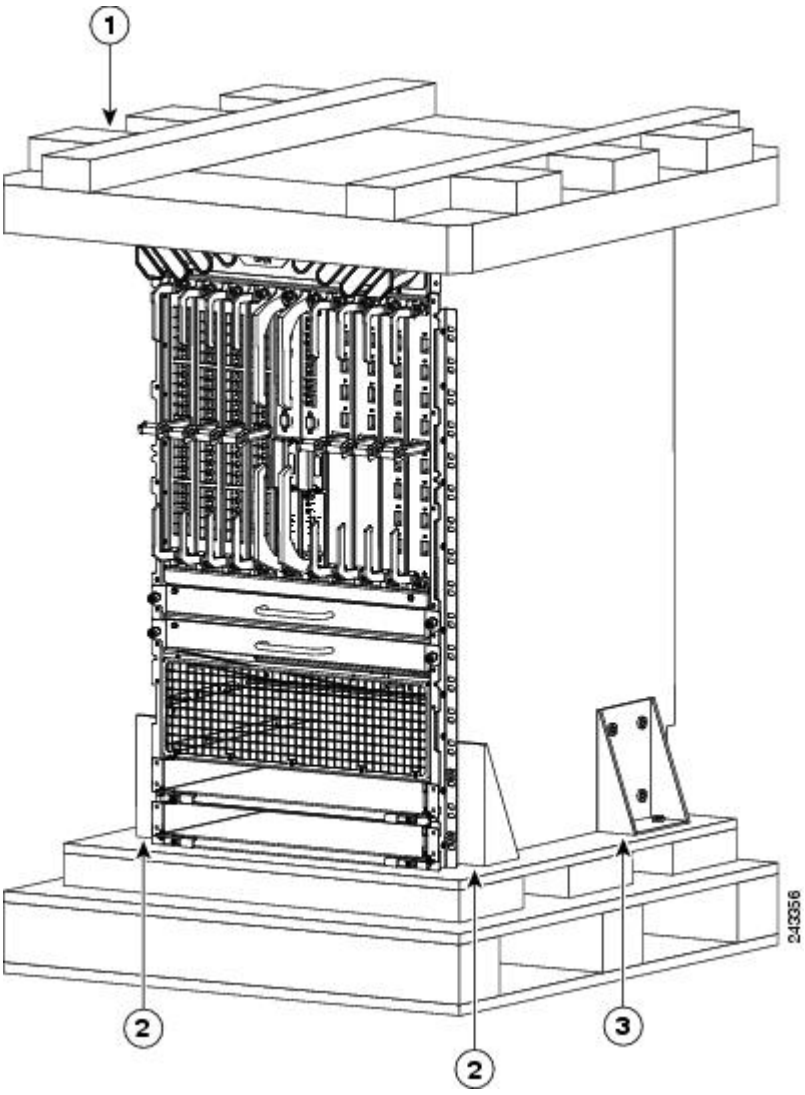
Step 3 Remove the packaging material.

a) Remove the foam packaging material from the top of the router.

b) Remove all screws that secure the four hold-down brackets to the router chassis. The forward hold-down brackets are secured to the router mounting brackets by two screws. The rear hold-down brackets are secured to the chassis by four screws. Save these four screws used to hold the rear bracket to the chassis to use later to attach the ground strap.

Step 4 Remove two bolts per hold-down bracket that secure the brackets to the pallet.

Figure 71: Unpacking the Cisco ASR 9010 Router from the Shipping Container and Pallet



1	Foam packaging material- top cap	2	Front hold-down bracket secured by two screws to the chassis mounting brackets, and by two bolts to the pallet (two places)	3	Rear hold-dow screws to the the pallet (two

Step 5 Remove components, such as line cards and the fan tray, to reduce the weight before lifting or moving the chassis. See the *Removing Components Before Installing the Chassis* for more information.

Step 6 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9904 Router

Follow these steps to unpack the Cisco ASR 9904 Router from its wooden shipping container.

Procedure

Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the corrugated top shipping container.

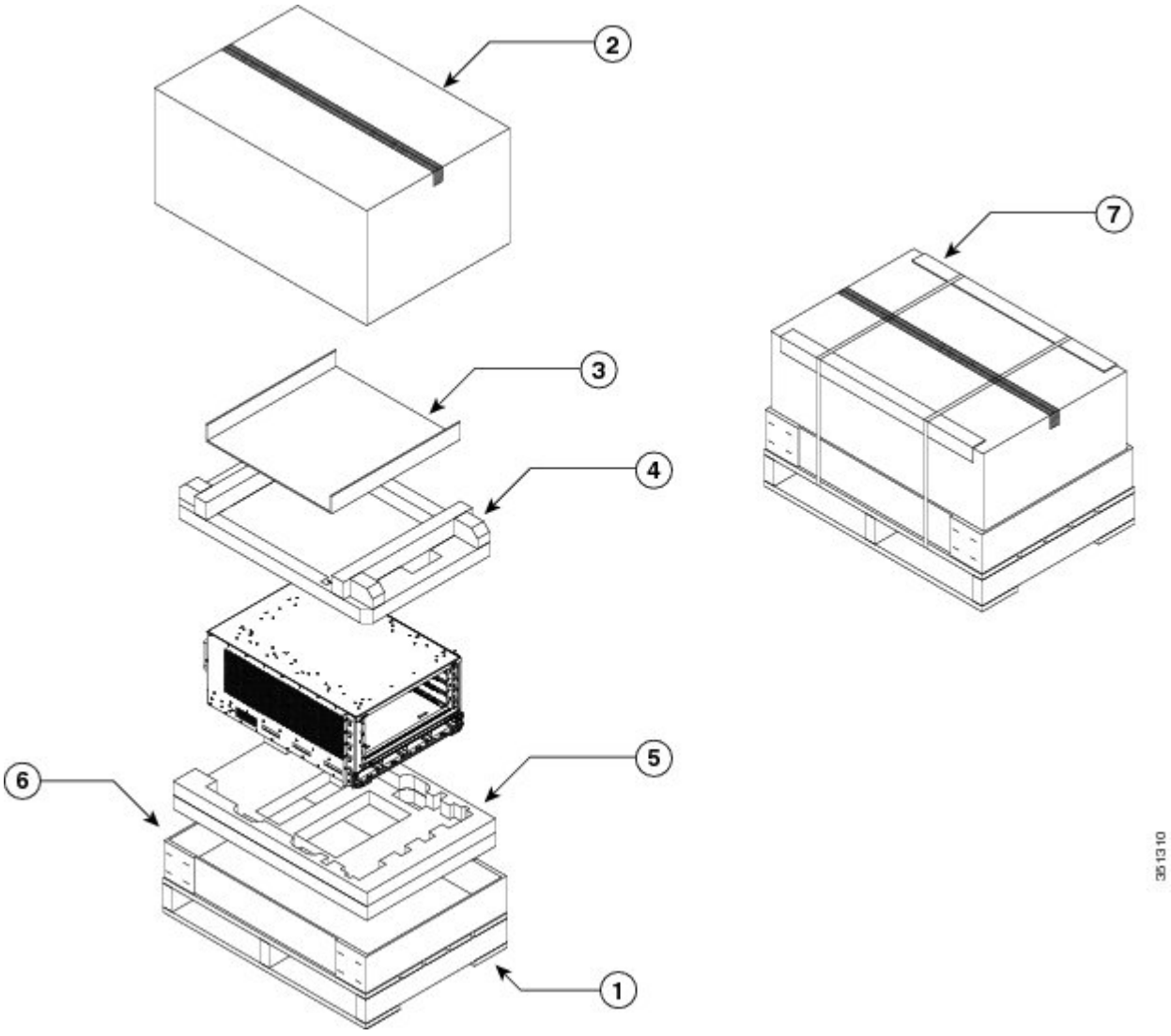
Step 3 Remove the accessories and corrugated packing accessory tray.

Step 4 Remove the packing material (see the figure below).

a) Remove the foam packaging material from the top of the router.

b) Remove the plastic covering from the router and remove it from the bottom foam.

Figure 72: Unpacking the Cisco ASR 9904 Router from the Shipping Container and Pallet



1	Shipping pallet	4	Foam packaging material(top cap)	7	Cardboard shipping container
2	Top corrugated packaging cap	5	Foam packaging material (bottom cap)		

3	Corrugated packaging accessory tray	6	Corrugated packaging (lower tray)		

Step 5 Remove components, such as line cards, power supplies, and the fan tray, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for more information.

Step 6 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9906 Router

Follow these steps to unpack the Cisco ASR 9906 Router from its shipping container (see the figure below).

Procedure

Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the three connecting clips.

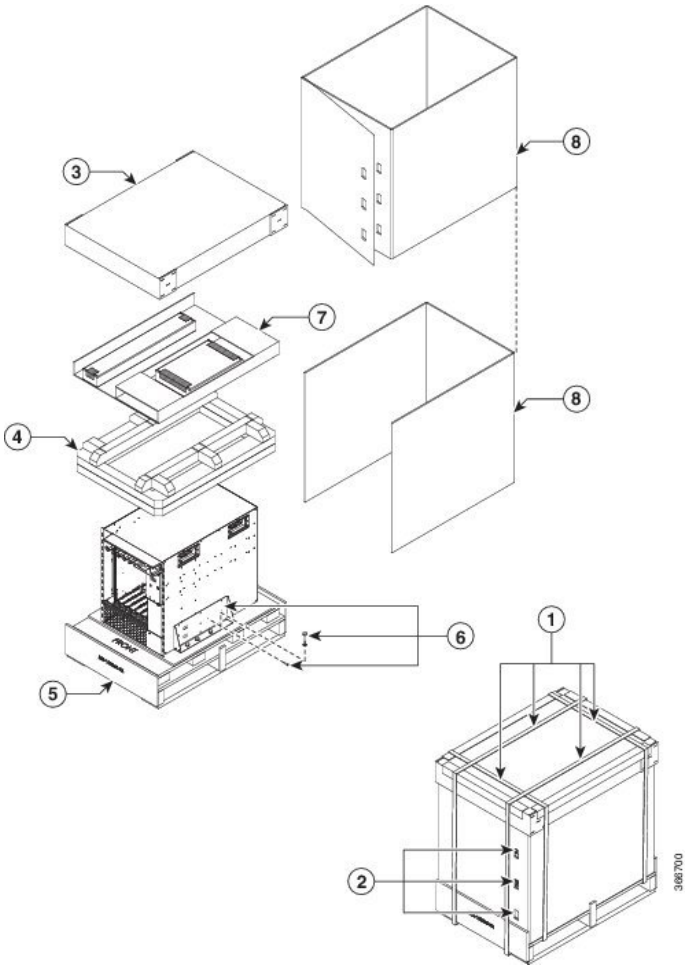
Step 3 Remove the cardboard shipping container.

Step 4 Remove the accessory tray and chassis accessories.

Step 5 Remove the packaging material (see the figure below).

a) Remove the foam packaging material from the top of the router.
b) Remove all screws that secure the two hold-down brackets to the router chassis.
c) Remove four bolts per hold-down bracket that secure the brackets to the pallet.

Figure 73: Unpacking the Cisco ASR 9906 Router from the Shipping Container and Pallet



1	Straps	5	Shipping pallet
2	Connecting clips	6	Hold-down bracket and screws
3	Top cardboard packaging cap	7	Cardboard accessory tray and chassis
4	Foam packaging material	8	Cardboard packaging container

Step 6 Remove components, such as line cards, power supplies, and the fan tray, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for more information.

Step 7 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9910 Router

Follow these steps to unpack the Cisco ASR 9910 Router from its shipping container.

Procedure

Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the cardboard shipping container.

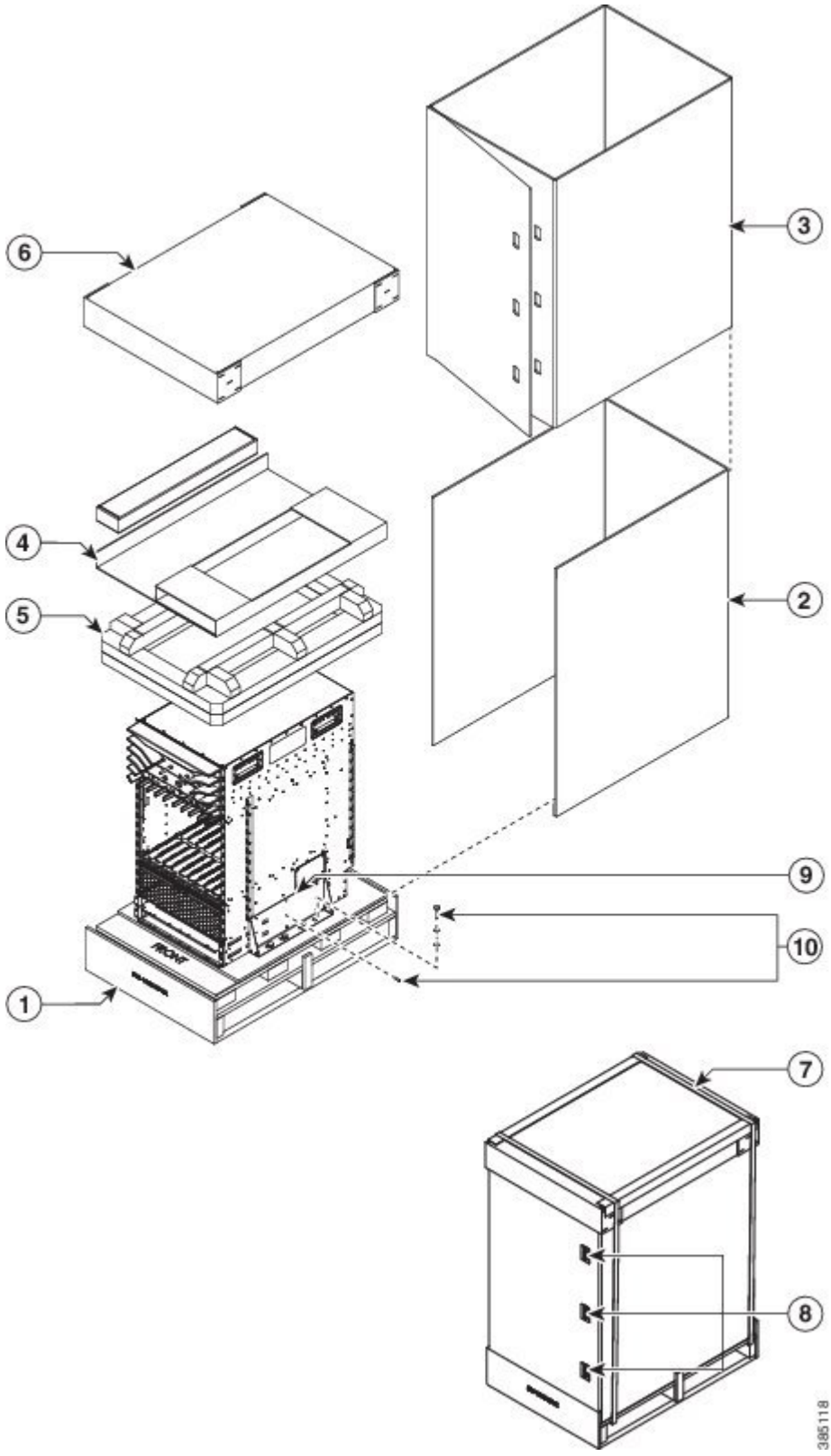
Step 3 Remove the packaging material (see the figure below).

a) Remove the foam packaging material from the top of the router.

b) Remove all screws that secure the two brackets to the router chassis. Save these screws used to hold the bracket to the chassis to use later to attach the ground strap.

Step 4 Remove two bolts per hold-down bracket that secure the brackets to the pallet.

Figure 74: Unpacking the Cisco ASR 9910 Router from the Shipping Container and Pallet


6
3
4
2
5
9
10
1
7
8
385118

Step 5 Remove components, such as line cards and the fan tray, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for more information.

Step 6 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9912 Router

Follow these steps to unpack the Cisco ASR 9912 Router from its wooden shipping container.

Procedure

Step 1 Cut the straps that secure the cardboard shipping container to the pallet.

Step 2 Remove the cardboard shipping container.

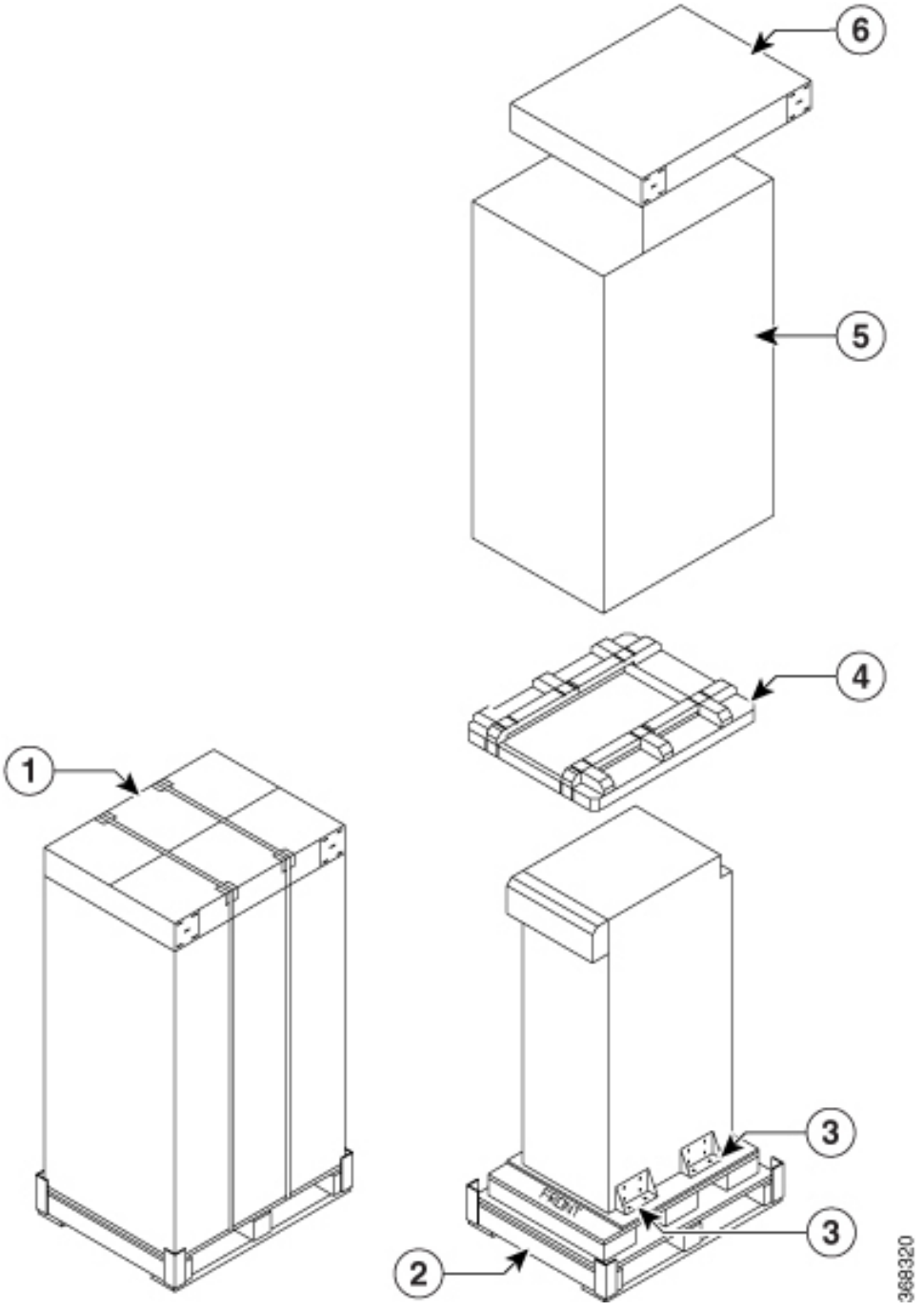
Step 3 Remove the packaging material (see the figure below).

a) Remove the foam packaging material from the top of the router.

b) Remove all screws that secure the four brackets to the router chassis. Save these screws used to hold the bracket to the chassis to use later to attach the ground strap.

c) Remove two bolts per hold-down bracket that secure the brackets to the pallet.

Figure 75: Unpacking the Cisco ASR 9912 Router from the Shipping Container and Pallet



1	Straps	4	Foam packaging material
2	Shipping pallet	5	Cardboard packaging container
3	Hold-down brackets and screws	6	Top cardboard packaging cap

Step 4 Remove components, such as line cards and the fan tray, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for more information.

Step 5 Save the packaging materials in case the router needs repackaging or shipping.

Unpacking the Cisco ASR 9922 Router

Follow these steps to unpack the Cisco ASR 9922 Router from its wooden shipping container.

Procedure

Step 1 Remove any strapping on the outside of the crate.

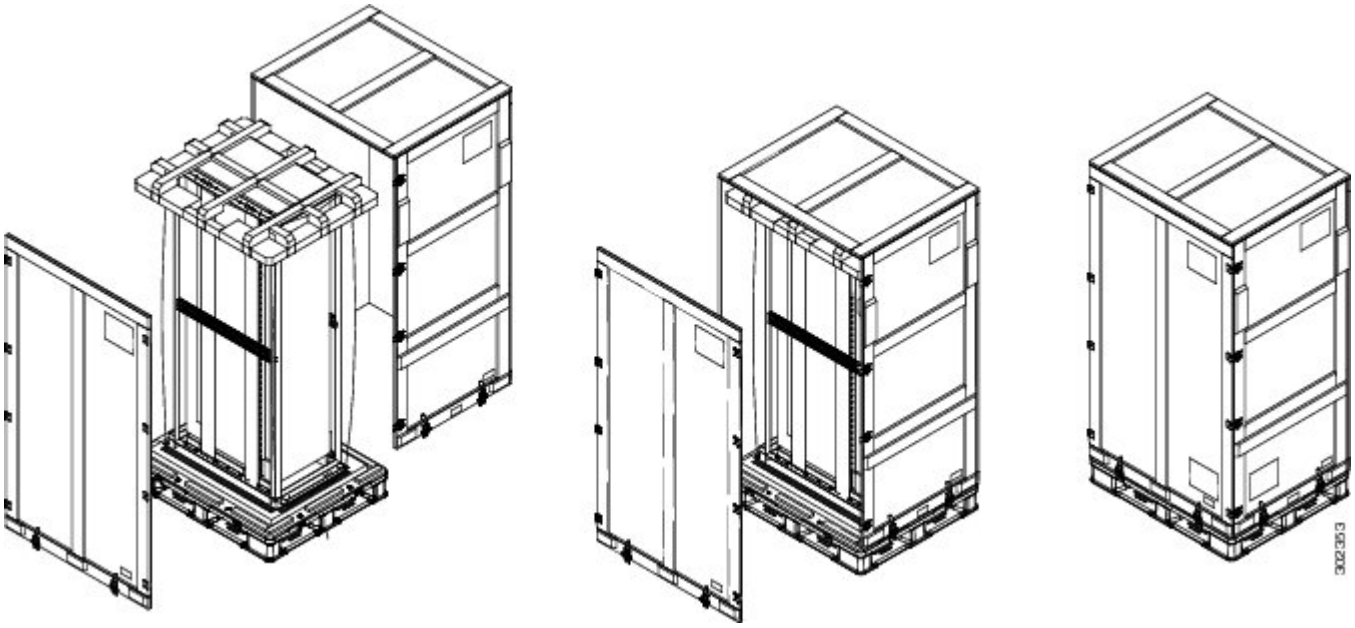
Step 2 Remove the crate cap door. Disengage the twist locks located along the bottom first. Then, disengage the twist locks located along the sides, working your way up from the bottom to the top. Refer to the right and middle figures in Figure 76: Unpacking the Cisco ASR 9922 Router from the Shipping Container, on page 73.

Step 3 Remove the crate cap. Disengage the twist locks located around the bottom of the crate cap (Figure 76: Unpacking the Cisco ASR 9922 Router from the Shipping Container, on page 73).

Note
Two people are required to evenly slide the crate cap back off of the plastic pallet base.

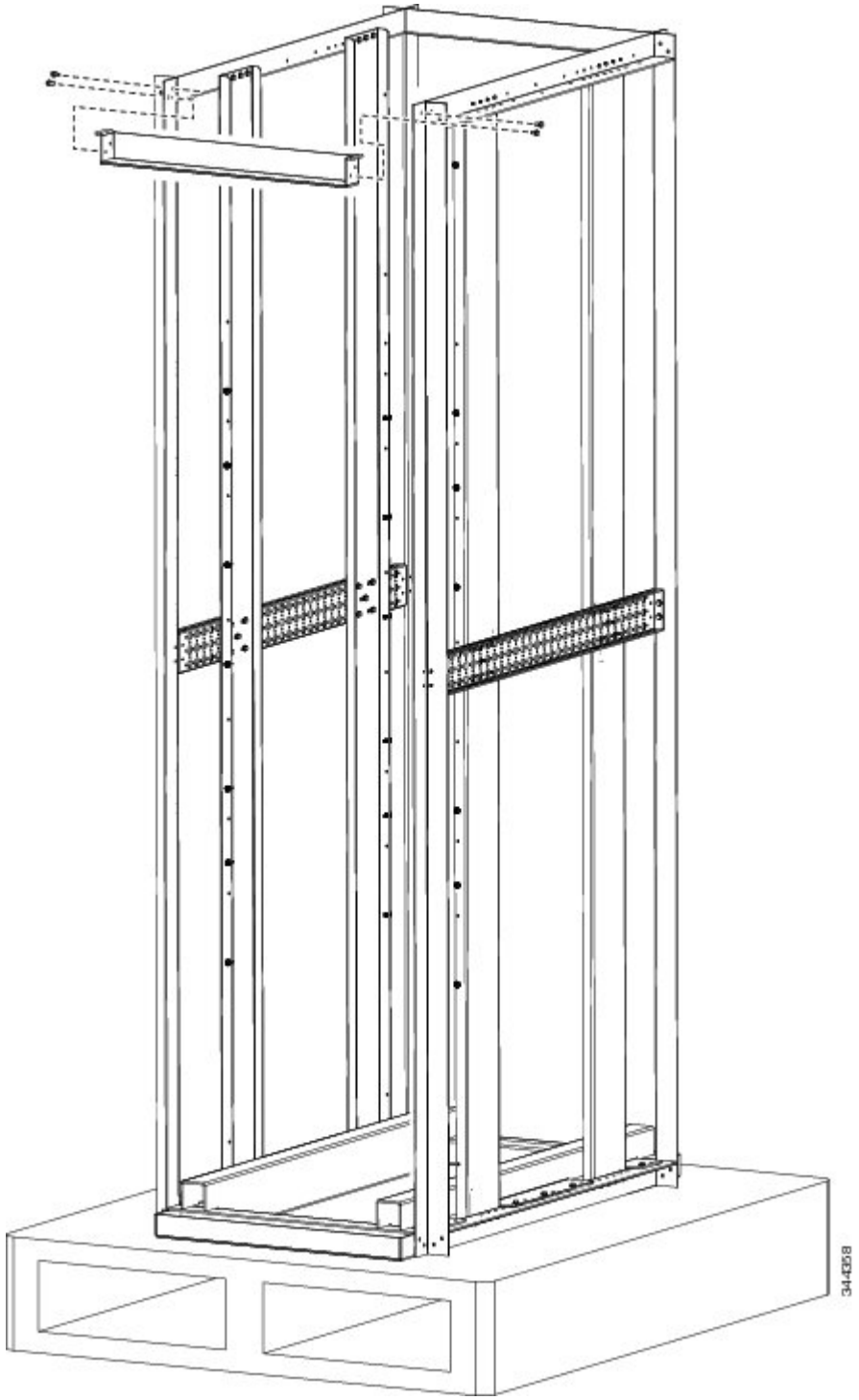
Step 4 Remove the foam packaging material from the top of the router.

Figure 76: Unpacking the Cisco ASR 9922 Router from the Shipping Container



Step 5 Using a 5/16” wrench or ratchet, remove the four attachment bolts and cross-brace from the shipping rack (see the figure below).

Figure 77: Cross-brace and Attachment Bolts on the Shipping Rack

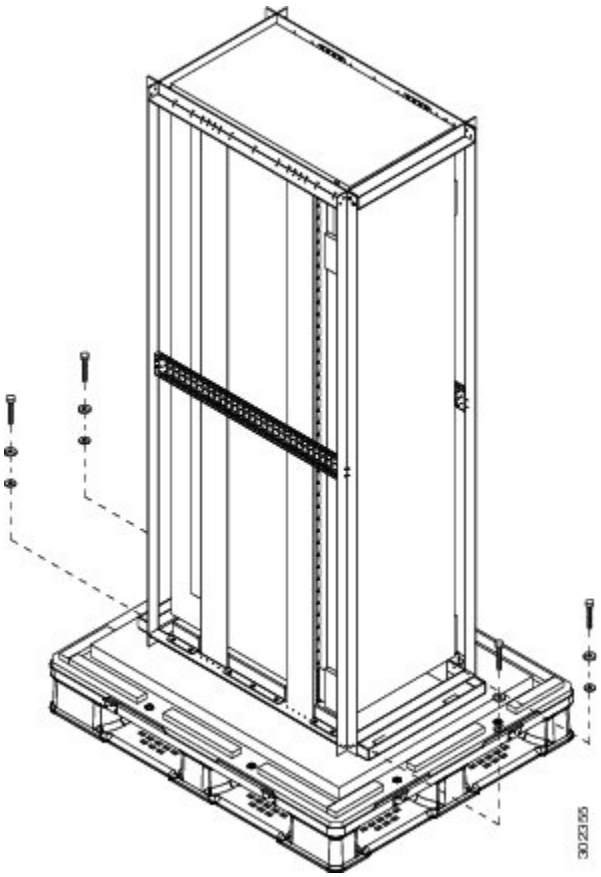


Step 6 Use a Phillips screwdriver to unscrew the rear mounting flange from the system and rack.

Step 7 Use a Phillips screwdriver to unscrew the front mounting flange from the rack.

Step 8 Remove two bolts per hold-down bracket that secure the brackets to the pallet (see the figure below).

Figure 78: Hold-Down Brackets on the Cisco ASR 9922 Router Shipping Pallet

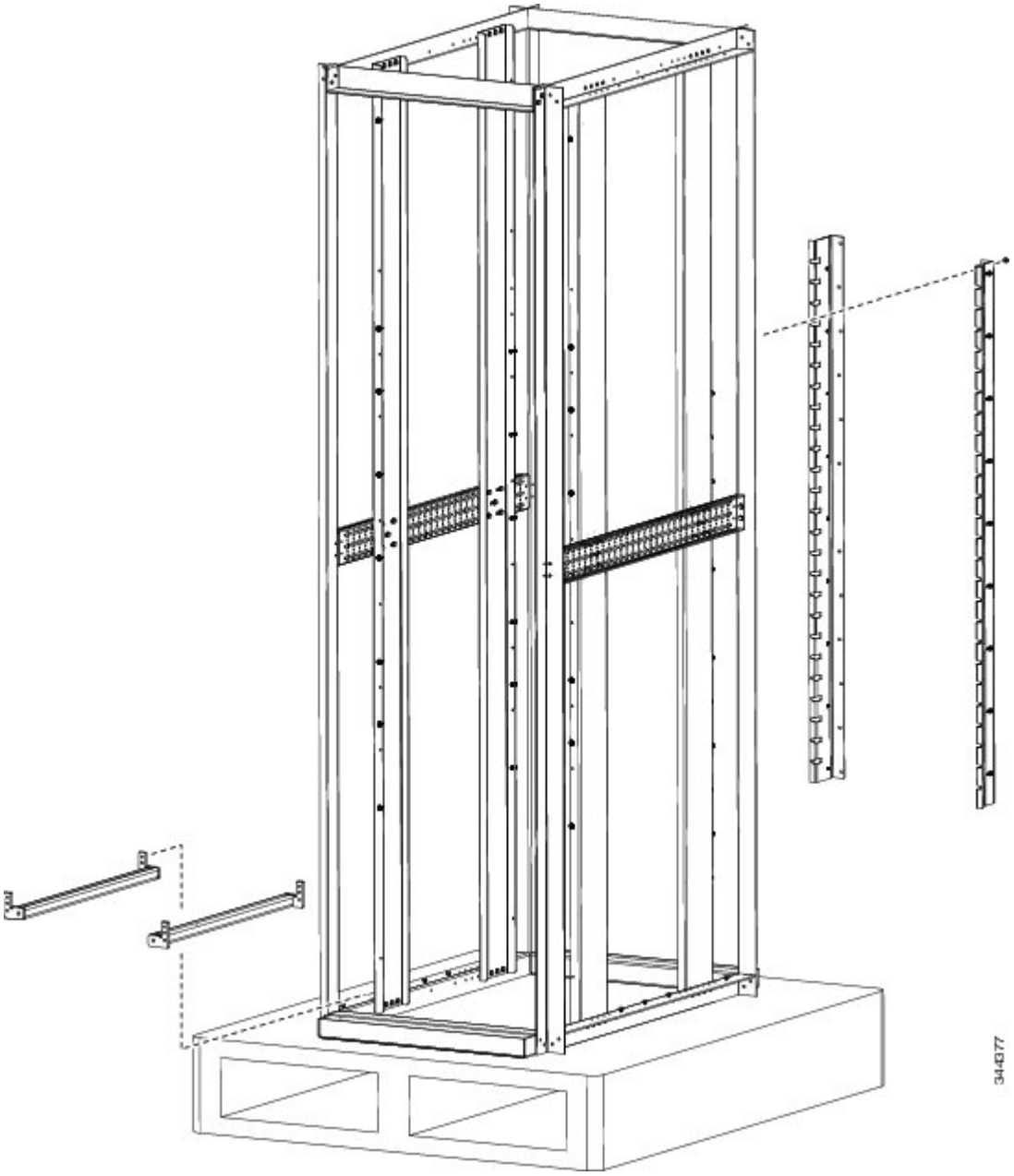


Note
Do not unbolt the shipping rack from the pallet.

Step 9 Save the rear brackets and screws from the shipping packaging for reuse in rack mounting of the chassis (see the figure below).

Note
The two guide rails at the bottom of the rack come in the ASR-9922-ACC-KIT accessory kit.

Figure 79: Rack Mount Installation Kit for the Cisco ASR 9922 Router



Step 10 Remove components, such as line cards and fan trays, to reduce the weight before lifting or moving the chassis. See Removing Components Before Installing the Chassis, on page 78 for procedures showing how to remove these components.

Step 11 Save the packaging materials in case the router needs to be repackaged for shipping.

Positioning the Router

Positioning the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco 9904 Router, Cisco ASR 9906 Router, Cisco ASR 9910 Router, and Cisco ASR 9912 Router

Use a safety hand truck to move the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, Cisco ASR 9910 Router, or Cisco ASR 9912 Router to its final location for rack installation.

Positioning the Cisco ASR 9922 Router

The Cisco ASR 9922 Router ships in a carton similar to the CRS-1 16-Slot shipping carton. Each chassis is installed in a shipping rack used only for shipping purposes. Remove the chassis from the shipping rack before installing it into the rack.

To prepare the 19-inch 45-RU rack:

Procedure

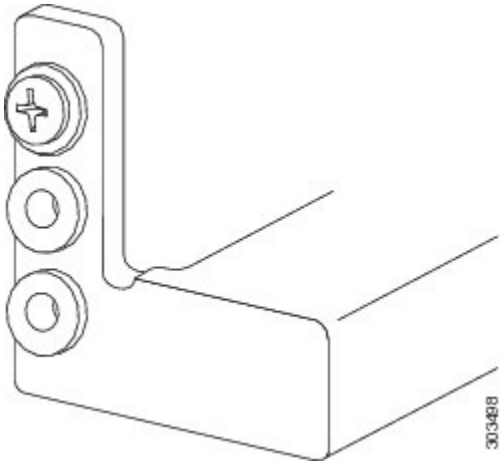
Step 1 Install the two guide rails onto the bottom of the rack.

The guide rails are included with the ASR-9922-ACC-KIT accessory kits. Each accessory kit ships with the chassis and includes the guide rails, grounding lug, associated hardware, and a warranty card.

Step 2 Use screws to fasten these two guide rails onto the front and rear rails of the rack.

The two guide rails at the bottom of the rack (Unpacking the Cisco ASR 9922 Router, on page 73) have six holes (three per rail) that accommodate 12-24 or M6 screws. If you are using smaller 10-32 screws, you must use bushings to fit the larger holes (see the figure below).

Figure 80: One 10-32 Screw with Bushings in Guide Rail Holes



Note
Delrin bushings with part number 17234-D-1 can be obtained from ASM at www.accuratescrew.com.

Step 3 Remove the shipping carton, plastic covering, rear brackets, attachment screws and bolts, shipping rack bar, and any cosmetic accessories included with the chassis.

Step 4 Use a scissors jack to remove the chassis from the shipping rack. Place a pallet jack next to the chassis inside the shipping rack and push/pull the chassis onto the pallet jack for transport to the rack.

Caution
Tilt the chassis only when absolutely necessary. The chassis is large and heavy. If it were to fall, it could cause harm to itself and its surroundings. Before attempting to tilt the chassis, reduce the weight of the system by removing all of the components in the chassis. The chassis should then be tilted in a direction so that the rear of the chassis is facing downward. The distance the chassis travels without its packaging should be as short as possible.

Step 5 On the rear of the chassis is an integrated handle which is used to pull the chassis from the pallet jack into the rack where the chassis is to be installed. Position the chassis so that the rear handle is facing the front of the rack.

Step 6 From the rear of the rack, pull the chassis by the handle into the rack, making sure that the chassis sits on top of the guide rails in the rack.

Step 7 Once the chassis is pulled into the rack and sits on top of the guide rails, use screws to fasten the chassis to the rack.

Removing Components Before Installing the Chassis

The Cisco ASR 9000 Series Routers are designed to be lifted for mounting into a rack. To reduce the weight of the system, you must remove some of the components before attempting to mount it into the rack.

Removing Power Modules

The power modules for the Cisco ASR 9000 Series Routers are shipped separately. If you need to remove an AC or DC power module at a later time, see Removing and Replacing Power System Components, page 5-14.

Removing Fan Trays

Note If an accessory grill or fan tray cover is installed on the front of the router, you must remove it first.

Removing a Fan Tray from the Cisco ASR 9010 Router, Cisco 9910 Router, Cisco ASR 9922 Router, and Cisco ASR 9912 Router

Follow these steps to remove a fan tray from the Cisco ASR 9010 Router (Figure 81: Removing or Installing the Fan Tray on the Cisco ASR 9010 Router Chassis, on page 80), Cisco ASR 9910 Router (Figure 82: Removing or Installing the Fan Tray on the Cisco ASR 9910 Router Chassis, on page 81), Cisco ASR 9922 Router (Figure 83: Removing or Installing the Fan Tray on the Cisco ASR 9922 Router Chassis, on page 82), or Cisco ASR 9912 Router (Figure 84: Removing or Installing the Fan Tray on the Cisco ASR 9912 Router Chassis, on page 82).

Note If an accessory grill is installed on the front of the Cisco ASR 9010 Router, remove the grill by pulling it towards you until it comes loose. See Installing Base Chassis Accessories on the Cisco ASR 9010 Router, on page 130 and Figure 140: Installing Base Chassis Accessories on the Cisco ASR 9010 Router, on page 132 for information.

Note If a fan tray cover is installed on the front of the Cisco ASR 9922 Router, remove the fan tray cover by pulling on the cover until it comes loose. See Removing a Fan Tray from the Cisco ASR 9010 Router, Cisco 9910 Router, Cisco ASR 9922 Router, and Cisco ASR 9912 Router, on page 78 for more information.

Note On the Cisco ASR 9922 Router, the third and fourth fan trays (under the middle cage) are installed upside down compared to the first and second fan trays (above the middle cage).

Procedure

Step 1 Loosen the captive screw on each side of the fan tray.

Step 2 Using the handle on the front panel, pull the fan tray halfway out of the chassis.

Note
Wait a few seconds for all the fans to stop rotating before lifting the fan tray from the chassis.

Step 3 Slide out the fan tray completely from the chassis while supporting it with your other hand.

Caution
Use two hands when handling the fan tray. Each version 1 fan tray weighs about 16 pounds (7.27 kg). Each version 2 fan tray weighs about 18 pounds (8.18 kg).

Figure 81: Removing or Installing the Fan Tray on the Cisco ASR 9010 Router Chassis

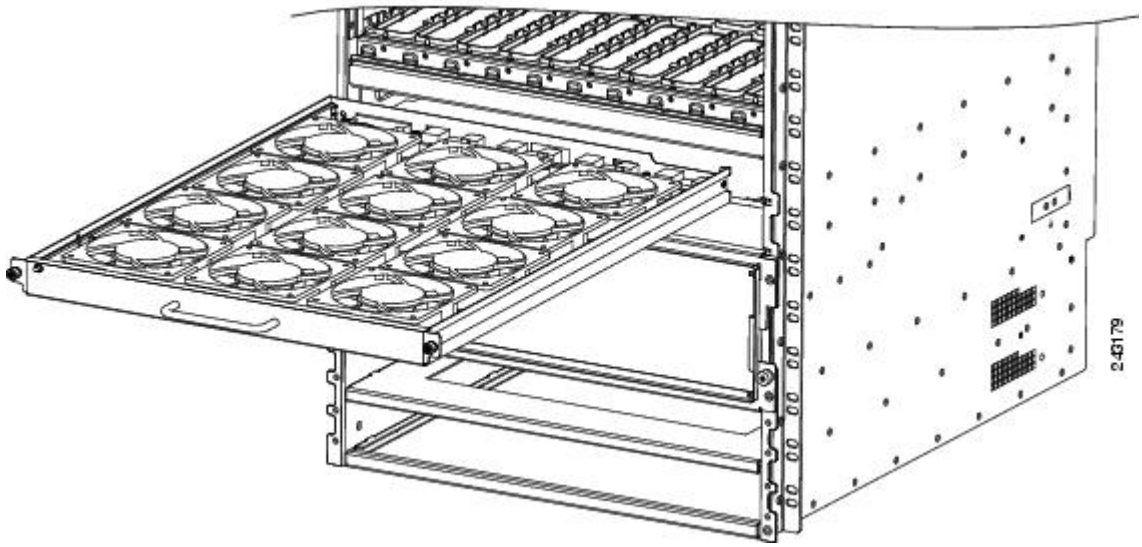


Figure 82: Removing or Installing the Fan Tray on the Cisco ASR 9910 Router Chassis

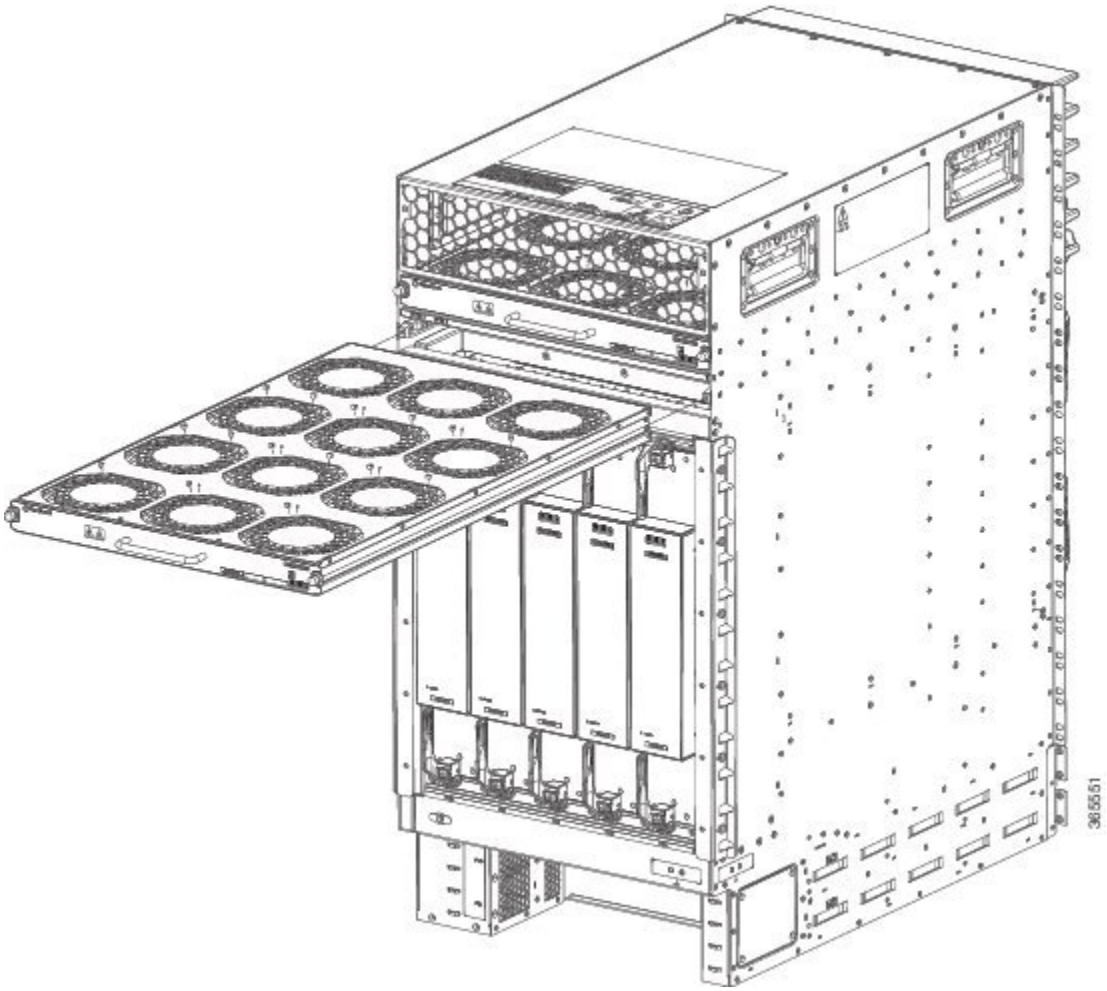


Figure 83: Removing or Installing the Fan Tray on the Cisco ASR 9922 Router Chassis

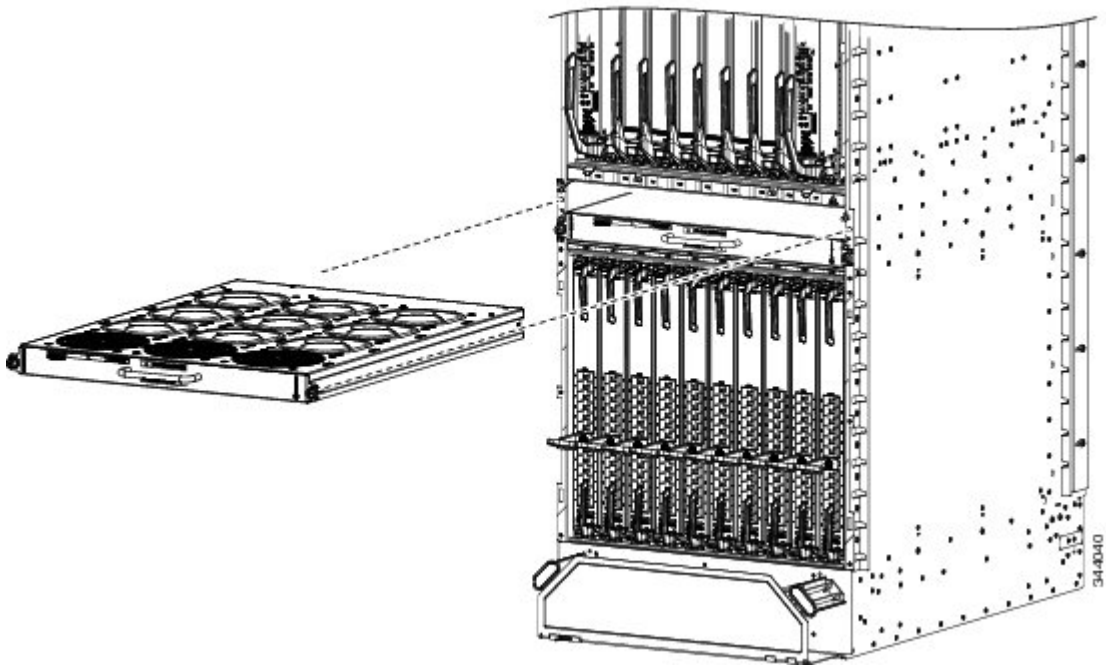
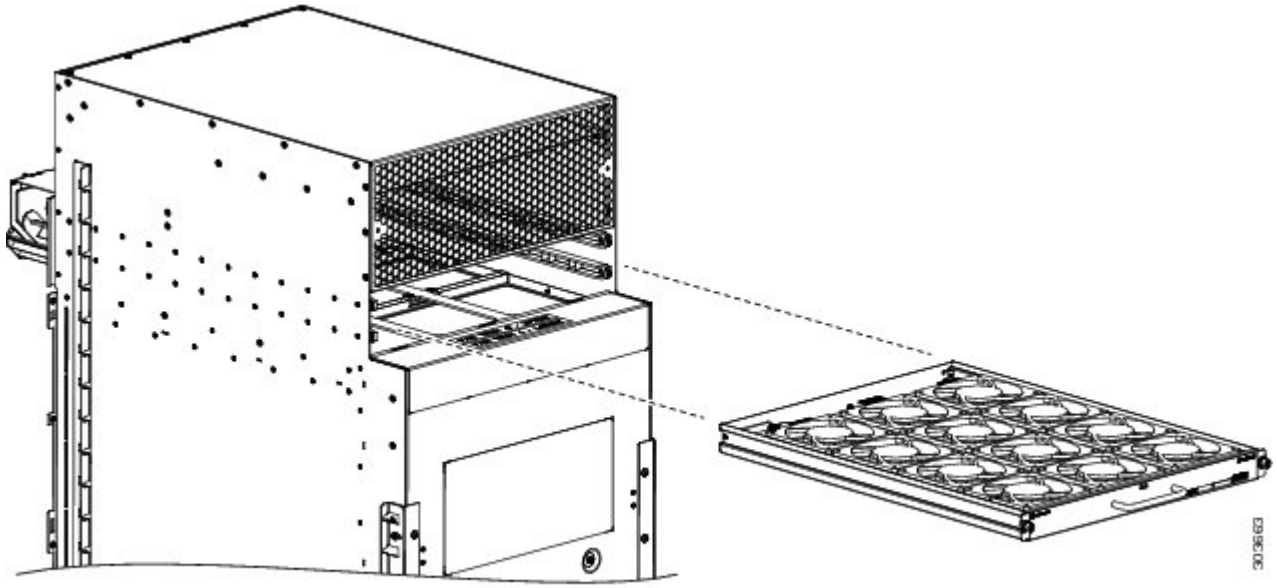


Figure 84: Removing or Installing the Fan Tray on the Cisco ASR 9912 Router Chassis



Removing a Fan Tray from the Cisco ASR 9006 Router

Follow these steps to remove a fan tray from the Cisco ASR 9006 Router (see the figure below).

Procedure

Step 1 Loosen the captive screw that secures the fan tray door to the chassis and open the door.

Step 2 Loosen the captive installation screw on the front of the fan tray you want to remove.

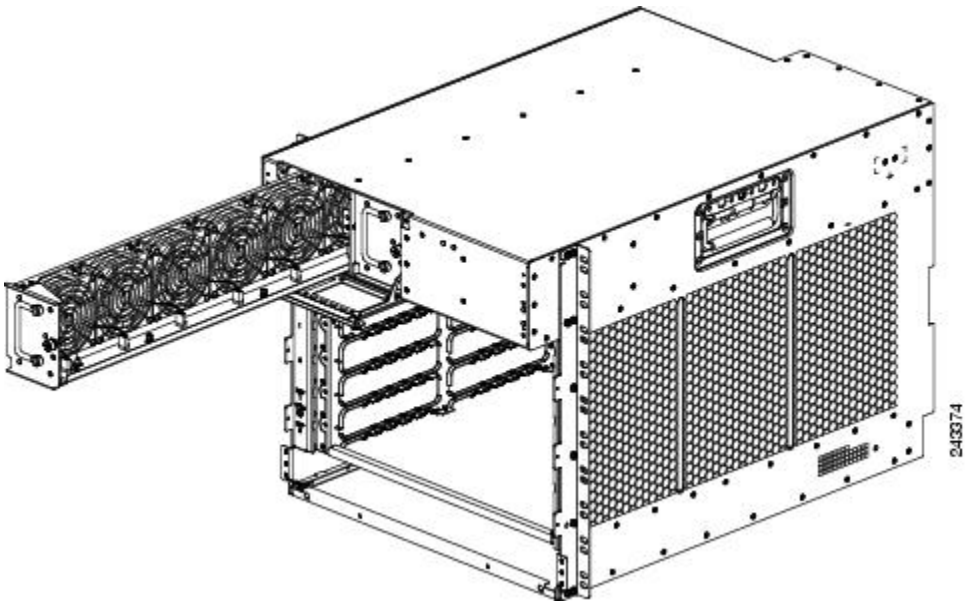
Step 3 Using the handle on the front panel, pull the fan tray halfway out of the chassis.

Note
Wait a few seconds for all the fans to stop rotating before lifting the fan tray from the chassis.

Step 4 Slide out the fan tray completely from the chassis while supporting it with your other hand.

Caution
Use two hands when handling the fan tray. The fan tray weighs about 7.6 pounds (3.45 kg).

Figure 85: Removing or Installing the Fan Tray on the Cisco ASR 9006 Router Chassis



Removing a Fan Tray from the Cisco ASR 9904 Router

Follow these steps to remove a fan tray from the Cisco ASR 9904 Router (see the figure below).

Procedure

Step 1 Loosen the three captive installation screws on the front of the fan tray.

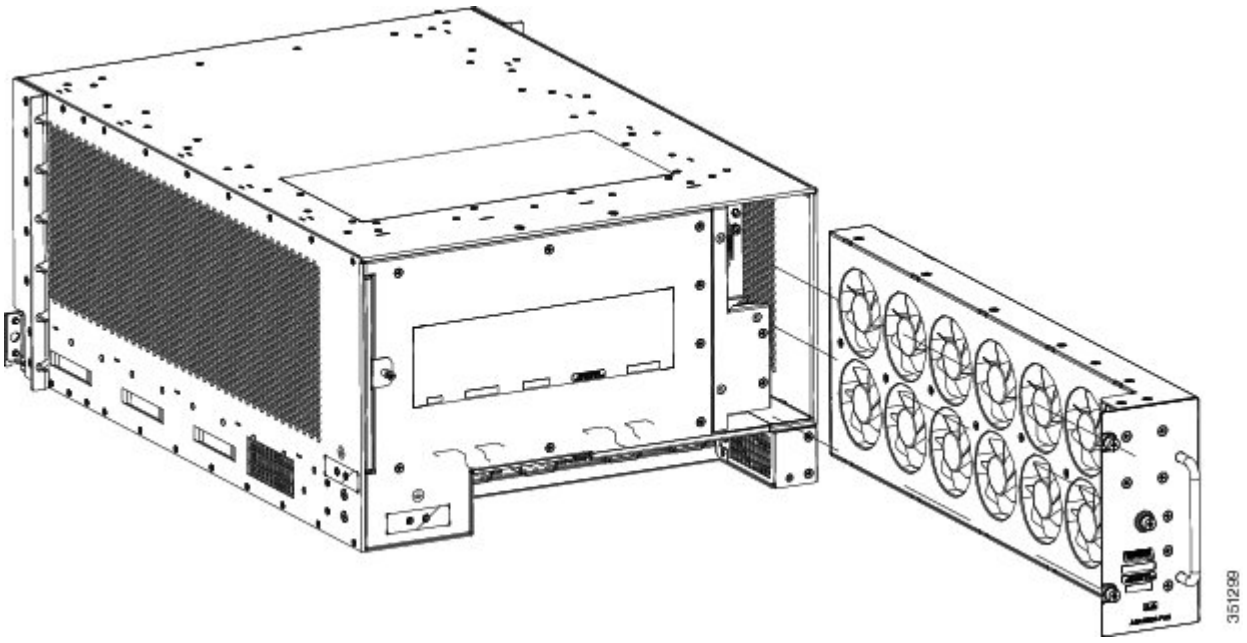
Step 2 Using the handle on the front panel, pull the fan tray halfway out of the chassis.

Step 3 Wait a few seconds for all the fans to stop rotating before lifting the fan tray from the chassis.

Step 4 Slide out the fan tray completely from the chassis while supporting it with your other hand.

Caution
Use two hands when handling the fan tray. The fan tray weighs about 11.0 pounds (4.99 kg).

Figure 86: Removing or Installing the Fan Tray on the Cisco ASR 9904 Router Chassis



Removing a Fan Tray from the Cisco ASR 9906 Router

Follow these steps to remove a fan tray from the Cisco ASR 9906 Router (see the figure below).

Procedure

Step 1 Loosen the screws that secure the fan tray door to the chassis and open the door.

Step 2 Loosen the captive installation screw on the front of the fan tray.

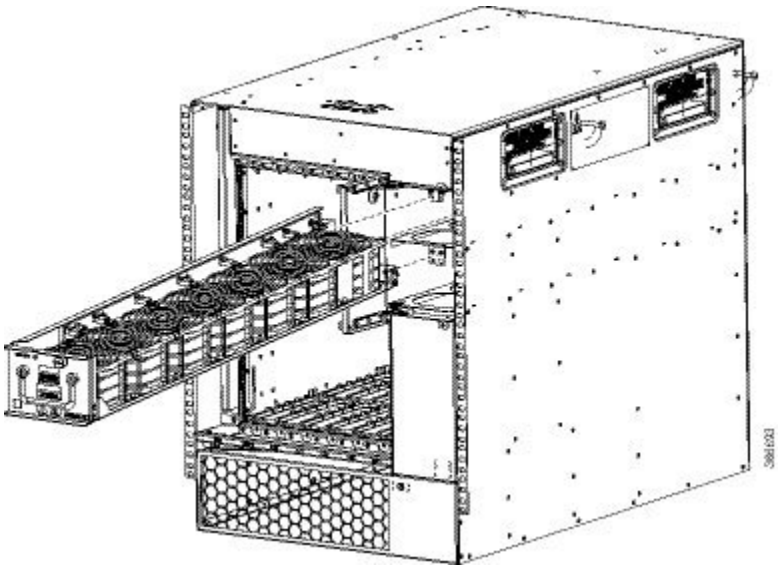
Step 3 Using the handle on the front panel, pull the fan tray halfway out of the chassis.

Step 4 Wait for all the fans to stop rotating.

Step 5 Slide out the fan tray completely from the chassis while supporting it with your other hand.

Caution
Use two hands when handling the fan tray. The fan tray weighs about 8.0 pounds (3.63 kg).

Figure 87: Removing or Installing the Fan Tray on the Cisco ASR 9906 Router Chassis



Removing Cards from the Chassis

To reduce additional weight from the chassis, you can remove all Route Switch Processor (RSP), Route Processor (RP), Switch Fabric Card (FC), shared port adapter (SPA), SPA interface processor (SIP), and line cards (LCs).

This section describes how to remove the RSP cards, RP cards, FCs, and LCs. For information about removing SPA and SIP cards, see:

Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Hardware Installation Guide

Caution Handle all cards by the metal card carrier edges only; avoid touching the board or any connector pins. After removing a card, carefully place it in an antistatic bag or similar environment to protect it from ESD and dust in the optic ports (fiber-optic line cards).

Caution Be careful to avoid damaging the electromagnetic interference (EMI) gasket that runs along the full height of the card front panel edge. Damage to the EMI gasket can affect the ability of your system to meet EMI requirements.

Caution To avoid damaging card mechanical components, never carry a card by the captive installation screws or ejector levers. Doing so can damage these components and cause card insertion problems.

Removing RSP Cards and Line Cards from the Cisco ASR 9006, 9010, 9904, 9906, and 9910 Routers

This section describes how to remove RSP and line cards from the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router. The below table and Table 11: Router Components and Slot Numbering for the Cisco ASR 9922 Router and Cisco ASR 9912 Router, on page 97) and describe the router components and slot numbering for each router.

Table 10: Router Components and Slot Numbering for the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router

Router Model Number	Router Components and Slot Numbering
Cisco ASR 9006 Router	• 6 slots. • Version 1 power system (Figure 88: Cisco ASR 9006 Router Components and Slot Numbering with Version 1 Power System, on page 87) or Version 2 power system (Figure 89: Cisco ASR 9006 Router Components and Slot Numbering with Version 2 DC Power System, on page 88). • Two RSP cards installed in the two lowest slots (labeled RSP0 and RSP1) located above the power modules. • Four line cards installed in slots 2 through 5 above the RSP card slots.
Cisco ASR 9010 Router	• 10 slots. • Version 1 power system (Figure 90: Cisco ASR 9010 Router Components and Slot Numbering with Version 1 Power System or Version 3 AC Power System, on page 88), Version 2 power system (Figure 91: Cisco ASR 9010 Router Components and Slot Numbering with Version 2 Power System or Version 3 DC Power System, on page 89), or Version 3 power system (Figure 90: Cisco ASR 9010 Router Components and Slot Numbering with Version 1 Power System or Version 3 AC Power System, on page 88 for AC and Figure 91: Cisco ASR 9010 Router Components and Slot Numbering with Version 2 Power System or Version 3 DC Power System, on page 89 for DC). • Two RSP cards installed in the two center slots (labeled RSP0 and RSP1). • Four line cards installed in slots 0 through 3 to the left of the RSP card slots. • Four line cards installed in slots 4 though 7 to the right of the RSP card slots.
Cisco ASR 9904 Router	• 4 slots. • Version 2 power system (Figure 92: Cisco ASR 9904 Router Components and Slot Numbering with Version 2 DC Power System , on page 89). • One line card installed in the top slot (labeled LC1). Two RSP cards installed in the middle two slots (labeled RSP1 and RSP0) located between the line cards (LC0 and LC1). • One line card installed in the lowest slot (LC0) located above the power modules.

Router Model Number	Router Components and Slot Numbering
Cisco ASR 9906 Router	• 6 slots. • Version 3 power system (Cisco ASR 9906 Router Components and Slot Numbering with Version 3 AC Power System for AC and Cisco ASR 9906 Router Components and Slot Numbering with Version 3 DC Power System for DC). • Two RSP cards installed in the two slots (labeled RSP0 and RSP1) • Four line cards installed in slots LC0 through LC3. • Up to 5 fabric cards, mounted from rear of the chassis.
Cisco ASR 9910 Router	• 15 slots. • Version 3 power system (Figure 95: Cisco ASR 9910 Router Components and Slot Numbering with Version 3 AC Power System , on page 91 for AC and Figure 96: Cisco ASR 9910 Router Components and Slot Numbering with Version 3 DC Power System , on page 91 for DC). • Two RSP cards installed in the two slots (labeled RSP0 and RSP1) • Eight line cards installed in slots LC0 through LC7. • Up to 5 fabric cards and mounted from rear of the chassis.

Figure 88: Cisco ASR 9006 Router Components and Slot Numbering with Version 1 Power System

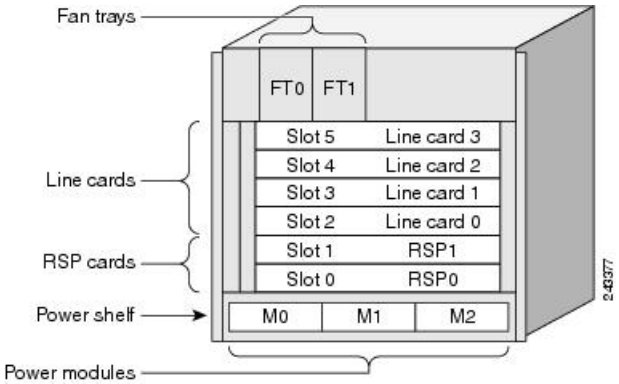


Figure 89: Cisco ASR 9006 Router Components and Slot Numbering with Version 2 DC Power System

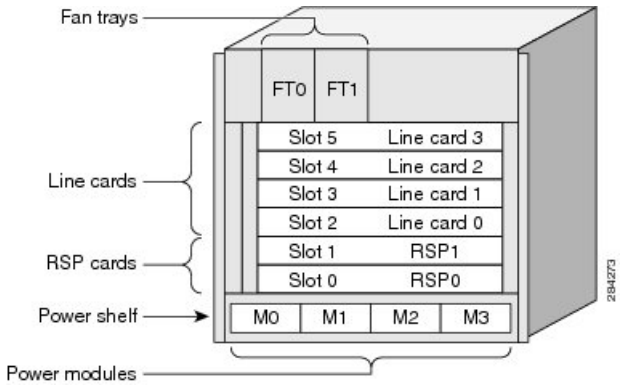


Figure 90: Cisco ASR 9010 Router Components and Slot Numbering with Version 1 Power System or Version 3 AC Power System

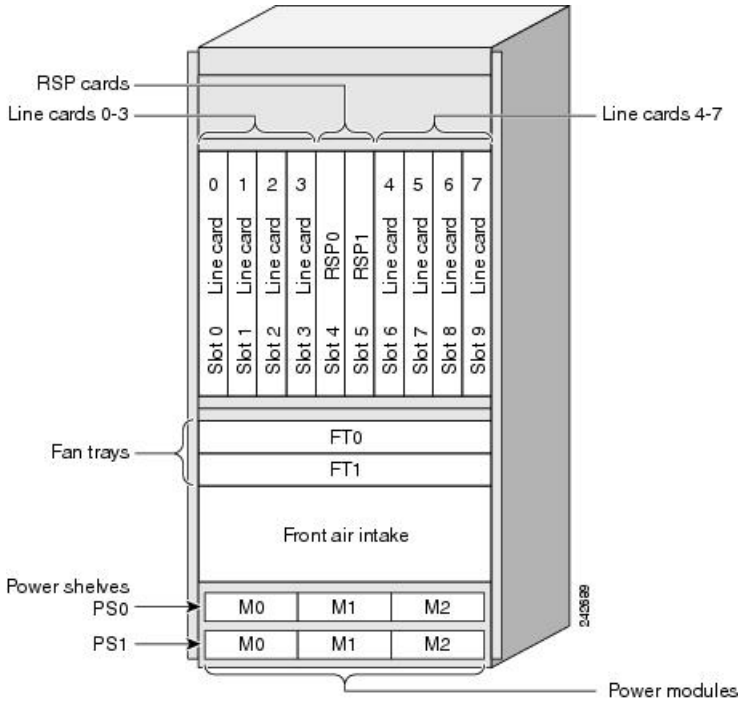


Figure 91: Cisco ASR 9010 Router Components and Slot Numbering with Version 2 Power System or Version 3 DC Power System

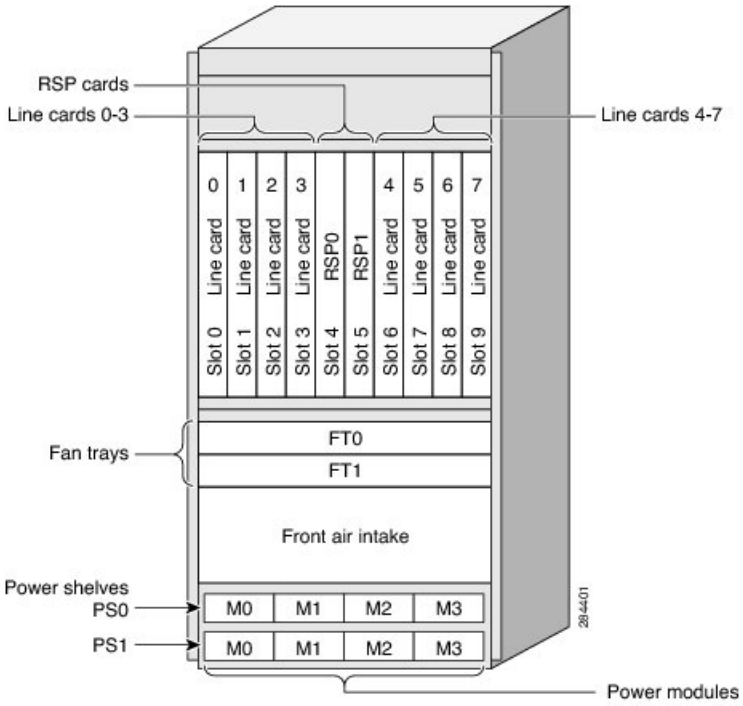


Figure 92: Cisco ASR 9904 Router Components and Slot Numbering with Version 2 DC Power System

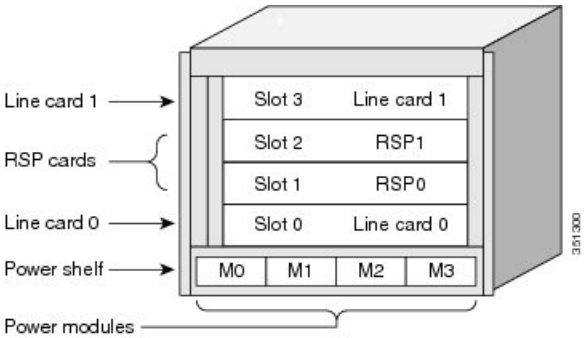


Figure 93: Cisco ASR 9906 Router Components and Slot Numbering with Version 3 AC Power System

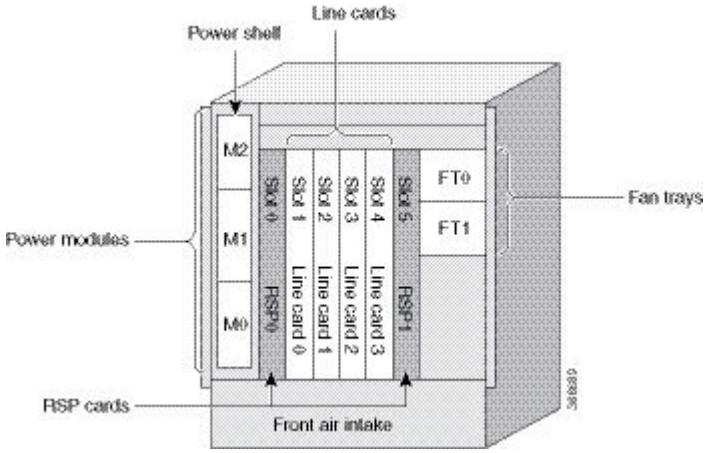


Figure 94: Cisco ASR 9906 Router Components and Slot Numbering with Version 3 DC Power System

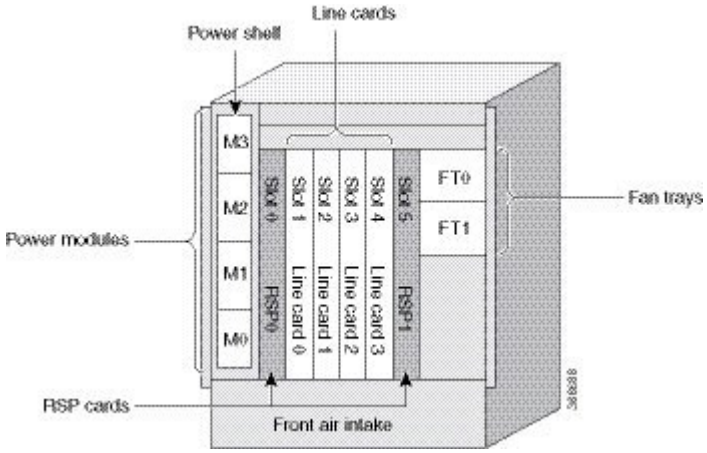


Figure 95: Cisco ASR 9910 Router Components and Slot Numbering with Version 3 AC Power System

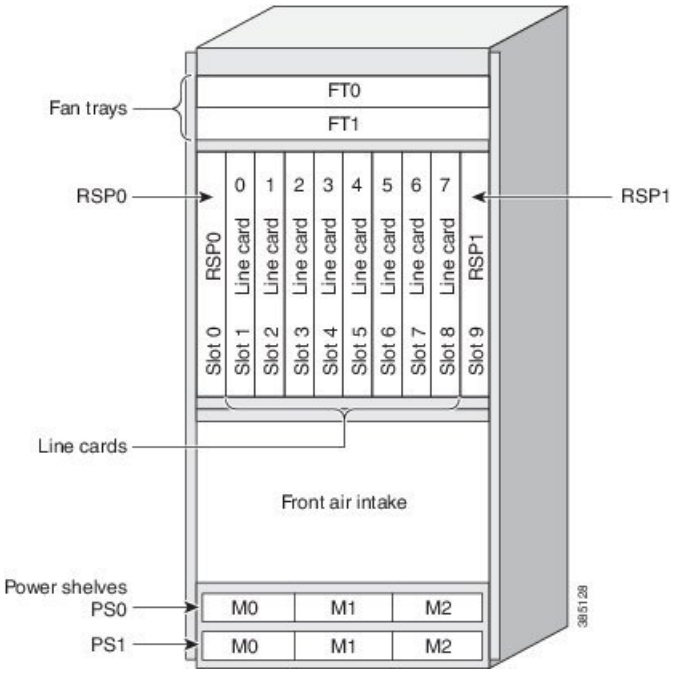


Figure 96: Cisco ASR 9910 Router Components and Slot Numbering with Version 3 DC Power System

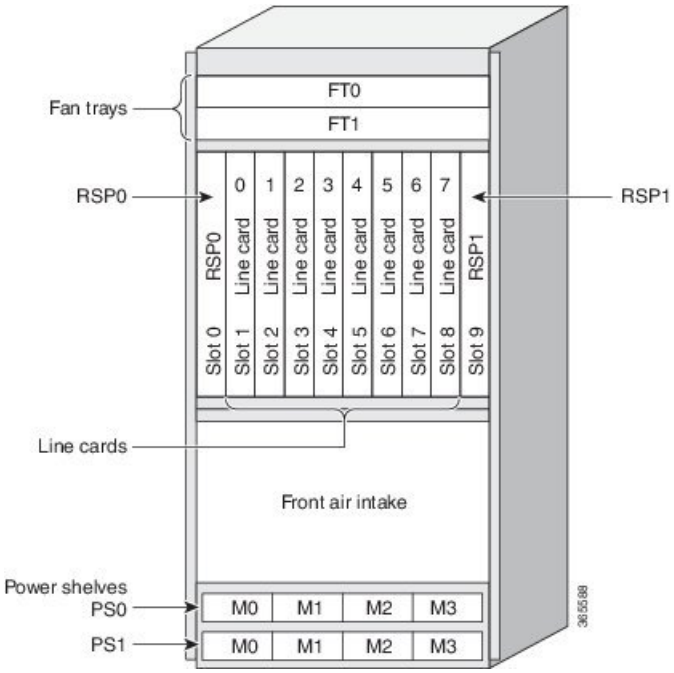


Figure 97: Cisco ASR 9906 Router Components and Slot Numbering for Fabric Cards

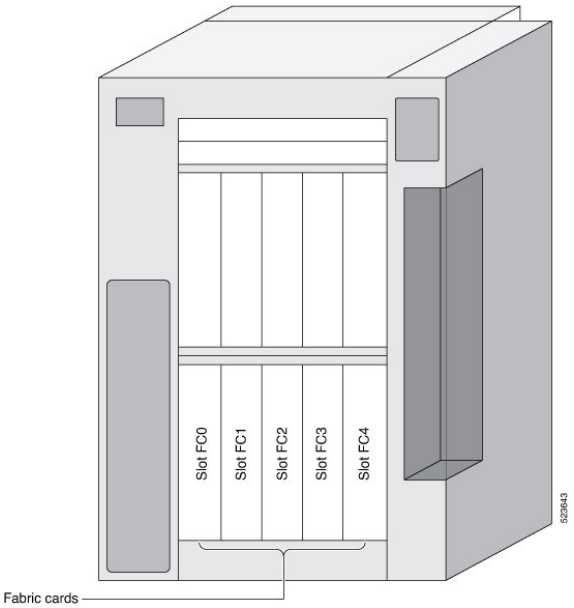
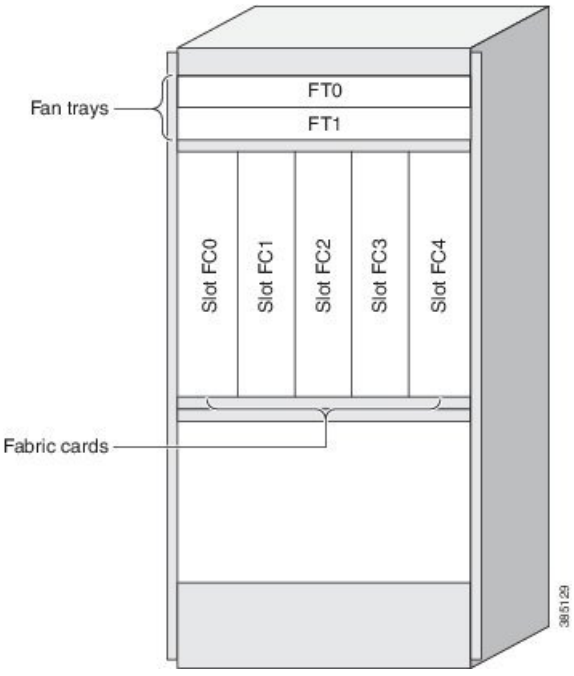


Figure 98: Cisco ASR 9910 Router Components and Slot Numbering for Fabric Cards



Follow these steps to remove RSP and line cards from the chassis.

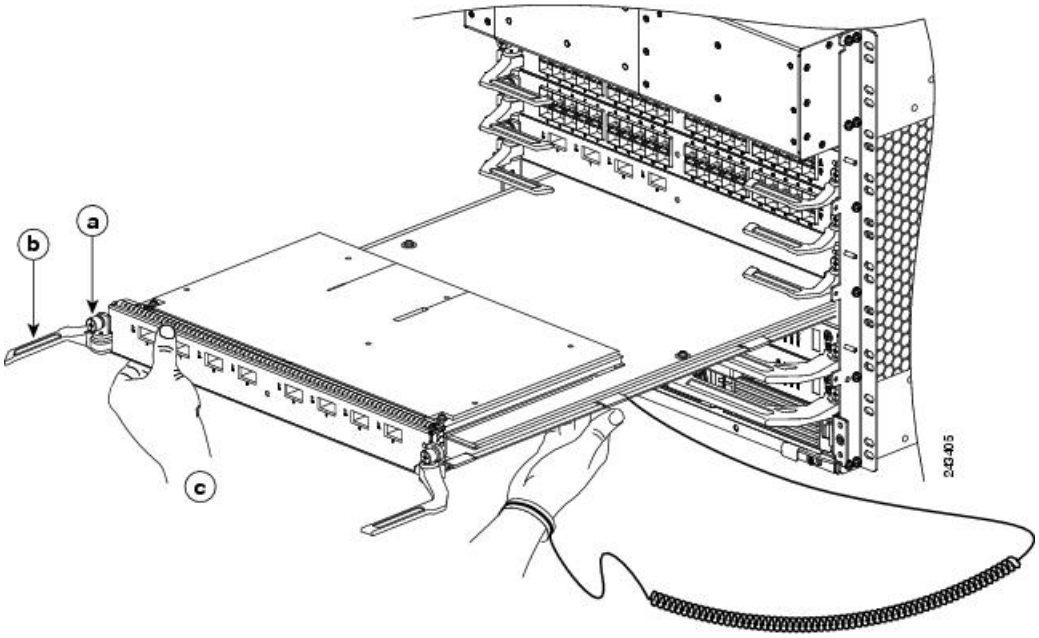
Procedure

Step 1 Refer to the above figures to identify each card and write down the card type and slot number on a piece of paper. You will need this information when you reinstall the cards in the chassis to be sure you reinstall each card in its original slot.

Step 2 To remove a card starting at the lowest numbered slot:

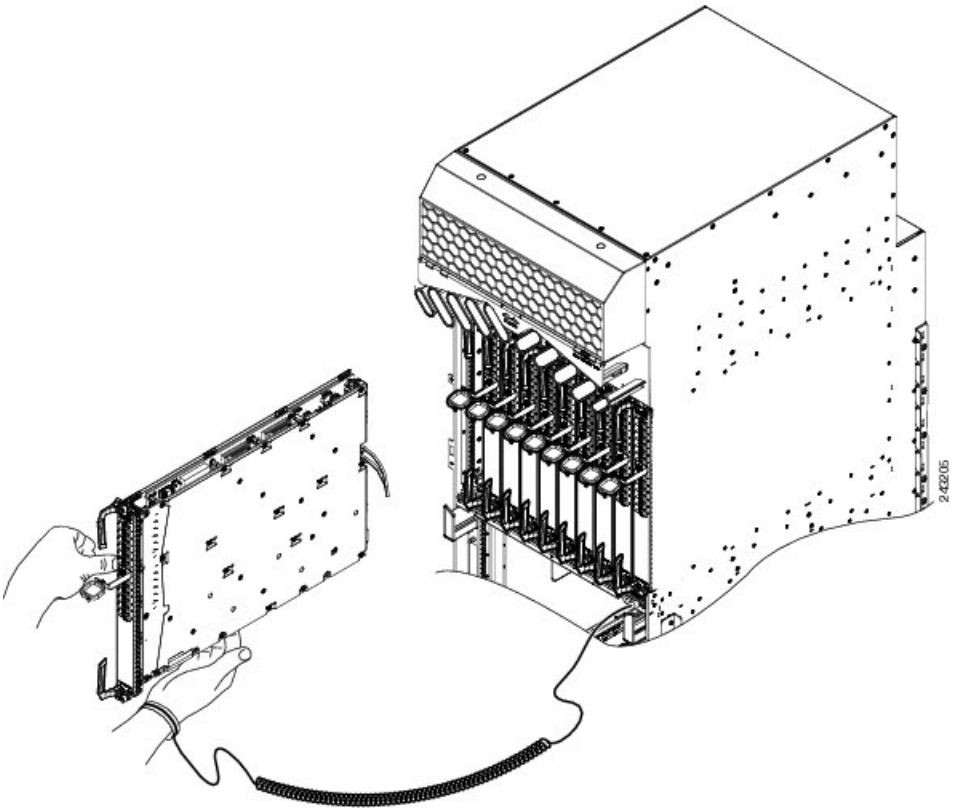
a) Use a screwdriver to loosen the captive screws at the ends of the line card front panel.
b) Pivot the ejector levers to unseat the card from the backplane connector.
c) Slide the card out of the slot and place it directly into an antistatic bag or other ESD-preventive container.

Figure 99: Removing a Line Card from the Cisco ASR 9006 Router Chassis



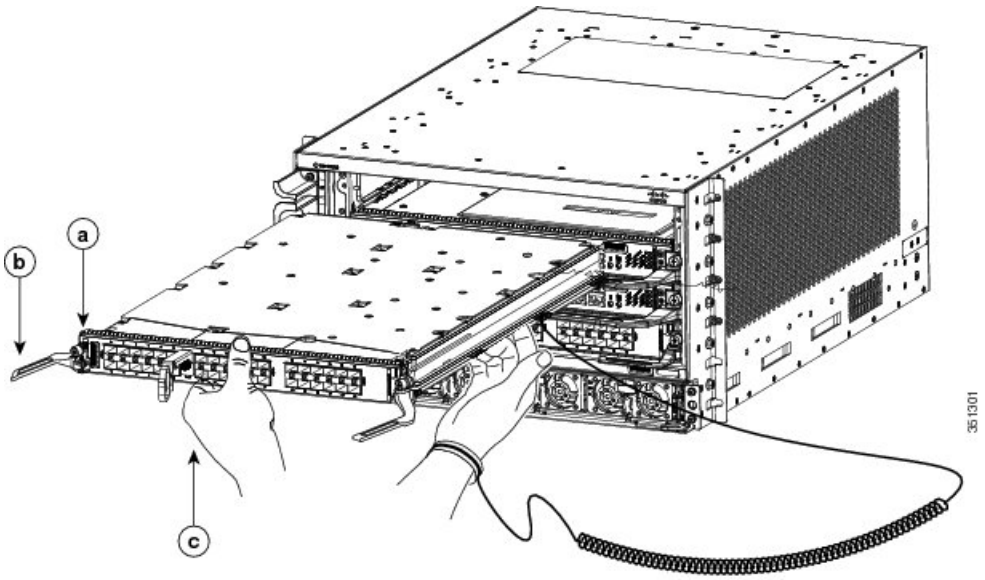
a	Loosen the captive screws.	b	Pivot the ejector levers to unseat the card from the backplane connector.	c	Slide the card out of the chassis.

Figure 100: Removing a Line Card from the Cisco ASR 9010 Router Chassis



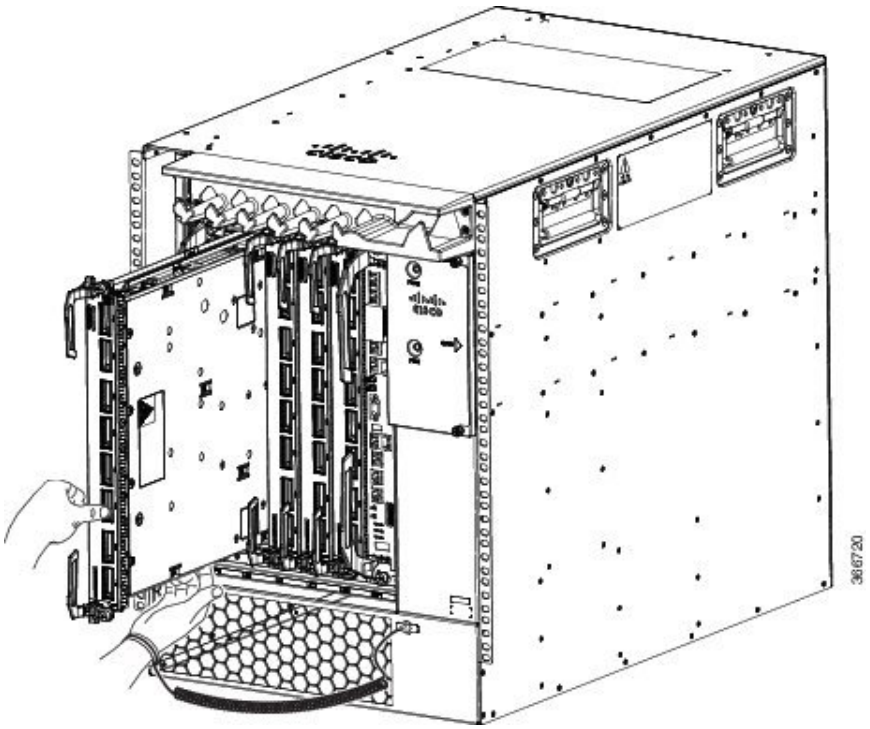
a	Loosen the captive screws.	b	Pivot the ejector levers to unseat the card from the backplane connector.	c	Slide the card out of the chassis.

Figure 101: Removing a Line Card from the Cisco ASR 9904 Router Chassis



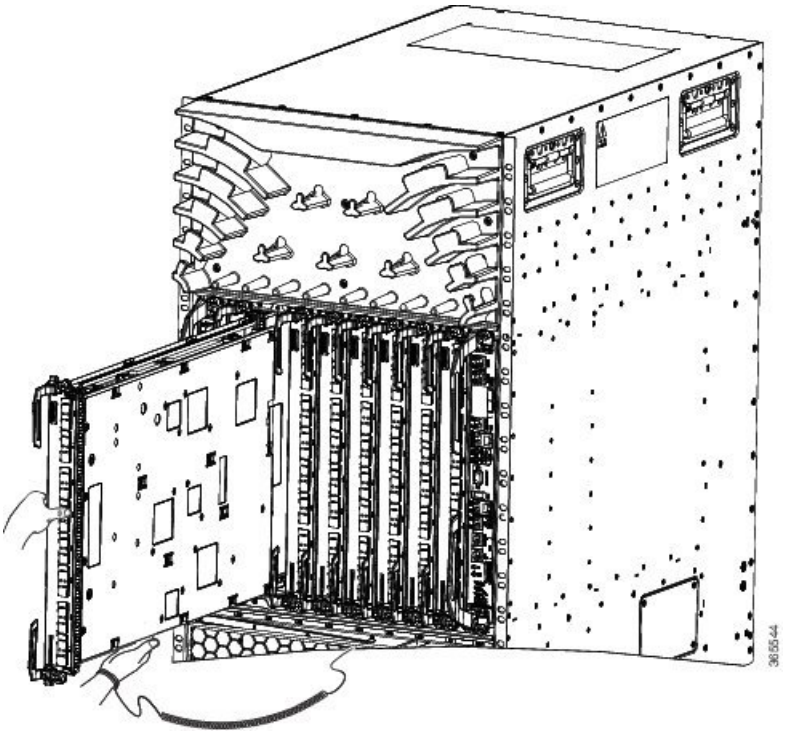
a	Loosen the captive screws.	b	Pivot the ejector levers to unseat the card from the backplane connector.	c	Slide the card out of the chassis.

Figure 102: Removing a Line Card from the Cisco ASR 9906 Router Chassis



a	Loosen the captive screws.	b	Pivot the ejector levers to unseat the card from the backplane connector.	c	Slide the card out of the chassis.

Figure 103: Removing a Line Card from the Cisco ASR 9910 Router Chassis



Step 3 Repeat for each RSP or line card.

Removing RP Cards, Fabric Cards, and Line Cards from the Cisco ASR 9922 Router and Cisco ASR 9912 Router

This section describes how to remove the Route Processor (RP) cards, Fabric Card (FC), and Line Cards (LCs) from the Cisco ASR 9922 Router and Cisco ASR 9912 Router. The table below describes the components and slot numbering for each router.

Table 11: Router Components and Slot Numbering for the Cisco ASR 9922 Router and Cisco ASR 9912 Router

Router Model Number	Router Components and Slot Numbering
Cisco ASR 9922 Router	• 22 slots. • Version 2 or version 3 power system. See Figure 104: Cisco ASR 9922 Router Components and Slot Numbering with Version 2 DC Power System, on page 98 for version 2 DC and Figure 105: Cisco ASR 9922 Router Components and Slot Numbering with Version 3 DC Power System, on page 99 for version 3 DC. See Figure 105: Cisco ASR 9922 Router Components and Slot Numbering with Version 3 DC Power System, on page 99 for version 2 AC and Figure 107: Cisco ASR 9922 Router Components and Slot Numbering with Version 3 AC Power System, on page 101 for version 3 AC. • Up to seven FC cards installed between the two RSP cards in the middle cage of the chassis. • Ten line cards installed in slots 0 through 9 in the top card cage. • Ten line cards installed upside down in slots 10 through 19 in the bottom card cage.
Cisco ASR 9912 Router	• 12 slots. • Version 2 or version 3 power system, See Figure 108: Cisco ASR 9912 Router Components and Slot Numbering with Version 2 DC Power System, on page 102 for version 2 DC or version 3 power systems (Figure 108: Cisco ASR 9912 Router Components and Slot Numbering with Version 2 DC Power System, on page 102 for DC and Figure 109: Cisco ASR 9912 Router Components and Slot Numbering with Version 3 AC Power System, on page 103 for AC). • Up to seven FC cards installed between the two RP cards above the power trays. • Ten line cards installed in slots 0 through 9 below the fan trays.

Figure 104: Cisco ASR 9922 Router Components and Slot Numbering with Version 2 DC Power System

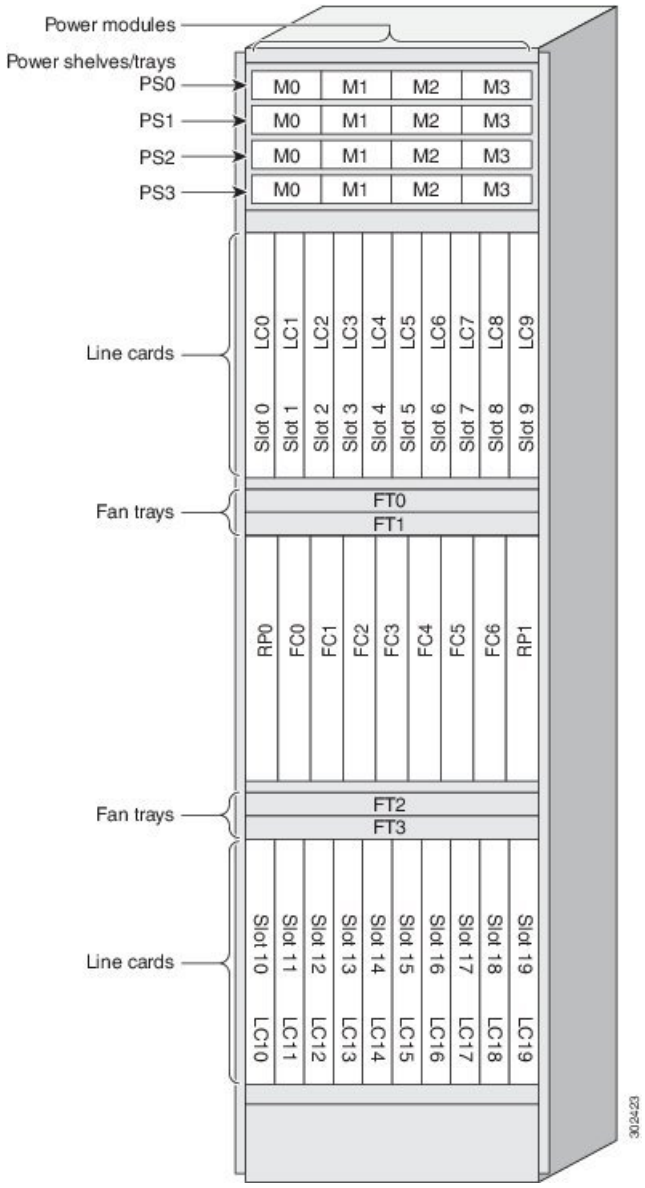


Figure 105: Cisco ASR 9922 Router Components and Slot Numbering with Version 3 DC Power System

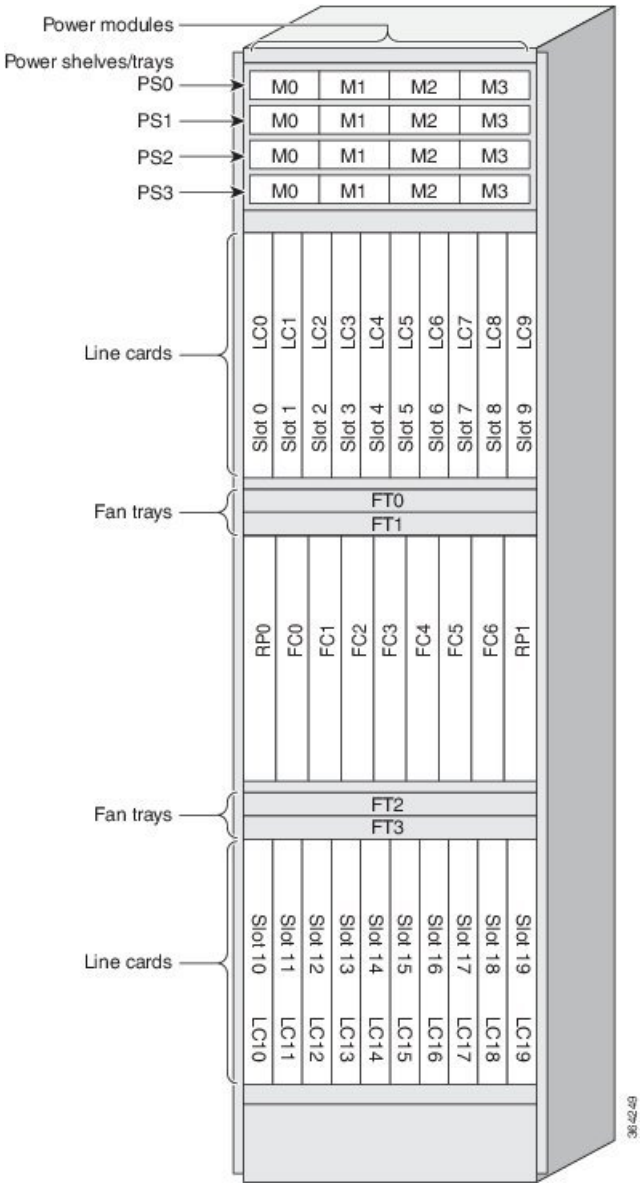


Figure 106: Cisco ASR 9922 Router Components and Slot Numbering with Version 2 AC Power System

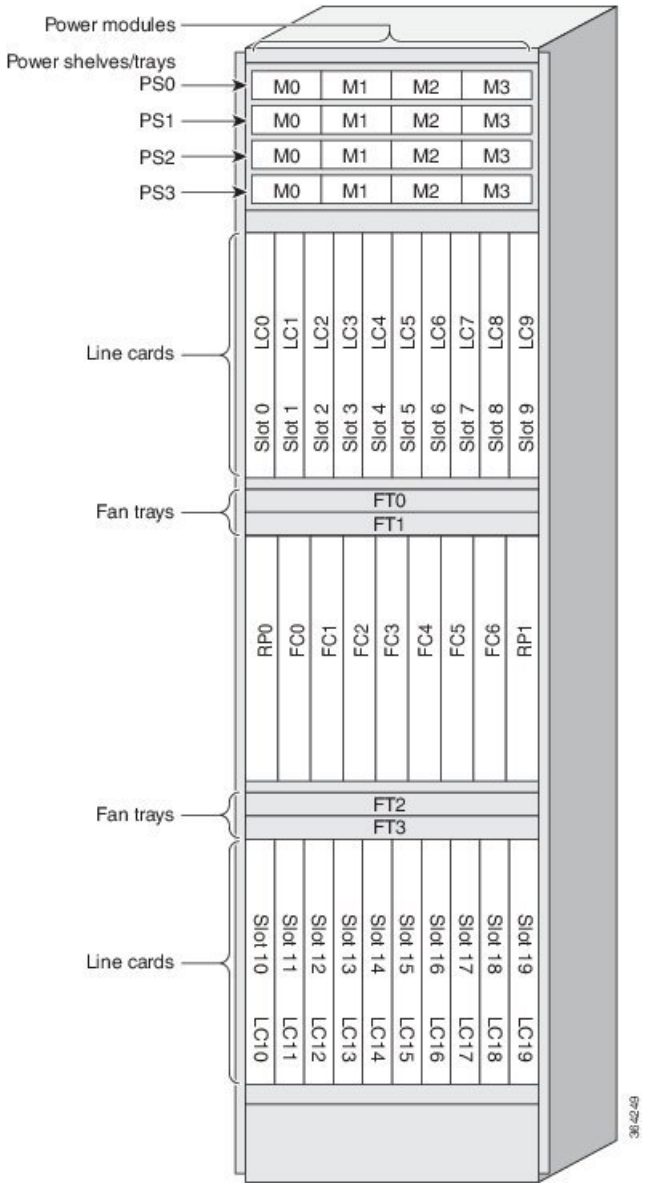


Figure 107: Cisco ASR 9922 Router Components and Slot Numbering with Version 3 AC Power System

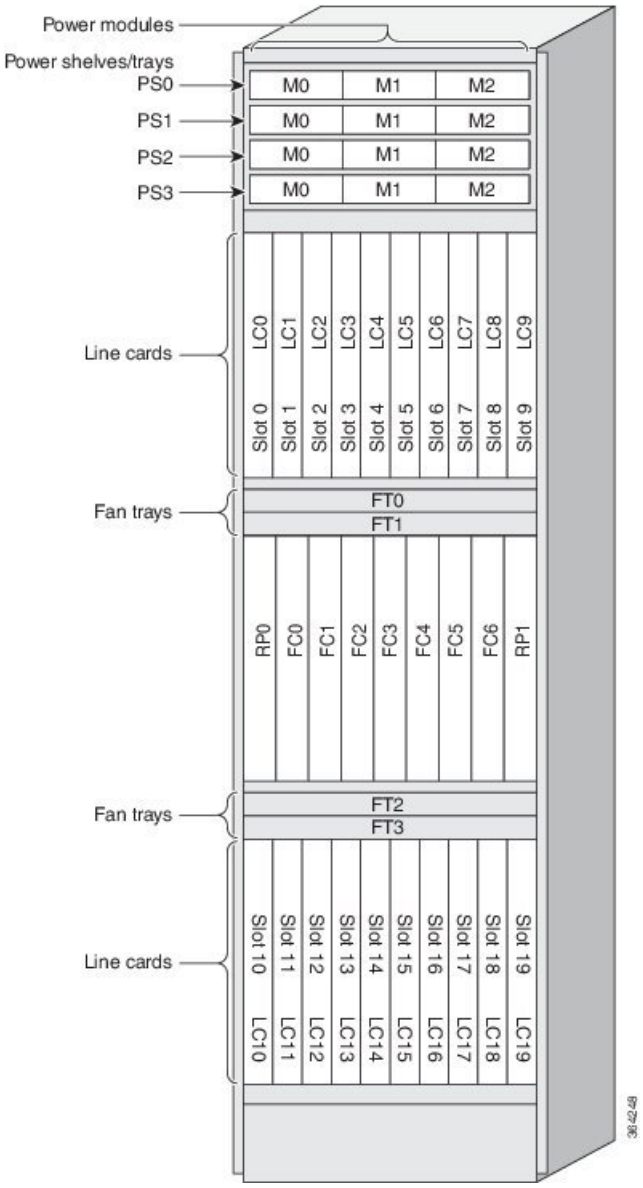


Figure 108: Cisco ASR 9912 Router Components and Slot Numbering with Version 2 DC Power System

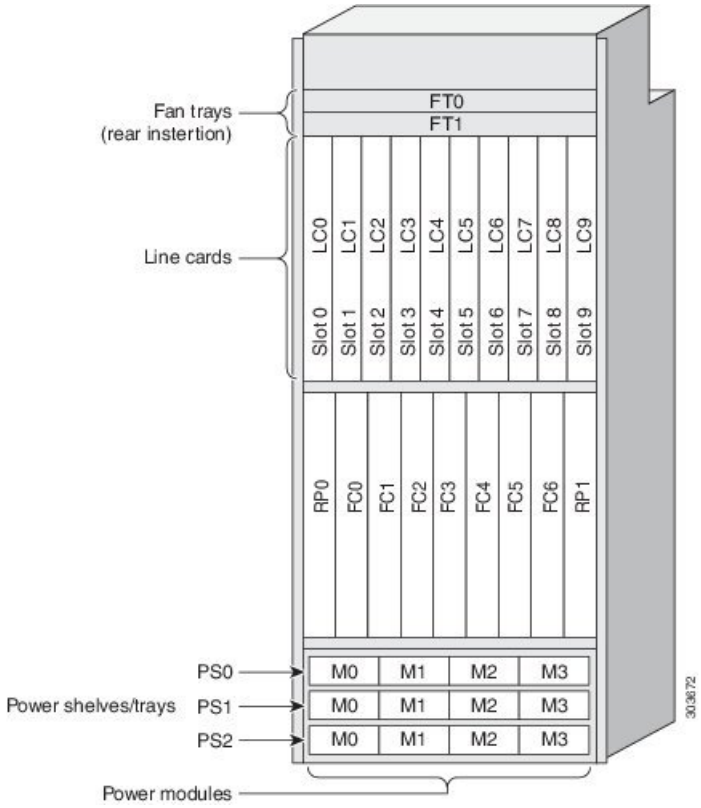
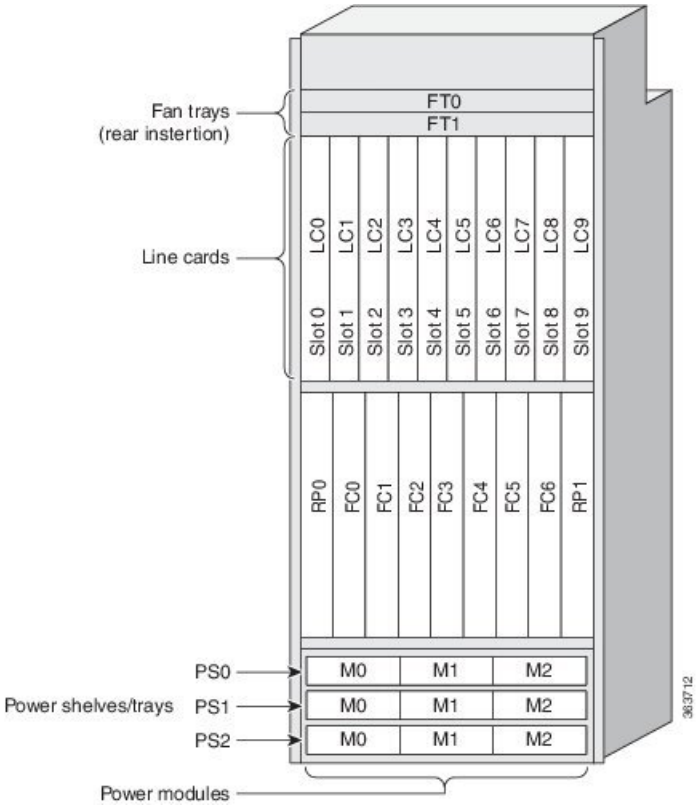


Figure 109: Cisco ASR 9912 Router Components and Slot Numbering with Version 3 AC Power System



Follow these steps to remove RP cards, FCs, and LCs from the Cisco ASR 9922 Router and Cisco ASR 9912 Router chassis.

Procedure

Step 1 Use Figure 108: Cisco ASR 9912 Router Components and Slot Numbering with Version 2 DC Power System, on page 102 or Figure 109: Cisco ASR 9912 Router Components and Slot Numbering with Version 3 AC Power System, on page 103 to identify each card and then write down the card type and slot number on a piece of paper. You will need this information when you reinstall the cards in the chassis to be sure you reinstall each card in its original slot.

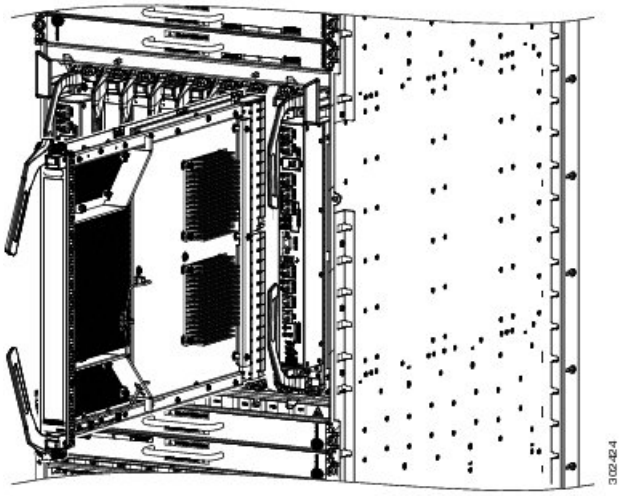
Step 2 To remove a FC card (see the figure below) or Figure 111: Removing a Switch Fabric Card from the Cisco ASR 9912 Router Chassis, on page 105), starting at the lowest numbered slot:

a) Remove the air filter covering the front of the middle cage.
b) Use a screwdriver to loosen the captive screws at the ends of the FC front panel.
c) Push in both ejector lever release buttons.

Note
Once any ejector lever release button is pushed in, the FC must by physically removed and reinserted (OIR) to restart the FC.

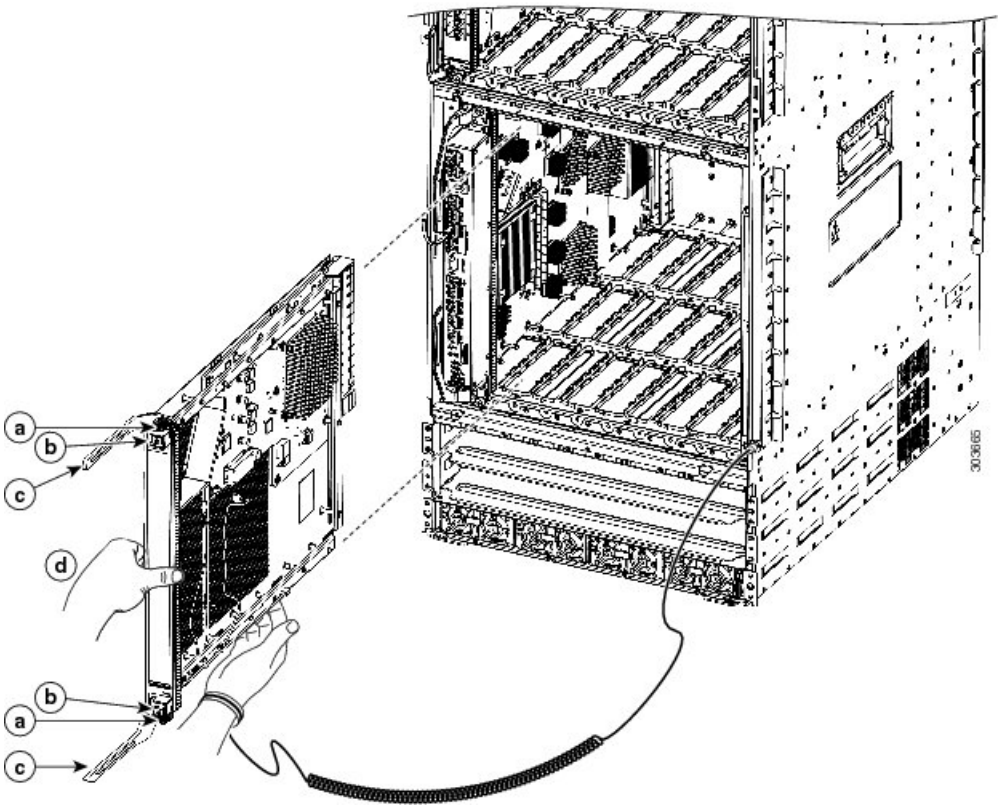
d) Pivot the ejector levers to unseat the FC from the backplane connector.
e) Slide the FC out of the slot and place it directly into an antistatic bag or other ESD-preventive container.

Figure 110: Removing a Switch Fabric Card from the Cisco ASR 9922 Router Chassis



a	Loosen the captive screws.	c	Pivot the ejector levers outward to unseat backplane connector.
b	Push in both ejector lever release buttons.	d	Slide the card out of the chassis.

Figure 111: Removing a Switch Fabric Card from the Cisco ASR 9912 Router Chassis

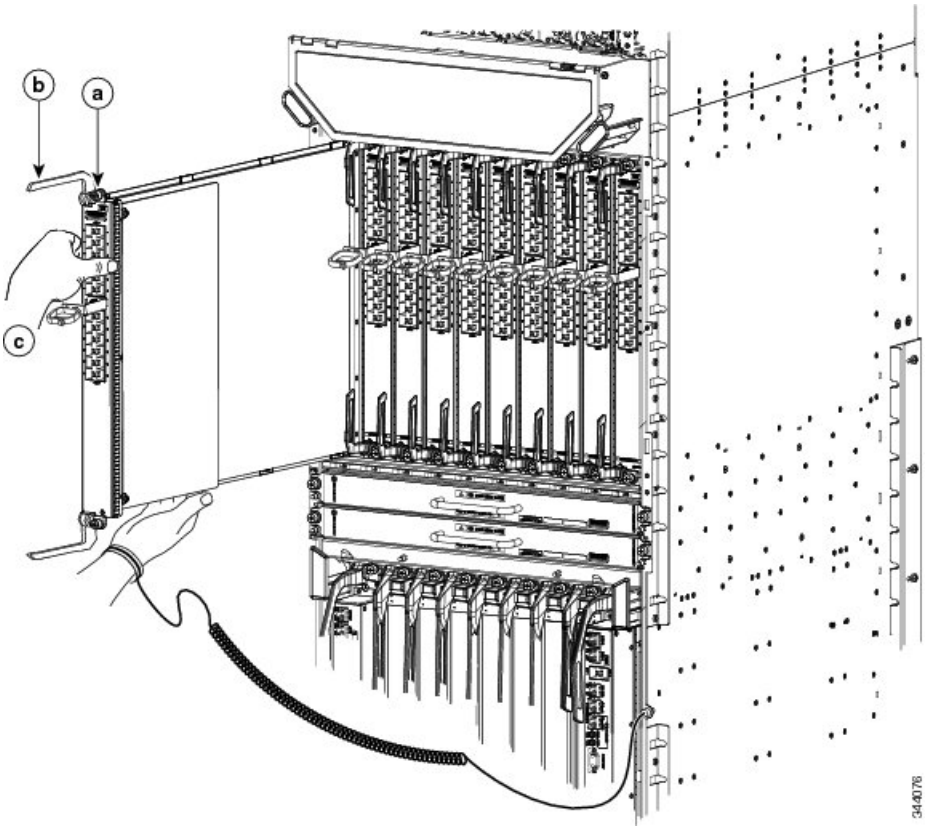


a	Loosen the captive screws.	c	Pivot the ejector levers outward to unseat the card from the backplane connector.
b	Push in both ejector lever release buttons.	d	Slide the card out of the chassis.

Step 3 To remove a RP or line card (see the figure below or Figure 113: Removing a Line Card from the Cisco ASR 9912 Router Top Card Cage , on page 107), starting at the lowest numbered slot:

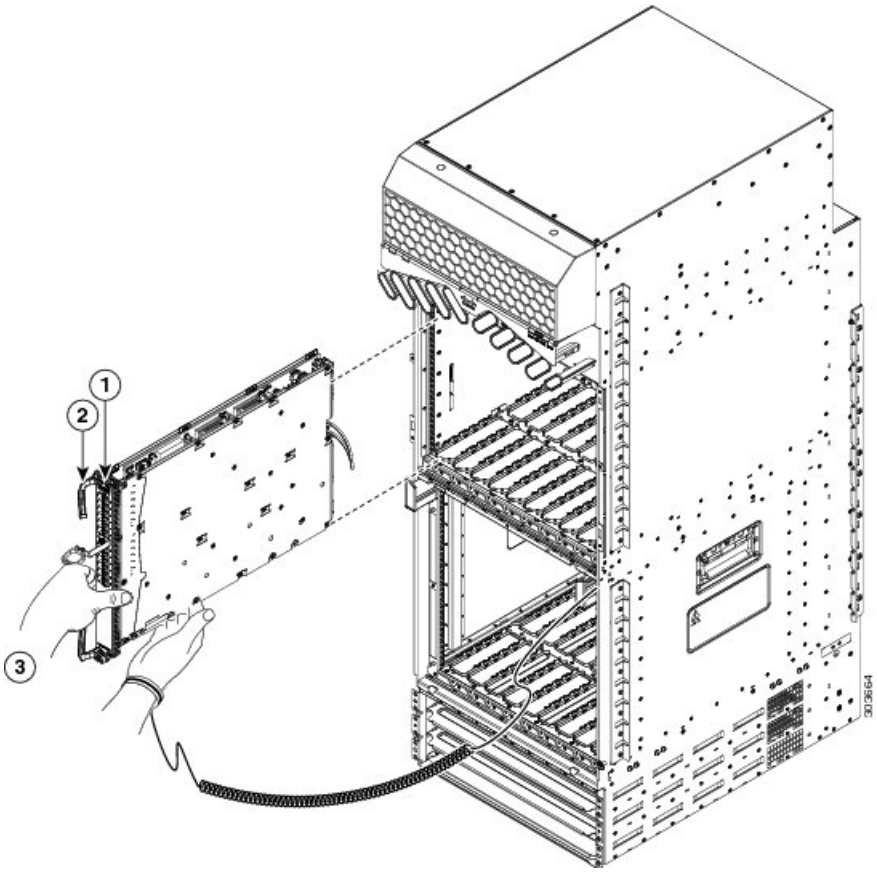
a) Use a screwdriver to loosen the captive screws at the ends of the line card front panel.
b) Pivot the ejector levers to unseat the card from the backplane connector.
c) Slide the card out of the slot and place it directly into an antistatic bag or other ESD-preventive container.

Figure 112: Removing a Line Card from the Cisco ASR 9922 Router Top Card Cage



a	Loosen the captive screws.	b	Pivot the ejector levers outward to unseat the card from the backplane connector.	c	Slide the card out of the chassis.

Figure 113: Removing a Line Card from the Cisco ASR 9912 Router Top Card Cage



1	Loosen the captive screws.	2	Pivot the ejector levers outward to unseat the card from the backplane connector.	3	Slide the card out of the chassis.

Step 4 Repeat Step 2 or Step 3 for each FC, LC, and RP card.

Rack-Mounting the Router Chassis

The router chassis is installed in a front-mounted position, as shown in the Telco 2-Post Rack section.

In a front-mounted position, the chassis rack-mounting flanges are secured directly to the rack posts.

Note The Cisco ASR 9922 Router and Cisco ASR 9912 Router are designed to mount in only 4-post racks.

Verifying Rack Dimensions

Before you install the chassis, measure the space between the vertical mounting flanges (rails) on your equipment rack to verify that the rack conforms to the measurements shown in Figure 114: Verifying Equipment Rack Dimensions, on page 108.

Procedure

Step 1 Mark and measure the distance between two holes on the left and right mounting rails.

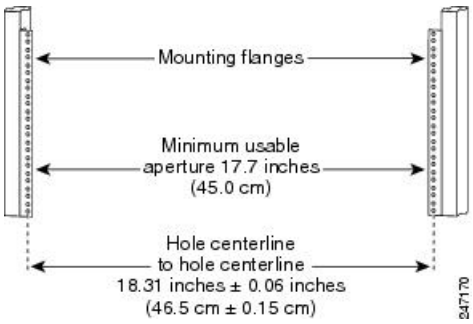
The distance should measure 18.31 inches ± 0.06 inches (46.5 cm ± 0.15 cm).

Note
Measure for pairs of holes near the bottom, middle and top of the equipment rack to ensure that the rack posts are parallel.

Step 2 Measure the space between the inner edges of the left front and right front mounting flanges on the equipment rack.

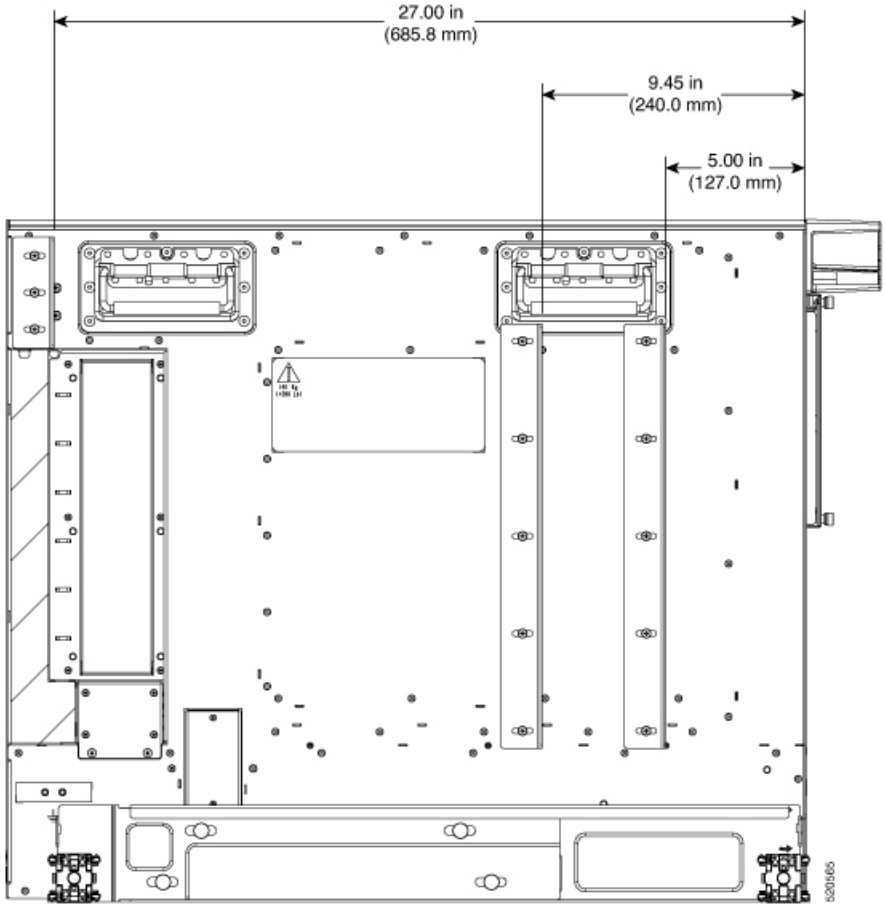
The space must be at least 17.7 inches (45 cm) to accommodate the chassis, which is approximately 17.50 inches (44.45 cm) wide and fits between the mounting posts on the rack.

Figure 114: Verifying Equipment Rack Dimensions



Vertical Rack Rail Locations for ASR 9906 Router

This image shows the vertical rack rail locations for installing the Cisco ASR 9906 router chassis in a 2-post and 4-post rack:



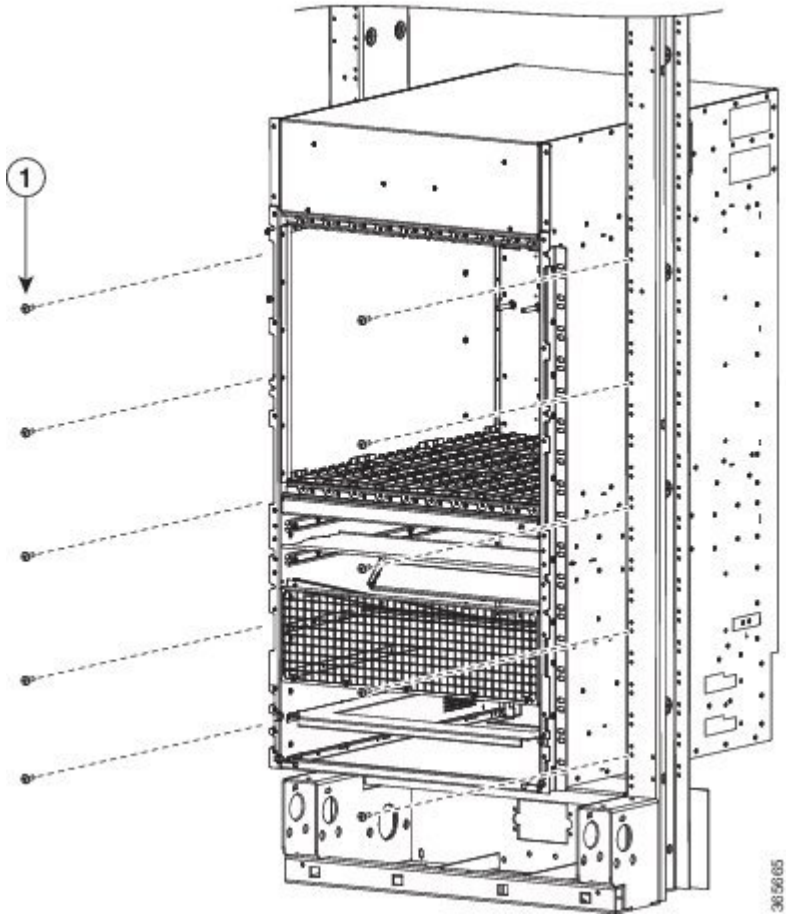
Installing the Chassis in a 2-Post Rack

This section describes how to install the chassis in a 2-post telco-style rack. Two people can lift an empty router chassis using the handles on the sides. To accommodate racks with different hole patterns in their mounting flanges, the chassis rack-mounting flanges have three groups of eight oblong screw holes on each side.

Caution An empty chassis weighs approximately 150 pounds (68 kg). You need two people to slide the chassis into the equipment rack safely.

This figure shows the orientation of the Cisco ASR 9010 Router chassis to the rack posts (3” or 6” channel width) of an industry-standard 2-post rack and components used in the installation.

Figure 115: Installing the Cisco ASR 9010 Router Chassis in a Standard 2-Post Rack

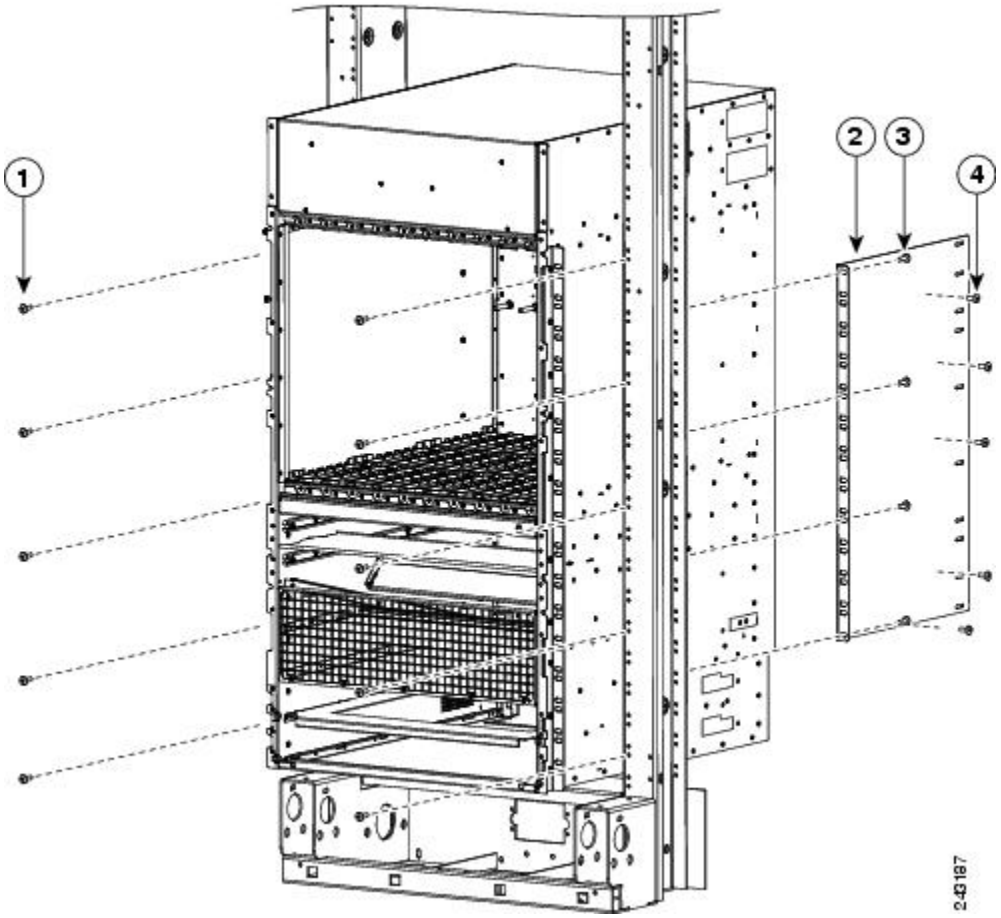


1	Five screws per side (minimum) to attach the router chassis to the rack

Note To install the Cisco ASR 9010 Router chassis in a Seismic 2-post rack for optional earthquake protection, two side brackets must be mounted to the chassis for attachment to the posts (5” channel width) of the GR-63 Zone 4 Seismic 2-post rack.

The below figure shows the orientation of the Cisco ASR 9010 Router chassis to the Seismic 2-post rack and components used in the installation.

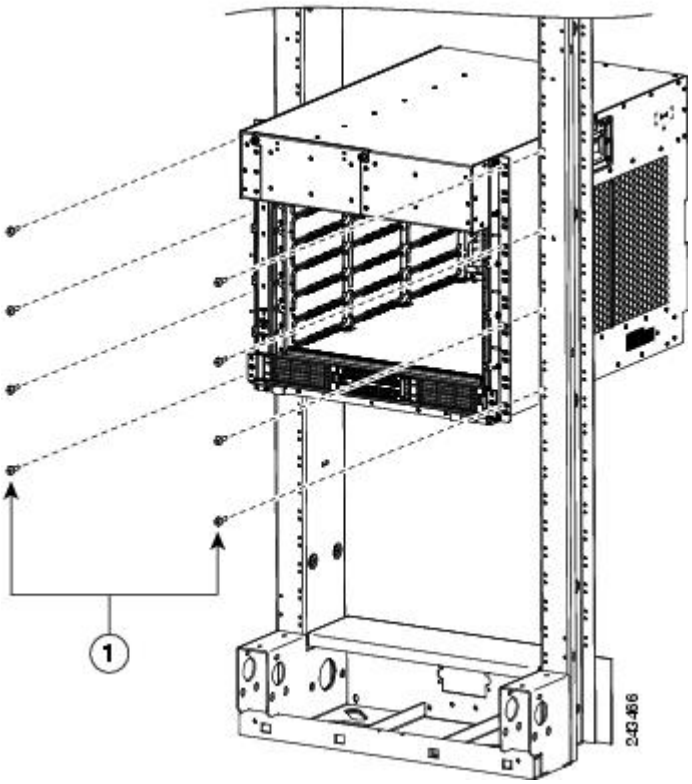
Figure 116: Installing the Cisco ASR 9010 Router Chassis in a Seismic 2-Post Rack



1	Five screws per side (minimum) to attach the router chassis to the rack	3	Rear mounting bracket
2	Four screws (minimum) to attach the rear mounting bracket to the rack	4	Five screws to attach the rear mounting b chassis

The figure below shows the orientation of the Cisco ASR 9006 Router chassis to the rack posts and components used in the installation.

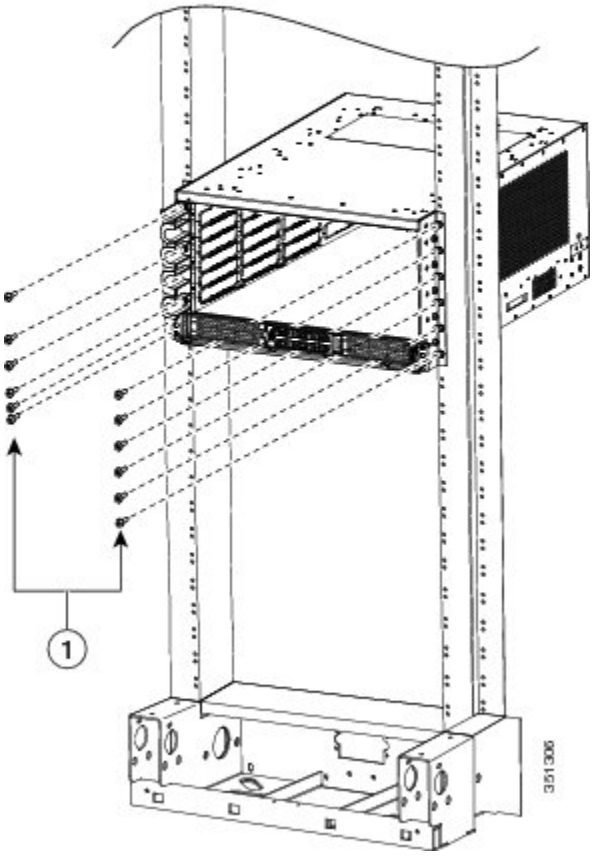
Figure 117: Installing the Cisco ASR 9006 Router Chassis in a Standard 2-Post Rack



1	Four screws per side (minimum) to attach the router chassis to the rack.

The figure below shows the orientation of the Cisco ASR 9904 Router chassis to the rack posts and components used in the installation.

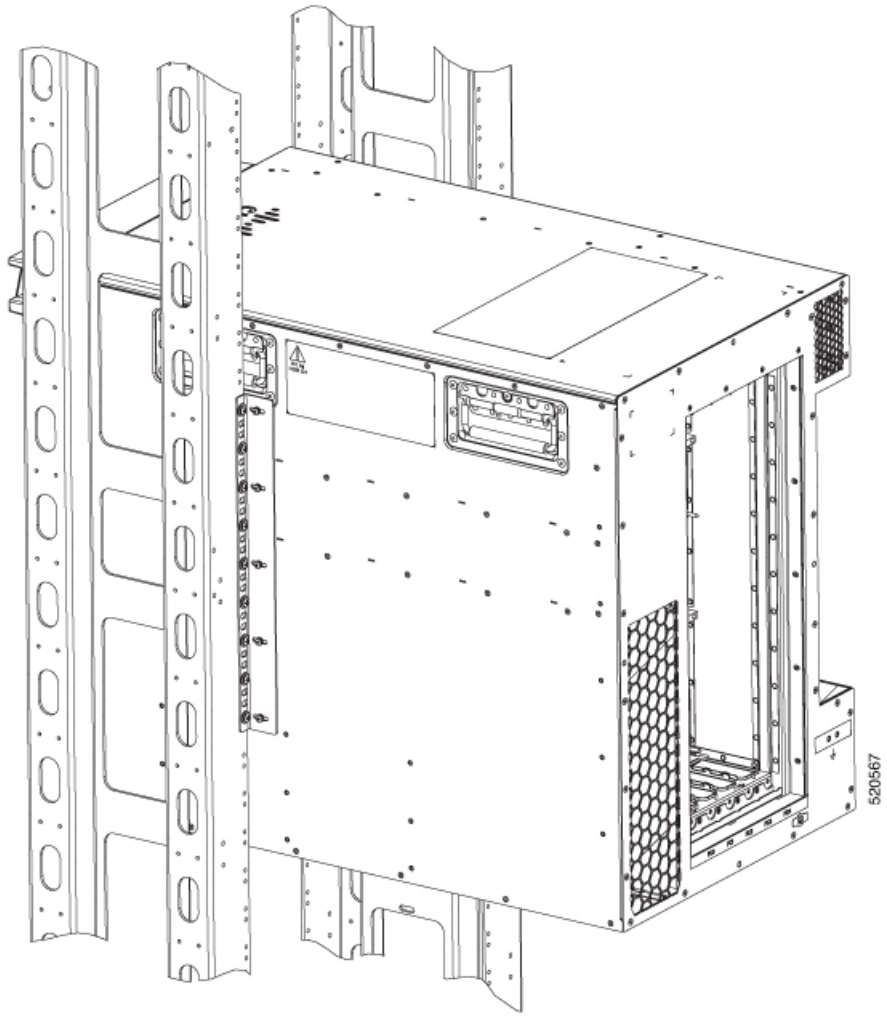
Figure 118: Installing the Cisco ASR 9904 Router Chassis in a Standard 2-Post Rack



1	Six screws per side (minimum) to attach the router chassis to the rack.

The figure below shows the orientation of the Cisco ASR 9906 Router chassis to the rack posts and components used in the installation.

Figure 119: Installing the Cisco ASR 9906 Router Chassis in a Seismic 2-Post Rack



1	Five screws per side (minimum) to attach the router chassis to the rack.

Figure 120: Installing the Cisco ASR 9906 Router Chassis in a Standard 2-Post

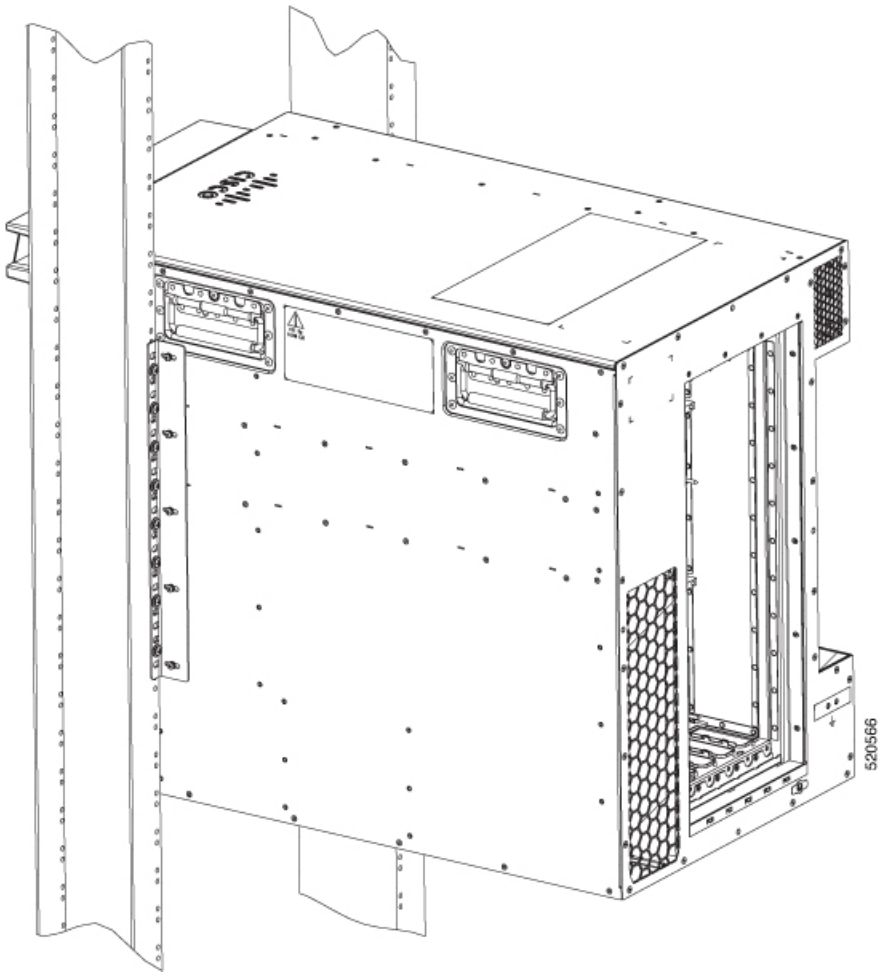
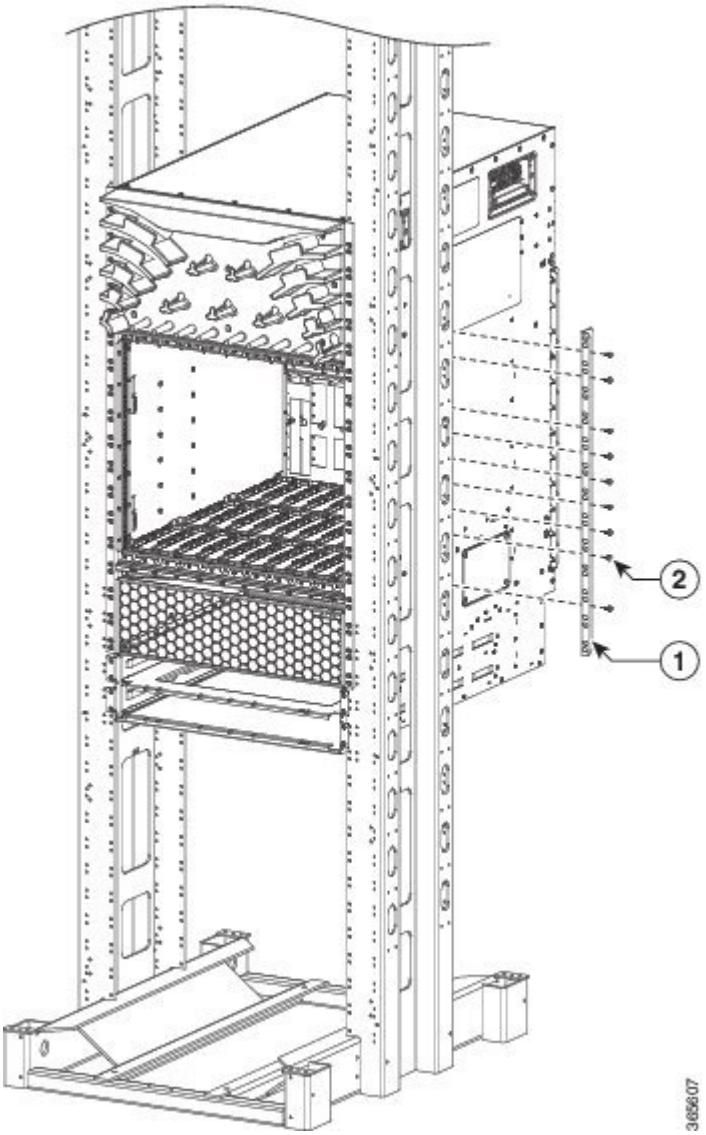


Figure 121: Installing the Cisco ASR 9910 Router Chassis in a 2-Post Seismic Rack



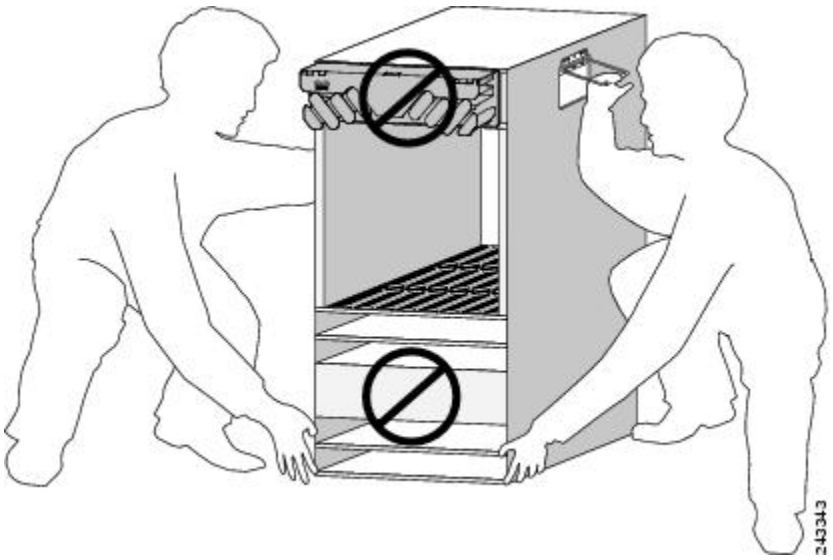
1	Use screw and brackets from 2 post rack mount bracket kit.

Follow these steps to install the chassis in the equipment rack.

Procedure

Step 1 Using two people, lift the chassis into the rack using the side handles and grasping underneath the power supply bays (see the figure below).

Figure 122: Correct Lifting Positions



Caution
Do not grasp the card cage or the air inlet grill when lifting the router chassis (see the figure below).

Figure 123: Incorrect Lifting Handholds



Step 2 Position the chassis until the rack-mounting flanges are flush against the mounting rails on the rack.

Step 3 Hold the chassis in position against the mounting rails while the second person finger-tightens a screw to the rack rails on each side of the chassis.

Step 4 Finger-tighten the screws to the rack rails on each side of the chassis. Space the screws evenly between the top and bottom of the chassis.

Step 5 (Optional) For optional earthquake protection for the Cisco ASR 9010 Router or Cisco ASR 9006 Router, two side brackets must be mounted to the chassis for attachment to the posts (5” channel width) of a GR-63 Zone 4 Seismic 2-post rack (Figure 116: Installing the Cisco ASR 9010 Router Chassis in a Seismic 2-Post Rack, on page 111).

a) Attach the side brackets to the left and right side of the chassis by finger-tightening five screws through each bracket into the chassis.
b) Attach the side bracket front flanges to the rack posts by finger-tightening four screws through each bracket flange into the mounting rails of the rack.
c) Fully tighten the five screws on each side bracket to secure the brackets to the chassis.
d) Fully tighten the four screws on each side bracket flange to secure the brackets to the rack rails.

Step 6 Fully tighten all five screws on the chassis mounting flanges on each side to secure the chassis to the rack rails.

Installing the Chassis in a 4-post Open Rack

To mount the Cisco ASR 9010 Router, Cisco ASR 9906 Router, Cisco ASR 9910 Router, Cisco ASR 9922 Router or Cisco ASR 9912 Router chassis in a 4-post open rack, two side brackets must be attached to the chassis and the rear posts. See Figure 124: Installing the Cisco ASR 9010 Router Chassis in a 4-Post Rack, on page 119 for the Cisco ASR 9010 Router , Figure 127: Installing the Cisco ASR 9906 Router Chassis in a 4-Post Rack - Right view, on page 121for the Cisco ASR 9906 Router, and Figure 130: Rack Mount Installation Kit for the Cisco ASR 9922 Router and Cisco ASR 9912 Router, on page 124 for the Cisco ASR 9922 Router and Cisco ASR 9912 Router.

To mount the Cisco ASR 9006 Router (Figure 125: Installing the Cisco ASR 9006 Router Chassis in a 4-Post Rack, on page 120) or Cisco ASR 9904 Router (Installing the Cisco ASR 9904 Router Chassis in a 4-Post Rack) in a 4-post open rack, extra brackets are not required.

Preparing the 19 Inch 45-RU Rack

To prepare the 19 Inch 45-RU rack that will contain either the Cisco ASR 9922 Router chassis or Cisco ASR 9912 Router chassis:

Procedure

Step 1 Install the two guide rails into the bottom of the rack (Figure 130: Rack Mount Installation Kit for the Cisco ASR 9922 Router and Cisco ASR 9912 Router, on page 124).

The two guide rails at the bottom of the rack are included in the ASR-9922-ACC-KIT and ASR-9912-ACC-KIT accessory kits. Use screws to fasten these two guide rails into the front and rear rails of the rack.

The two guide rails have six holes (three per rail) that accommodate 12-24 or M6 screws. If you want to use smaller 10-32 screws, you must use them with bushings to fit the larger holes (Figure 80: One 10-32 Screw with Bushings in Guide Rail Holes , on page 77). The bottom rail is keyed to the EIA mounting hole pattern. Install the rails at the first RU location. The rear rack mount brackets are installed by aligning the bracket mounting holes to the holes on the rear cover of the chassis.

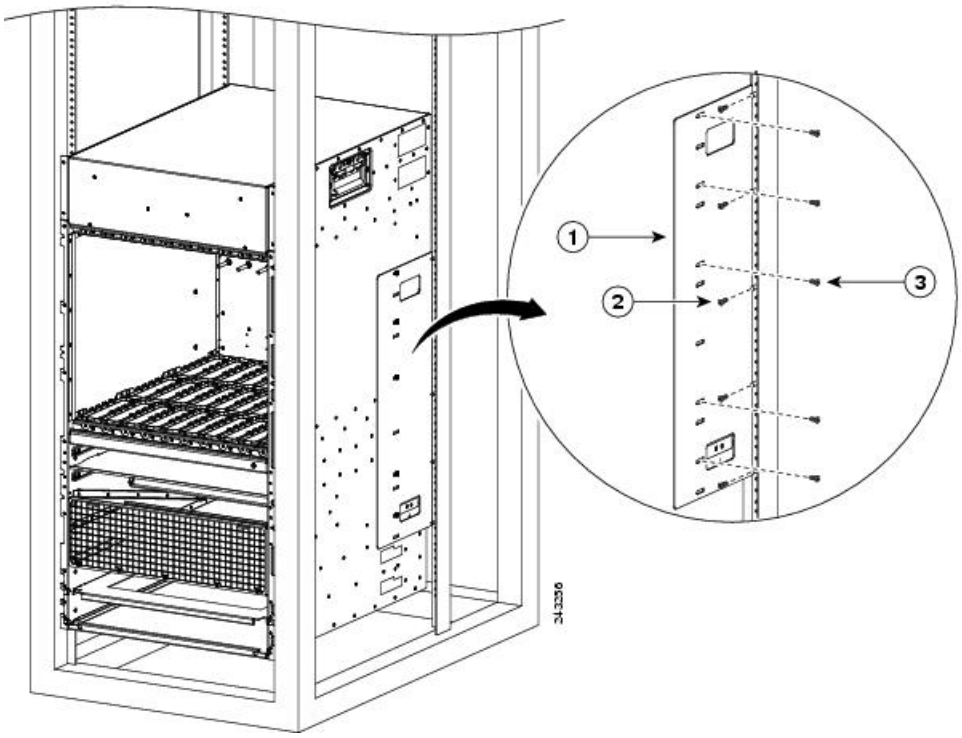
Step 2 Use a scissors jack to remove the chassis from the shipping rack. Place a pallet jack next to the chassis inside the shipping rack and push/pull the chassis onto the pallet jack for transport to the rack.

Step 3 On the rear of the Cisco ASR 9922 Router is an integrated handle that is used to pull the chassis from the pallet jack into the rack where the chassis is to be installed.

a) Position the chassis so that the rear handle is facing the front of the rack.
b) From the rear of the rack, pull the chassis by the handle into the rack, making sure that the chassis sits on top of the guide rails in the rack.

Step 4 On the Cisco ASR 9912 Router, the handles are on the sides of the chassis. Once the chassis is pulled into the rack and sits on top of the guide rails, use screws to fasten the chassis to the rack.

Figure 124: Installing the Cisco ASR 9010 Router Chassis in a 4-Post Rack



1	Rear mounting bracket	2	Five screws (minimum) to attach the rear mounting bracket to the rear post of the rack	3	Five screw mounting

Figure 125: Installing the Cisco ASR 9006 Router Chassis in a 4-Post Rack

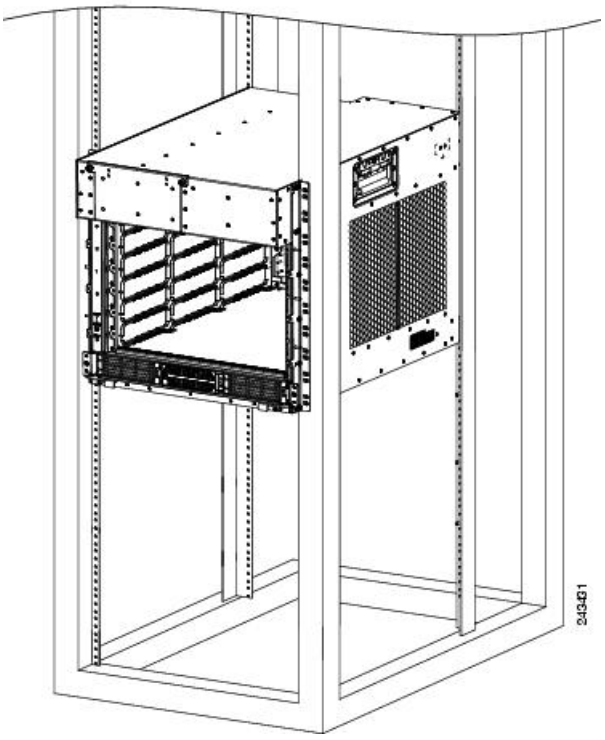


Figure 126: Installing the Cisco ASR 9904 Router Chassis in a 4-Post Rack

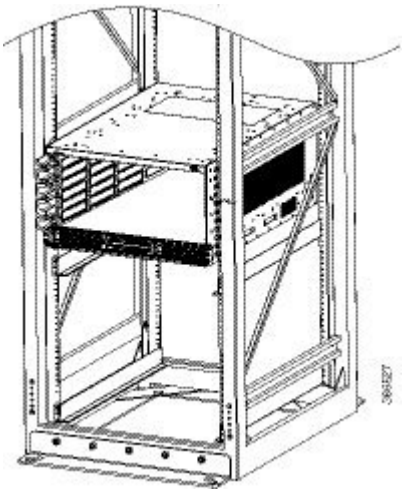


Figure 127: Installing the Cisco ASR 9906 Router Chassis in a 4-Post Rack - Right view

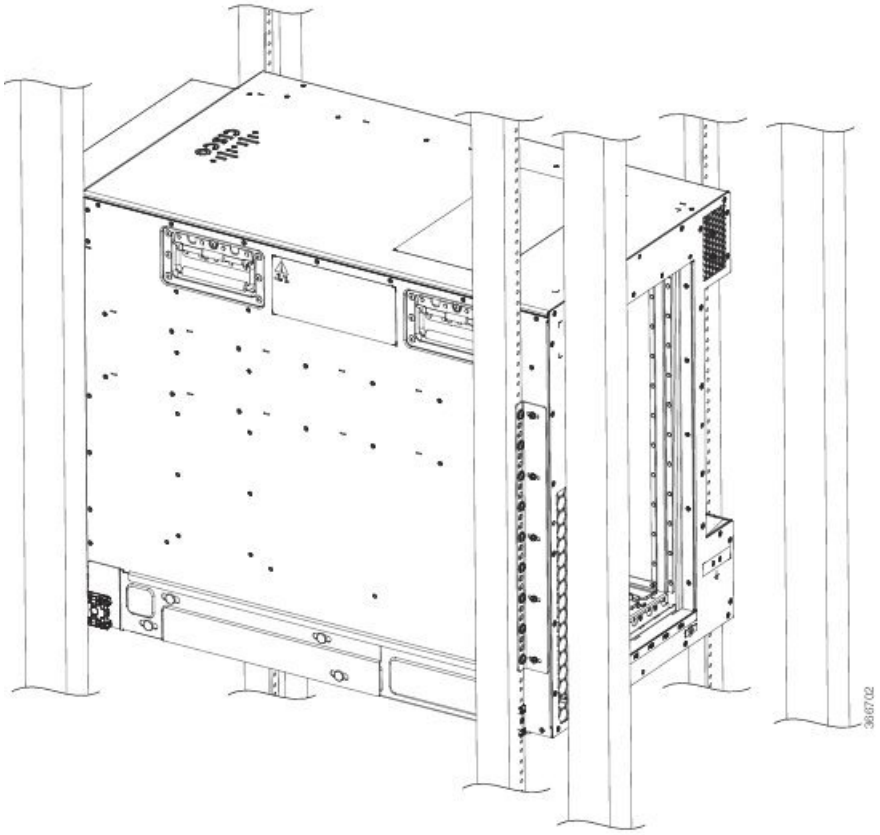


Figure 128: Installing the Cisco ASR 9906 Router Chassis in a 4-Post Rack - Left view

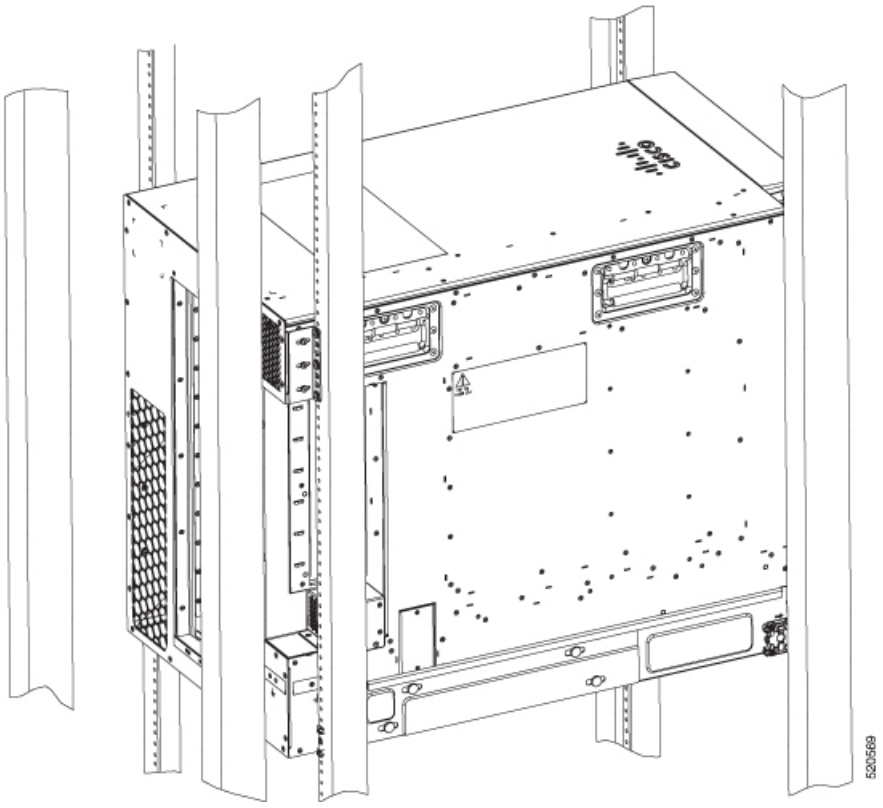
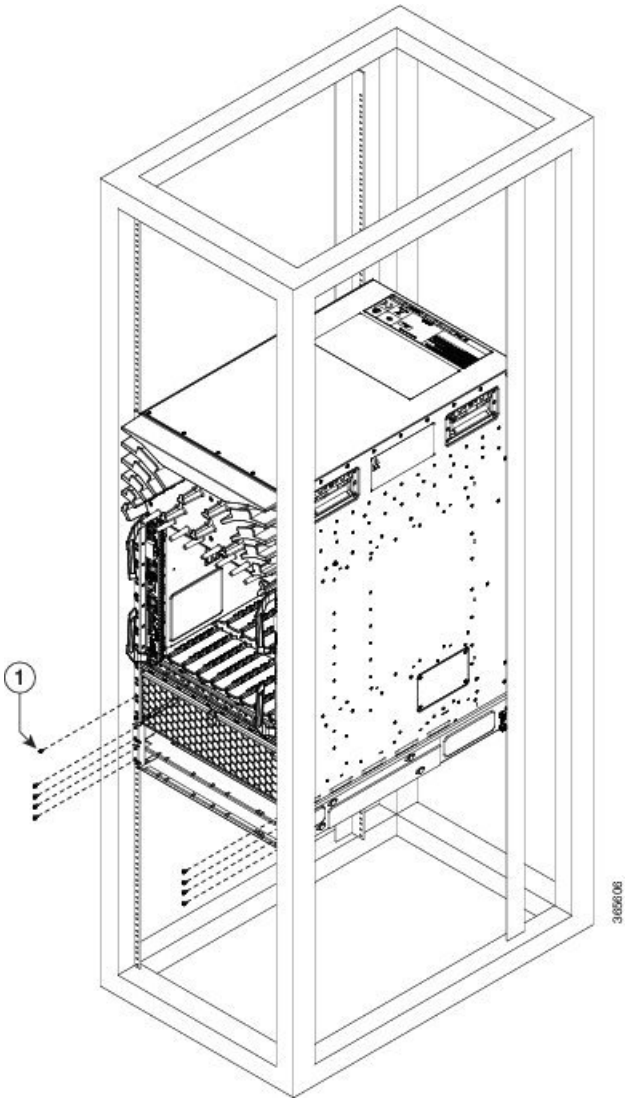


Figure 129: Installing the Cisco ASR 9910 Router Chassis in a 4-Post Rack



1	Use screws to attach the router chassis to the rack.	2	Use screws and four post rack mount brac rack mount bracket kit for this installatio

Figure 130: Rack Mount Installation Kit for the Cisco ASR 9922 Router and Cisco ASR 9912 Router

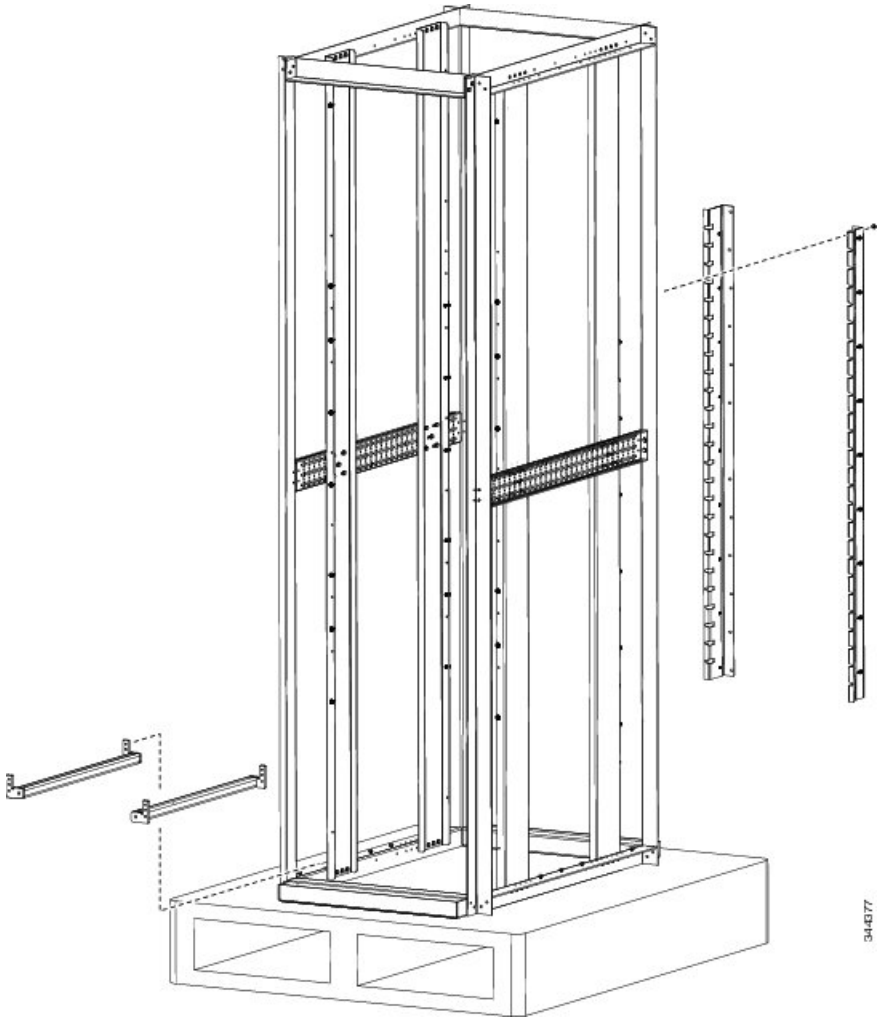


Figure 131: Installing the Cisco ASR 9922 Router Chassis in a 4-Post Rack

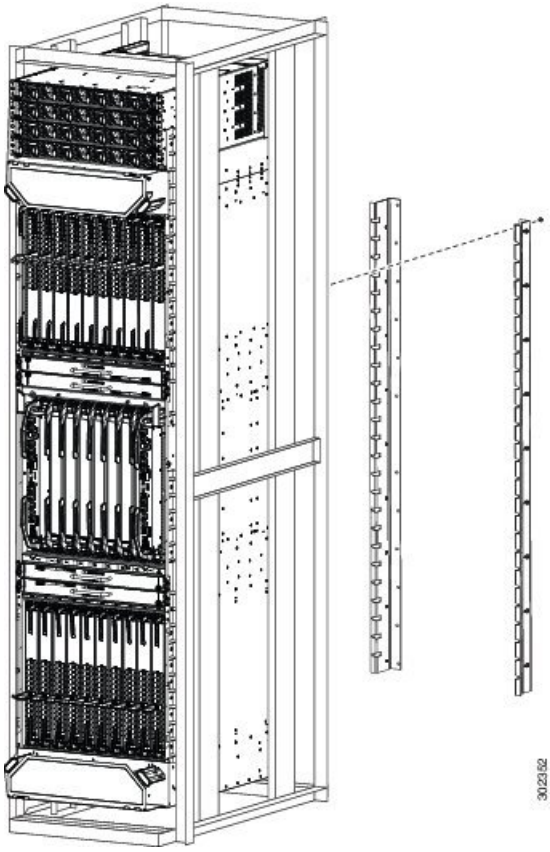
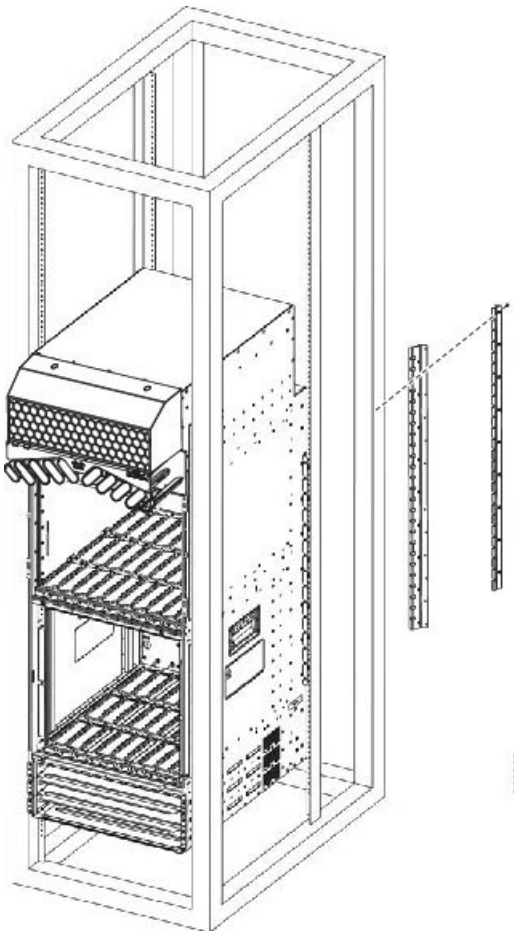


Figure 132: Installing the Cisco ASR 9922 Router Chassis in a 4-Post Rack



Supplemental Bonding and Grounding Connections

Before you connect power to the router, or power on the router for the first time, we recommend that you connect the central office ground system or Network Equipment Building System (NEBS) to the threaded supplemental bonding and grounding receptacles on the router. For more information on supplemental bonding and grounding cable requirements, see NEBS Supplemental Unit Bonding and Grounding Guidelines, page 1-60 .

The table below references the grounding receptacle locations for the Cisco ASR 9000 Series Routers.

Table 12: Grounding Receptacle Locations

Model Number	Grounding Receptacle Location
Cisco ASR 9010 Router and Cisco ASR 9910 Router	Bottom rear right side of the chassis (Figure 133: NEBS Bonding and Grounding for the Cisco ASR 9010 Router, on page 127).

Model Number	Grounding Receptacle Location
Cisco ASR 9006 Router	Top rear right side of the chassis (Figure 134: NEBS Bonding and Grounding for the Cisco ASR 9006 Router, on page 128).
Cisco ASR 9904 Router	Bottom rear right side and rear left side of the chassis (Figure 135: NEBS Bonding and Grounding for the Cisco ASR 9904 Router, on page 128).
Cisco ASR 9906 Router	Bottom rear and left side of the chassis (NEBS Bonding and Grounding for the Cisco ASR 9906 Router).
Cisco ASR 9922 Router	Top rear right side of the chassis (Figure 137: NEBS Bonding and Grounding for the Cisco ASR 9922 Router, on page 129).
Cisco ASR 9912 Router	Bottom rear right side of the chassis (Figure 138: NEBS Bonding and Grounding for the Cisco ASR 9912 Router, on page 130).

Follow these steps to attach a grounding cable lug to the router:

Procedure

Step 1 Insert the grounding screws (10-32 round-head) through the locking washers (ideally nickel-plated brass) and into the threaded grounding receptacle (has two M6 bolt holes with 0.625 to 0.75 spacing between them). The wire receptacle is large enough to accept a #6 AWG or larger multi-strand copper wire.

Step 2 Tighten the grounding screws securely to the receptacles.

Step 3 Prepare the other end of the grounding wire and connect it to the appropriate grounding point at your site to ensure an adequate earth ground.

Figure 133: NEBS Bonding and Grounding for the Cisco ASR 9010 Router

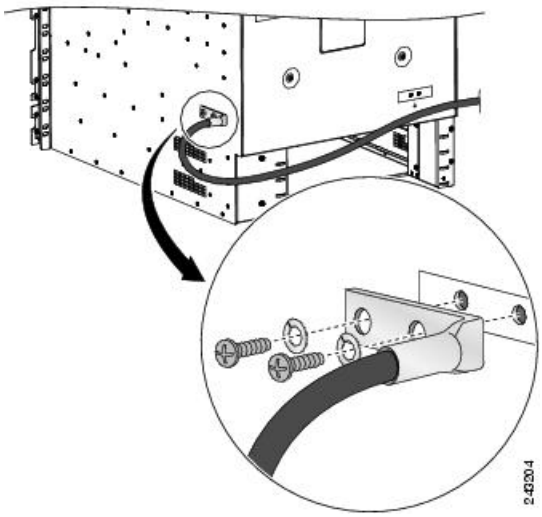


Figure 134: NEBS Bonding and Grounding for the Cisco ASR 9006 Router

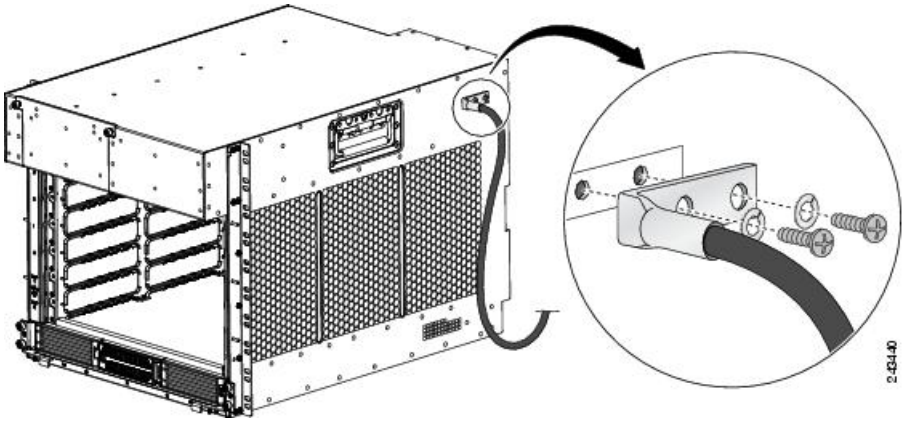


Figure 135: NEBS Bonding and Grounding for the Cisco ASR 9904 Router

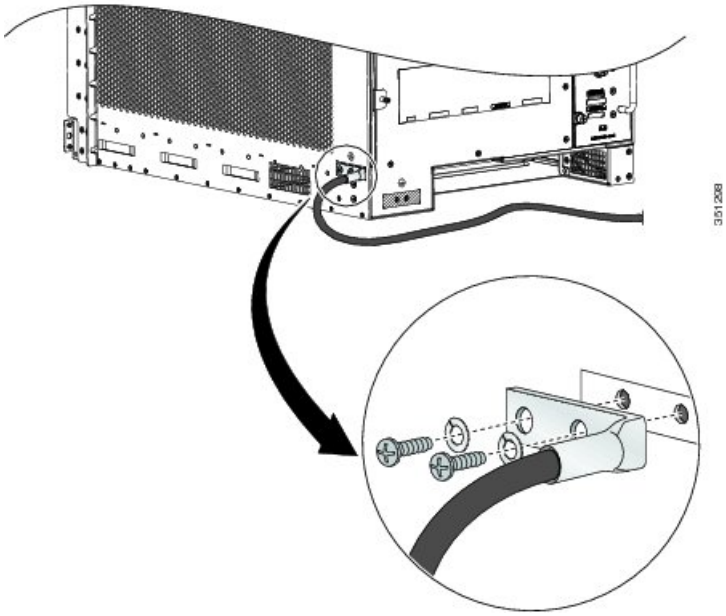


Figure 136: NEBS Bonding and Grounding for the Cisco ASR 9906 Router

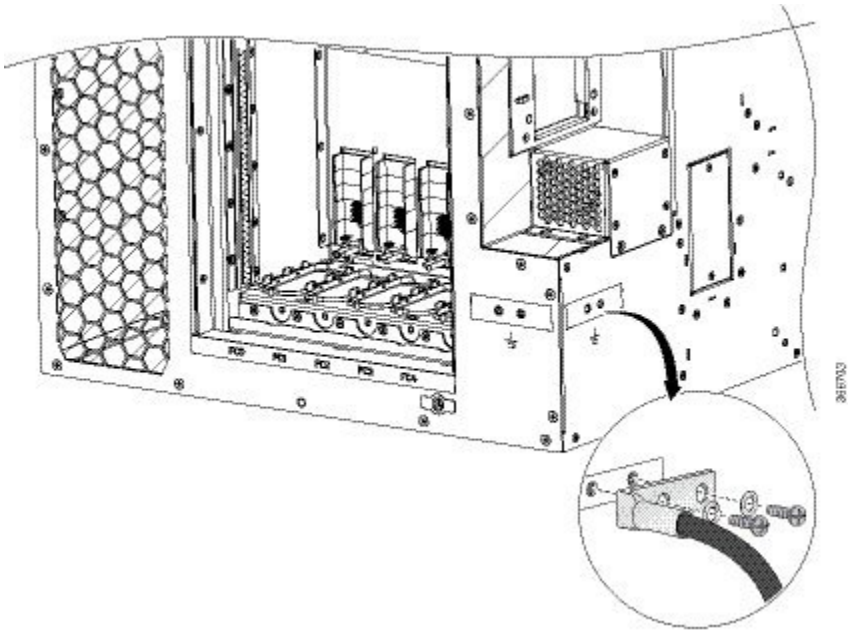


Figure 137: NEBS Bonding and Grounding for the Cisco ASR 9922 Router

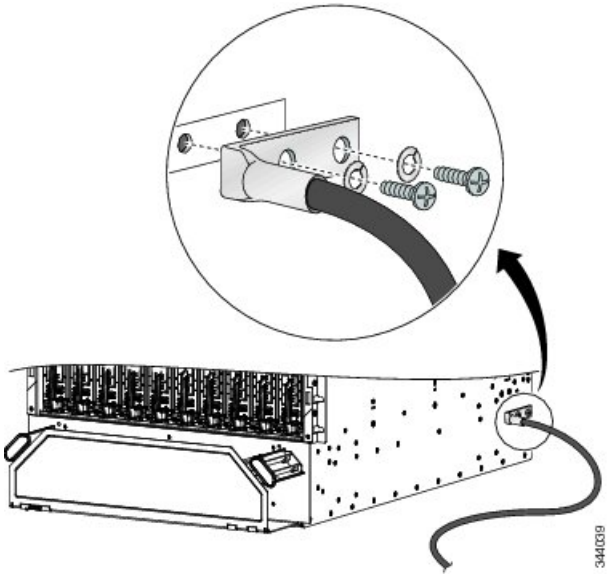
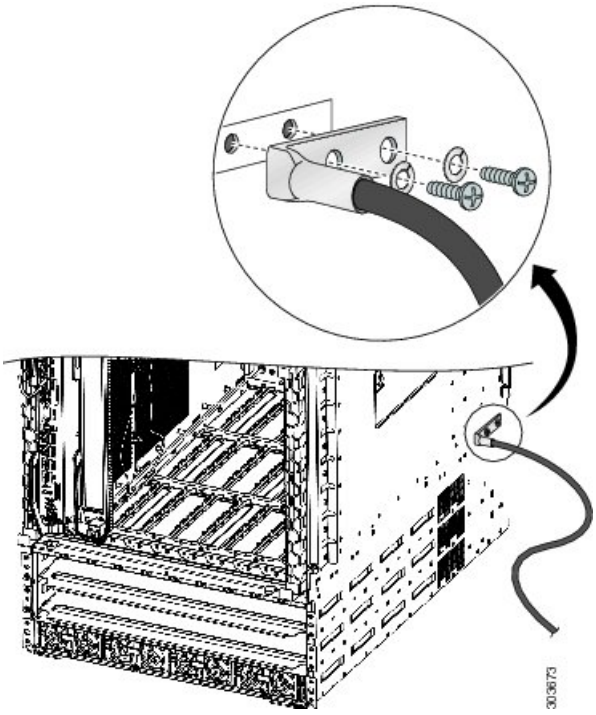


Figure 138: NEBS Bonding and Grounding for the Cisco ASR 9912 Router



Installing Chassis Accessories

The Cisco ASR 9000 Series Routers ship with a base set of chassis accessories. To install the base accessories and optional accessories, see the appropriate installation procedure below for your router:

Base Accessories

Note The Cisco ASR 9904 Router and Cisco ASR 9910 Router do not include base chassis accessories.

Optional Accessories

Installing Base Chassis Accessories on the Cisco ASR 9010 Router

The base chassis accessories for the Cisco ASR 9010 Router include:

- Two ball studs
- Two plastic side strips
- One accessory front grill

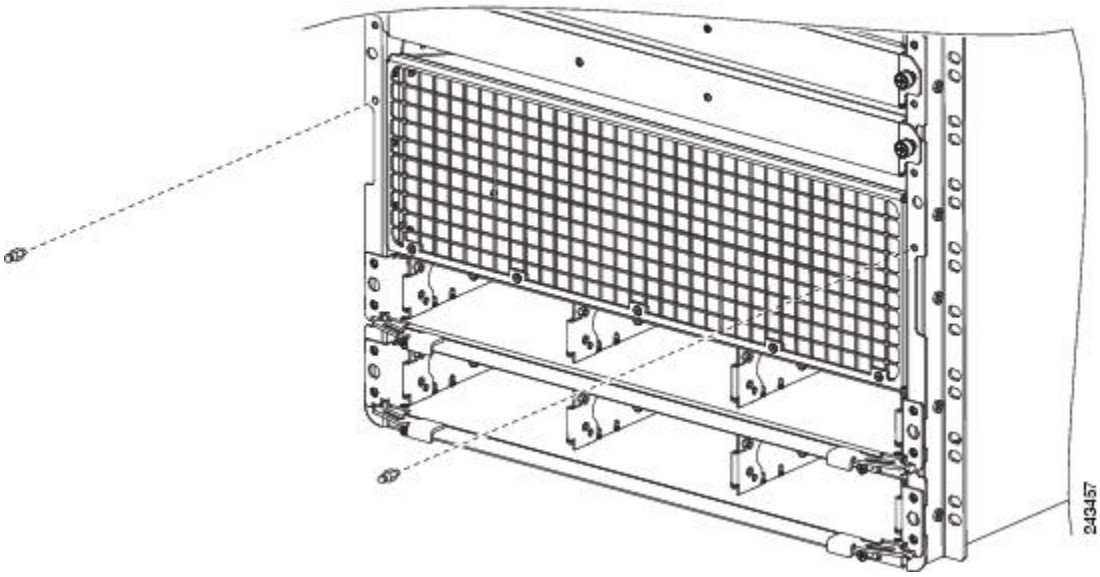
Note If you ordered the optional accessories set, see Installing Optional Chassis Accessories on the Cisco ASR 9910 Router, on page 156 to install both the base and optional accessories.

If you did not order the optional accessory set, follow these steps to install the supplied base chassis accessories on the Cisco ASR 9010 Router:

Procedure

Step 1 Install two ball studs (one per side) into the chassis front edge (see the figure below) near the top of the chassis grill. Tighten the ball studs to a torque of 8 in-lb (0.90 N-m).

Figure 139: Installing Ball Studs: Version 1 Power Cisco ASR 9010 Router (Base Accessories Installation)

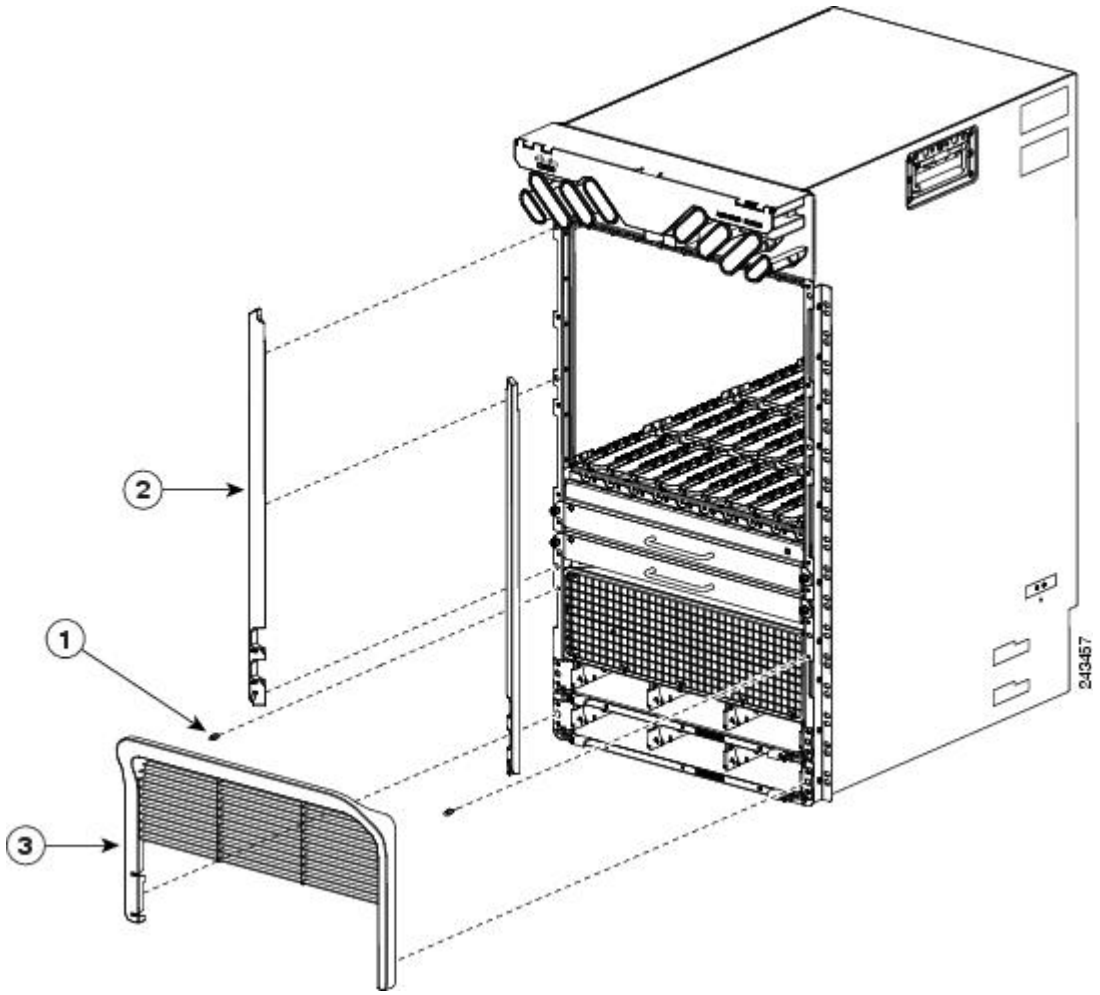


Step 2 Attach two plastic strips (one per side) along the chassis front edge. The bottom tab of each strip attaches to the hole about 2 inches above the ball stud locations (Figure 140: Installing Base Chassis Accessories on the Cisco ASR 9010 Router, on page 132).

Step 3 Attach the accessory grill to the chassis in front of the chassis grill. The top of the accessory grill attaches to the ball studs.

Note
You must install the lower fan tray before attaching the accessory grill. The lower fan tray slot is located behind the accessory grill. See Installing Cards and Modules in the Chassis, on page 163.

Figure 140: Installing Base Chassis Accessories on the Cisco ASR 9010 Router



1	Two are ball studs inserted in front chassis edge threaded holes next to chassis grill	2	Two side strips attach to front chassis edge (one per side).	3	Accessory gri edge by attacl

Installing Optional Chassis Accessories on the Cisco ASR 9010 Router

The optional chassis accessories for the Cisco ASR 9010 Router include:

- Six ball studs
- Two L-shaped brackets
- Two hinge brackets (left and right side)
- Eight screws (plus one extra) for attaching the hinge brackets
- Four screws for attaching the L-shaped brackets

- Two doors (left and right side)
- One mid-cover with door lock

Note Installation of the optional accessory pieces also includes the base accessory ball studs and front grill. The base accessory side strips are not used when installing the optional chassis accessories.

If you ordered the optional accessories set, follow these steps to install both the base and optional accessories (see the figure below):

Procedure

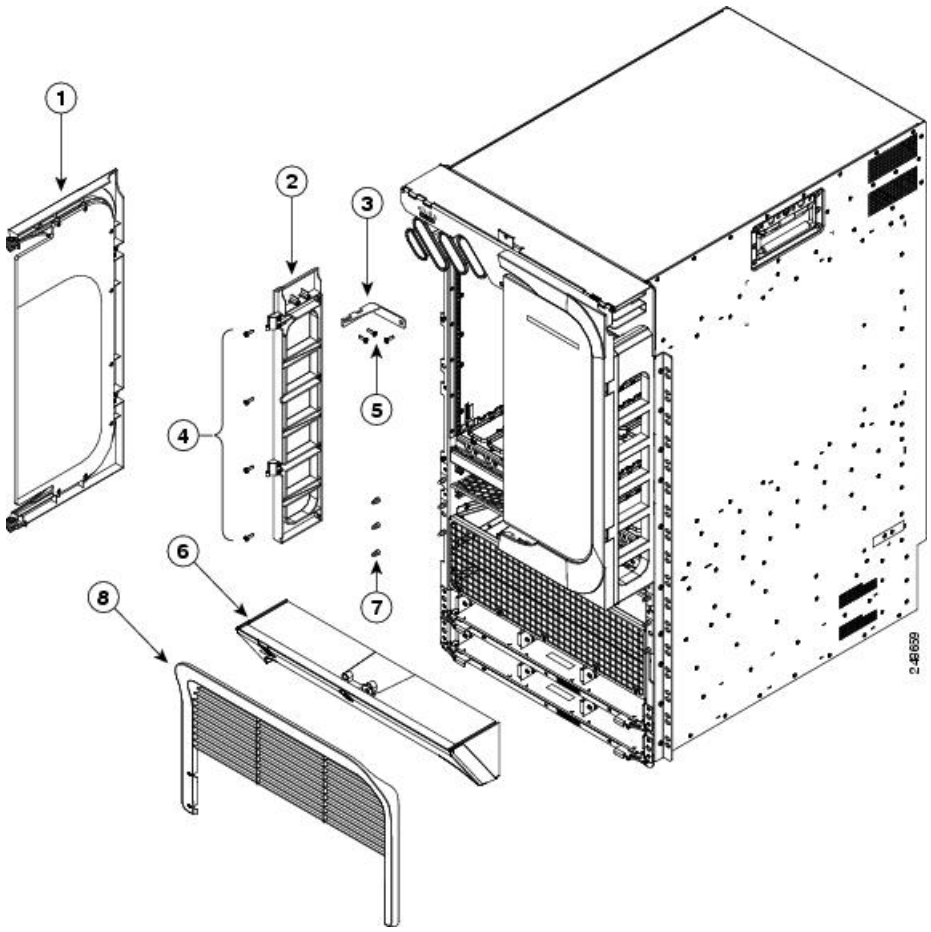
Step 1 Attach the left L-shaped bracket (item 3 in the figure below) to the left hinge bracket (item 2 in the figure below) with two screws. Tighten the screws to a torque of 5 in-lb (0.55 N-m).

Step 2 Repeat Step 1 for the right hinge bracket and right L-shaped bracket.

Step 3 Remove the two screws that secure the bottom edge of the cable management tray to the chassis.

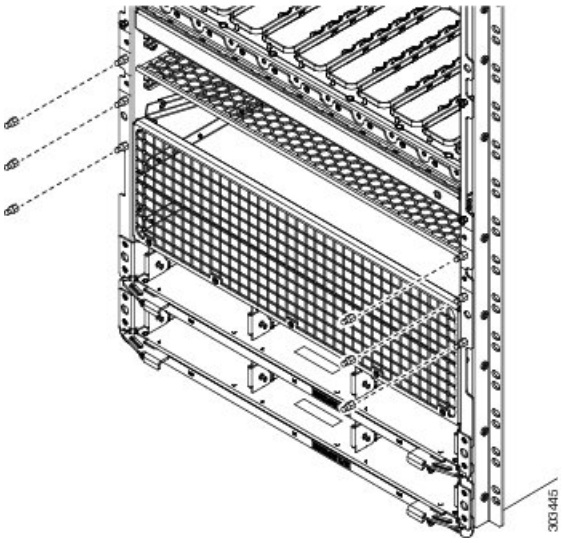
Step 4 Install six ball studs (three per side) into the chassis front edge (item 7 in the figure below and Figure 142: Locations for the Six Ball Studs on the Cisco ASR 9010 Router, on page 135). Tighten the ball studs to a torque of 8 in-lb (0.90 N-m).

Figure 141: Optional Chassis Accessories for the Cisco ASR 9010 Router



1	Door (one per side)	5	Screws for attaching the L-shaped bracket to t (one screw is removed and re-inserted to atta bracket to the cable management tray and cha
2	Hinge bracket (one per side)	6	Mid-cover with door lock
3	L-shaped bracket (one per side)	7	Balls studs (three per side)
4	Four screws for attaching each hinge bracket (eight screws total)	8	Front grill

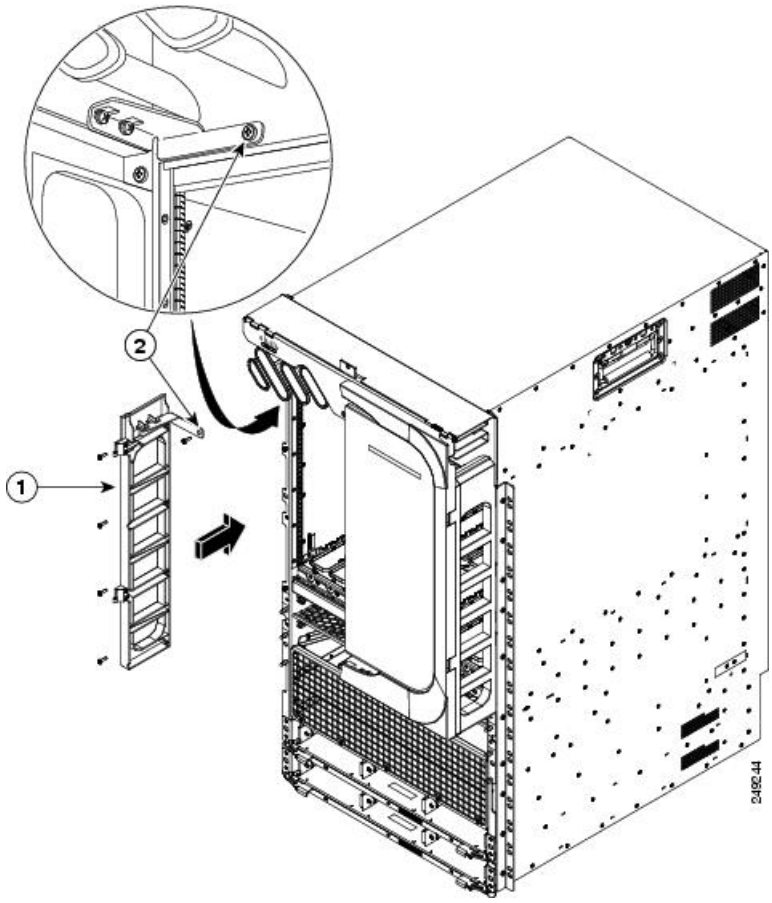
Figure 142: Locations for the Six Ball Studs on the Cisco ASR 9010 Router



Step 5 Attach the left and right hinge brackets to the chassis using four screws for each bracket. Tighten the screws to a torque of 11 in-lb (1.20 N-m). The L-shaped brackets should align with the holes in the cable management tray from which you removed the screws.

Step 6 Secure the L-shaped brackets to the chassis and cable management tray by re-inserting and tightening the cable management tray screws you removed (see the figure below).

Figure 143: Installing the Hinge Brackets and L-Shaped Brackets on the Cisco ASR 9010 Router



1	Install each hinge bracket, with an L-shaped bracket attached, using four screws.	2	After the hinge brackets are installed, secure bracket to the cable management tray and cha screw that you previously removed from that

Step 7 Install the mid-cover with door lock (item 6 in Step 4, on page 133) by engaging it to the upper four ball studs and lining up the grooves in the top outside edges of the mid-cover with ridges at the bottom of the hinge brackets.

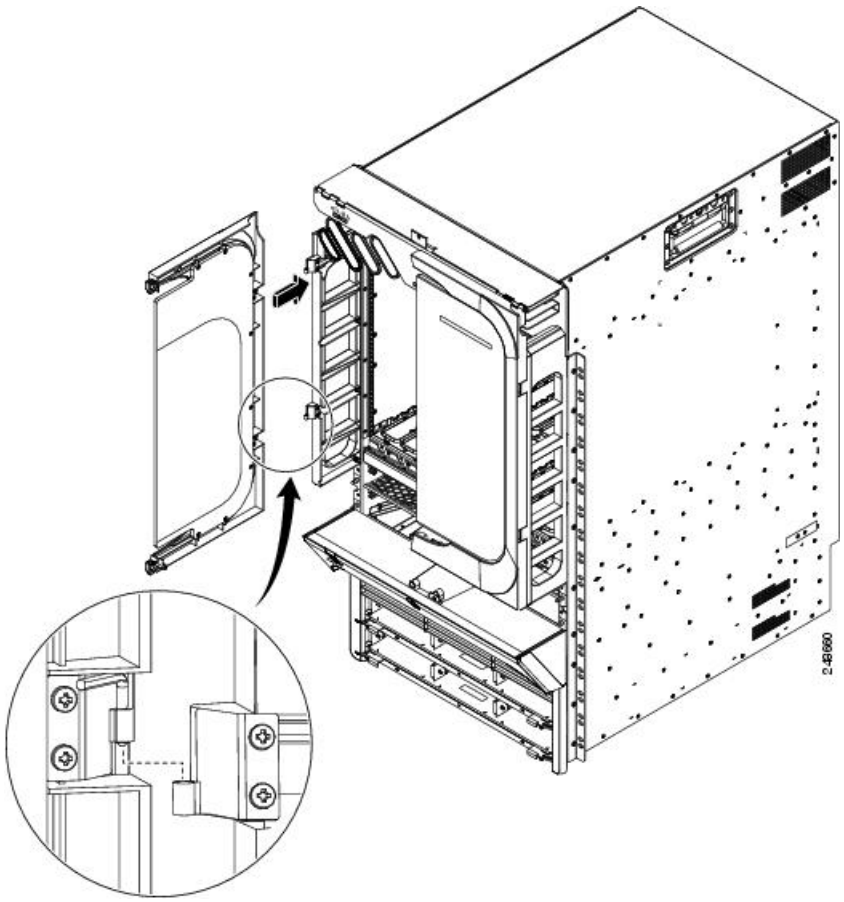
Step 8 Attach two doors to the hinge brackets (one per side). For each door:

a) Align the door hinge hole with the bracket hinge hole (see the figure below).

b) Insert the captive pin in the door hinge through the hole in the bracket hinge.

Note
You must install the lower fan tray before attaching the accessory grill. The lower fan tray slot is located behind the accessory grill. See Installing Fan Trays, page 3-4 .

Figure 144: Installing Optional Chassis Accessory Doors on the Cisco ASR 9010 Router



Step 9 Install the front grill (item 8 in the Step 4, on page 133 by aligning and engaging it to the bottom two ball studs and pressing it in.

Installing Base Chassis Accessories on the Cisco ASR 9006 Router

The base chassis accessories for the Cisco ASR 9006 Router include:

- One plastic fan tray door accessory piece
- Two metal mounting brackets (left and right)
- Two chassis side brackets (left and right)
- Two plastic chassis corner pieces (left and right)
- Two screws for attaching the plastic fan tray door accessory piece
- Six screws for attaching the metal mounting brackets
- Six screws for attaching the side brackets

Note If you ordered the optional accessories set, see Installing Optional Chassis Accessories on the Cisco ASR 9010 Router, on page 132 to install both the base and optional accessories.

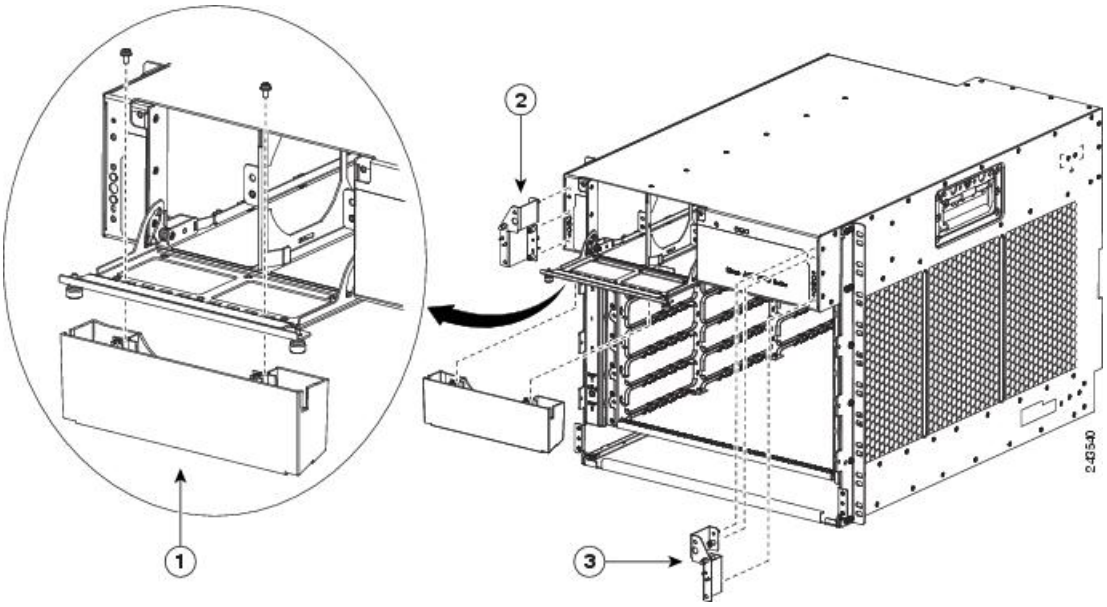
If you did not order the optional accessory set, follow these steps to install the supplied base chassis accessories on the Cisco ASR 9006 Router.

Procedure

Step 1 Attach the plastic accessory piece to the fan tray door using two supplied screws. Insert the screws through the fan tray door from the inside of the door into the accessory piece (see the figure below).

Step 2 Attach the left metal mounting bracket to the front upper left corner of the chassis with three screws.

Figure 145: Installing Plastic Fan Tray Door Accessory and Metal Mounting Brackets on the Cisco ASR 9006 Router

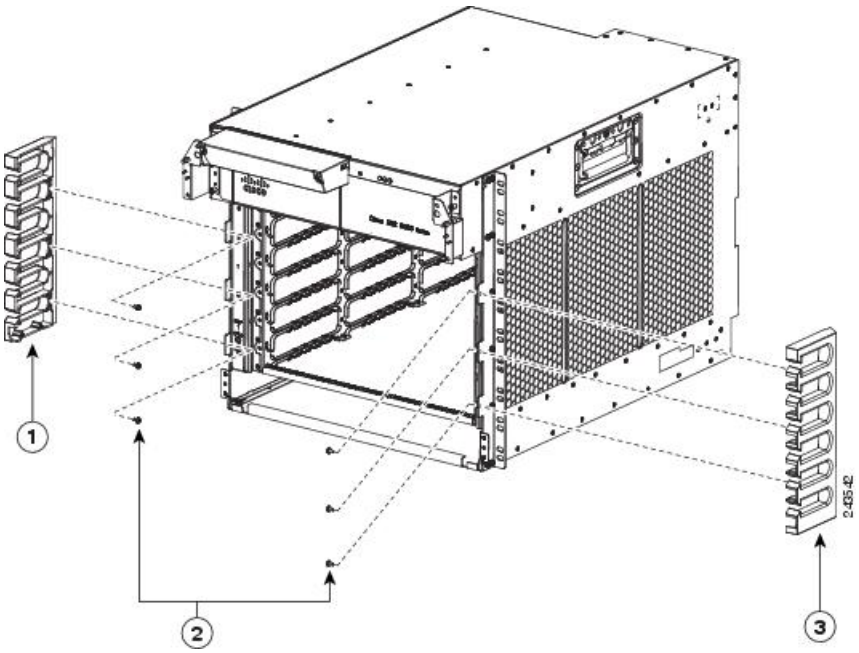


1	Plastic fan tray door accessory	2	Metal mounting bracket on left upper corner of chassis	3	Metal mounting bracket on right upp corner of chassis

Step 3 Attach the right metal mounting bracket to the front upper right corner of the chassis with three screws.

Step 4 Attach the left and right side brackets to the chassis front edge on each side (see the figure below). Attach each bracket to the chassis using three screws per bracket inserted from the inside of the chassis, through the three chassis tabs into the plastic brackets. Tighten the screws to a torque of 7 in-lb (0.80 N-m).

Figure 146: Installing Chassis Side Brackets on the Cisco ASR 9010 Router

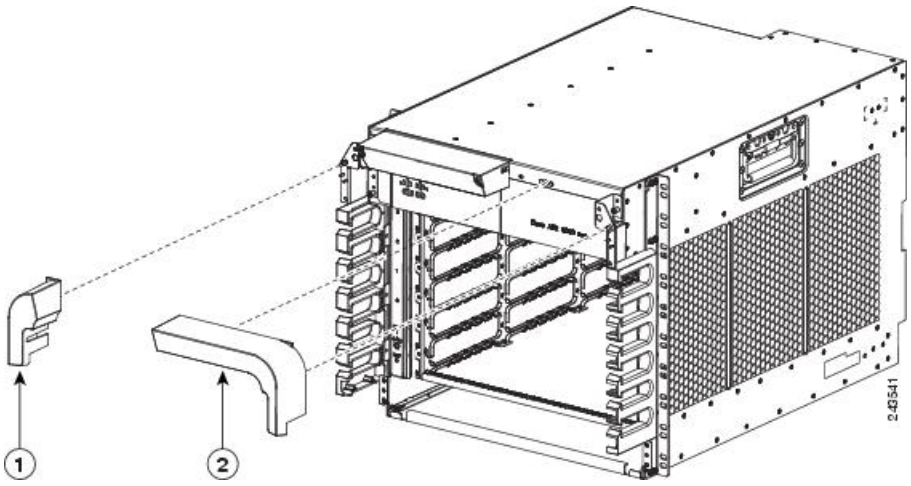


1	Left chassis side bracket	2	Six screws for attaching the chassis side brackets (three per side)	3	Right chas

Step 5 Attach the left plastic corner piece to the mounting bracket at the front upper left corner of the chassis (see the figure below).

Step 6 Attach the right plastic corner piece to the mounting bracket at the front upper right corner of the chassis.

Figure 147: Installing Plastic Chassis Corners on the Cisco ASR 9006 Router (Base Accessories Installation)



1	Plastic chassis corner piece attaches to metal bracket at upper left corner of chassis	2	Plastic chassis corner piece attaches to me right corner of chassis

After the chassis has been installed in the rack and all chassis accessories have been attached, you can install the fan trays, power supply modules, and RSP and line cards. See the chapter *Installing Cards and Modules in the Chassis* in the book *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide*for detailed installation instructions.

Installing Optional Chassis Accessories on the Cisco ASR 9006 Router

The optional chassis accessories for the Cisco ASR 9006 Router include:

- Four ball stud assembly pieces (one set of two pieces per side)
- One door with attached hinges
- Four screws for assembling and attaching the ball stud assemblies
- Four small hex nuts for attaching the door hinges

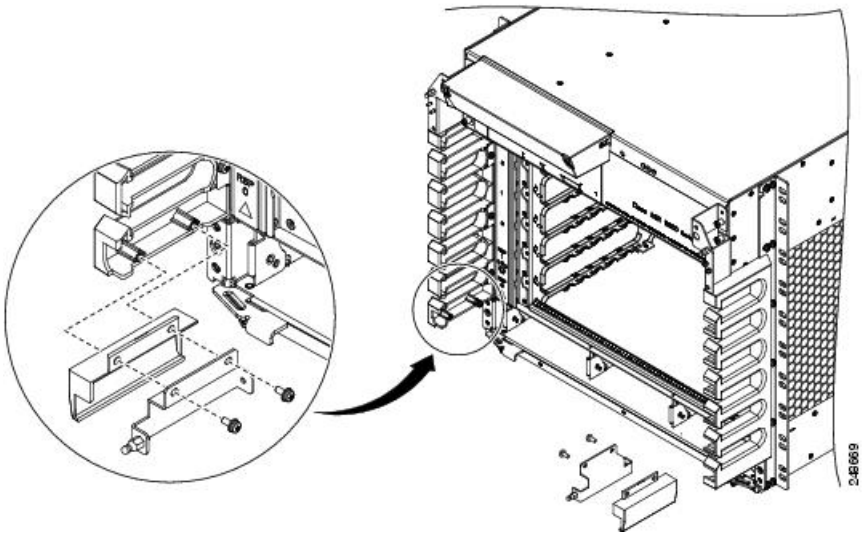
Procedure

Step 1 Perform Step 1 through Step 2 in the task Installing Base Chassis Accessories on the Cisco ASR 9006 Router, on page 137.

Step 2 Assemble and attach the two ball stud assemblies (see the figure below) to each chassis side bracket. For each assembly:

a) Align the two halves of the assembly to each other and to the screw holes in the chassis side bracket.
b) Insert and tighten two screws to secure the assembly to the side bracket.

Figure 148: Installing Ball Stud Assemblies on the Cisco ASR 9006 Router (Shown with Version 1 Power System)

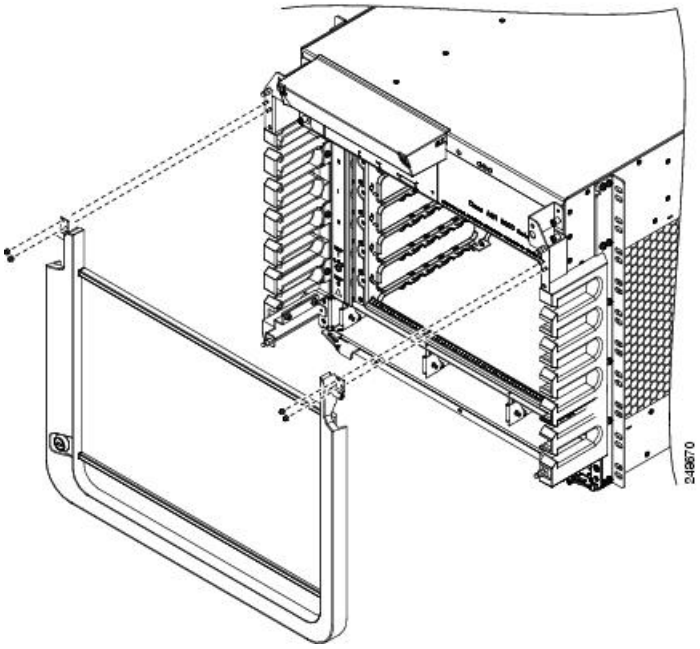


Step 3 Attach the door to the upper chassis panel (see the figure below) using two hex nuts per side to secure the door hinges to the panel. Tighten the hex nuts to a torque of 4 in-lb (0.45 N-m).

Caution
Do not overtighten the hex nuts. They can be broken through overtightening.

Caution
When opening the door, be sure to grasp the center of the door to pull it open. Do not open the door by pulling on a corner or side of the door frame.

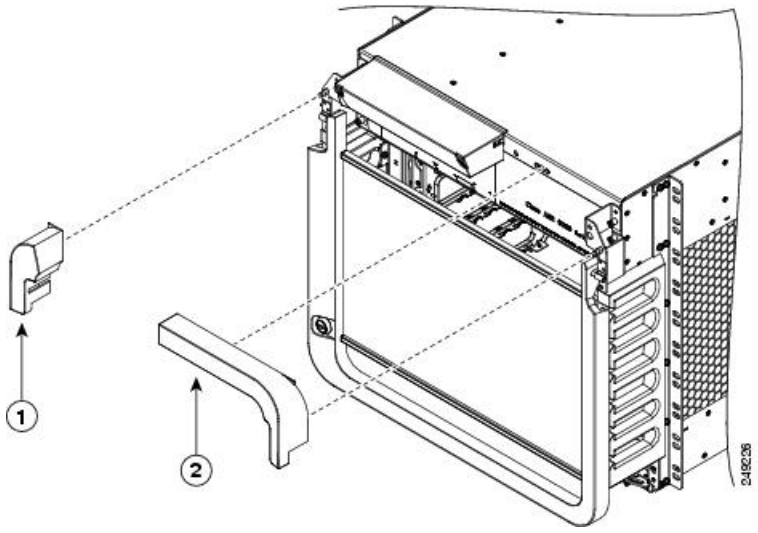
Figure 149: Installing the Optional Accessory Door on the Cisco ASR 9006 Router



Step 4 Attach the left plastic corner piece to the mounting bracket at the front upper left corner of the chassis (Figure 150: Installing Plastic Chassis Corners on the Cisco ASR 9006 Router (Optional Accessories Installation), on page 142).

Step 5 Attach the right plastic corner piece to the mounting bracket at the front upper right corner of the chassis.

Figure 150: Installing Plastic Chassis Corners on the Cisco ASR 9006 Router (Optional Accessories Installation)



1	Plastic chassis corner piece attaches to metal bracket at upper left corner of chassis	2	Plastic chassis corner piece attaches to metal right corner of chassis

After the chassis has been installed in the rack and all chassis accessories have been attached, you can install the fan trays, power supply modules, and RSP and line cards. See *Installing Cards and Modules in the Chassis* in the book *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide* for detailed installation instructions.

Installing Optional Air Baffles on the Cisco ASR 9006 Router

The Cisco ASR 9006 Router has an optional air baffle accessory kit (800-43858-01) for mounting the router chassis in a 2-post or 4-post 19-inch rack. The accessory kit includes:

- One plenum with two pre-installed front rack-mounting brackets for attaching plenum to front side of rack-post
- One support bracket
- One plastic glide strip
- Two rear rack-mounting brackets for attaching plenum to rear side of rack-post
- Twelve 12-24 x 0.5 in. pan-head screws (six for attaching support bracket to chassis and six for securing chassis to rack-mounted plenum)
- Twelve 8-32 x 0.5 in. pan-head screws for attaching rear rack-mounting brackets on plenum

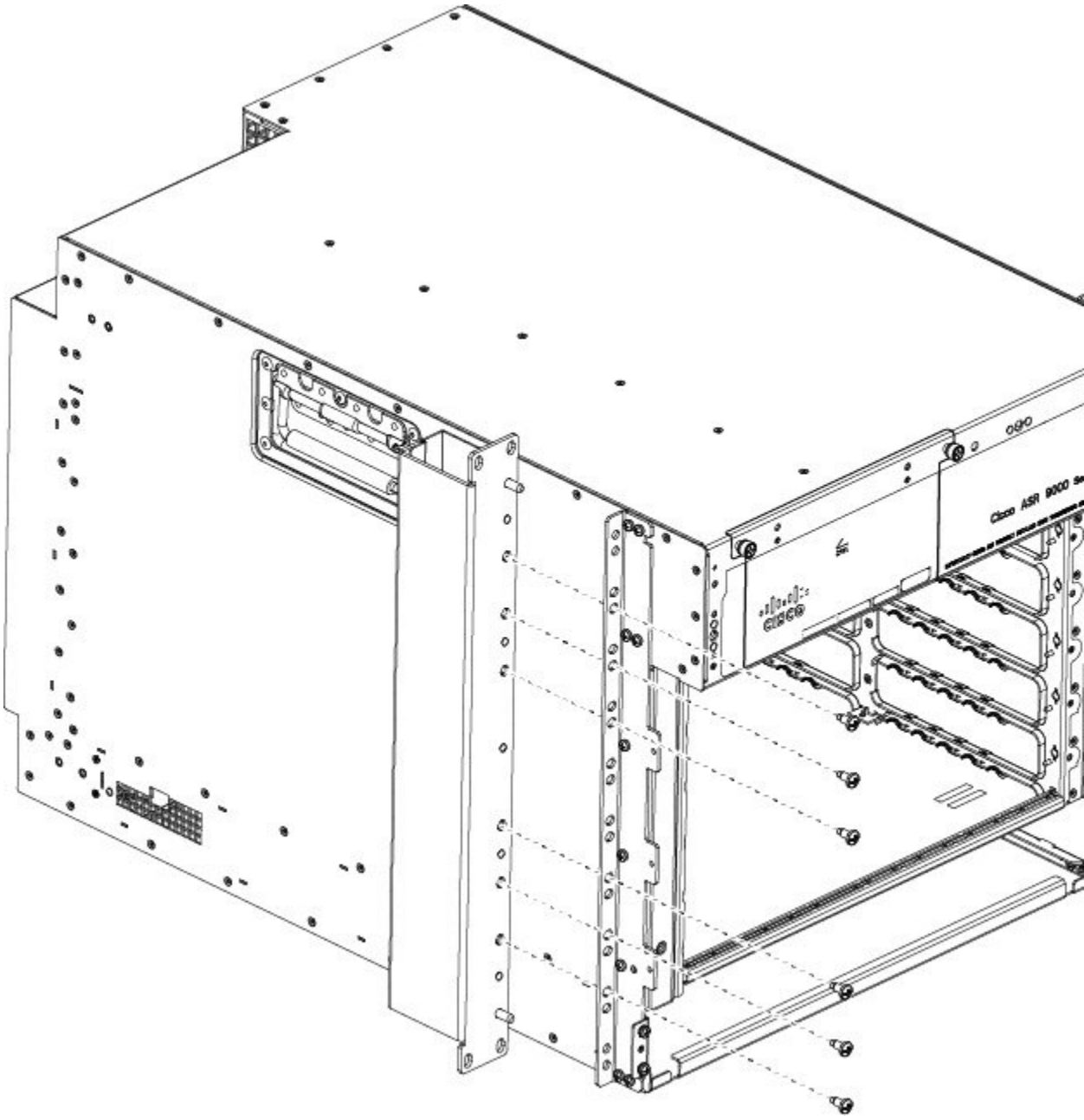
Air baffles allow for front-to-back air flow through the chassis and help isolate exhaust air from the intake air.

If you ordered the optional air baffle accessory kit, follow these steps to install it:

Procedure

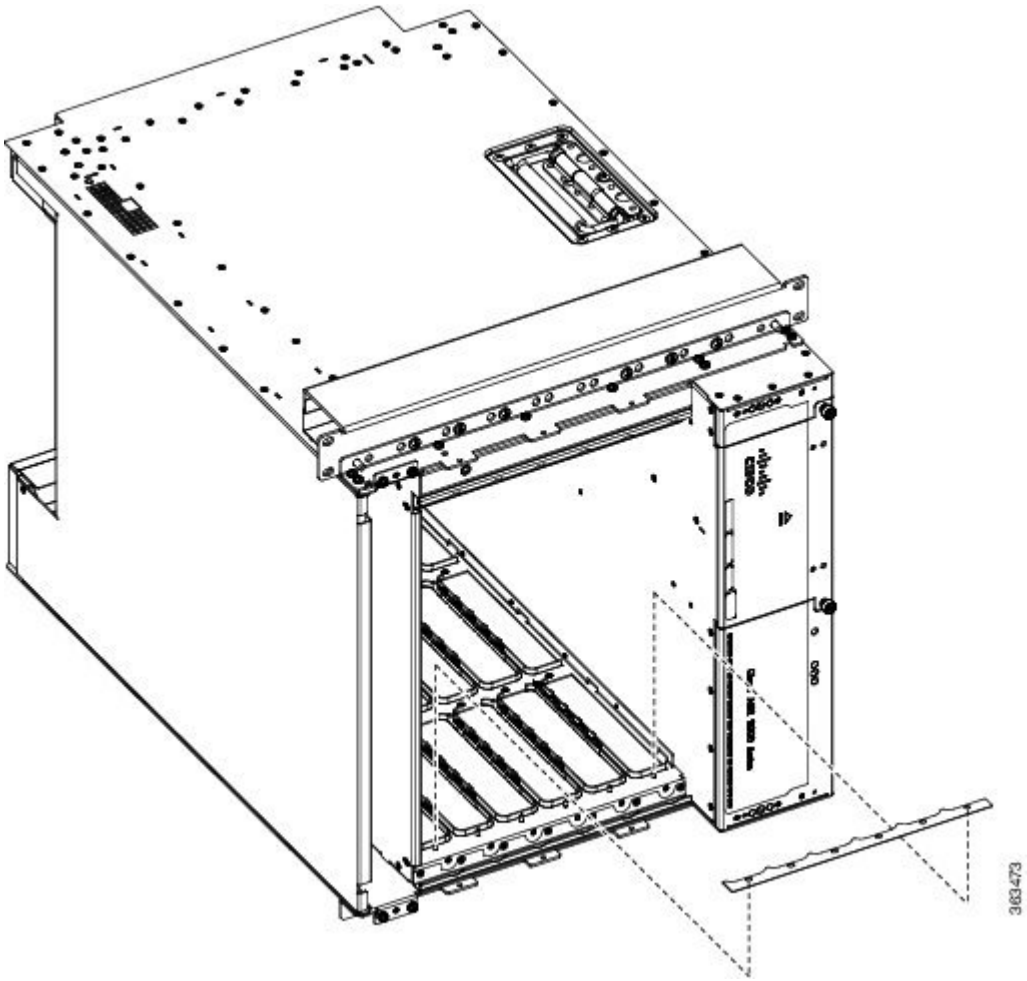
Step 1 Attach the support bracket (part number: 800-43857-01) to the left side of the Cisco ASR 9006 Router using six 12-24 x 0.5 in. pan-head screws (part number: 48-0523-01). See the figure below.

Figure 151: Attaching the Support Bracket to the Left Side of the Cisco ASR 9006 Router Chassis



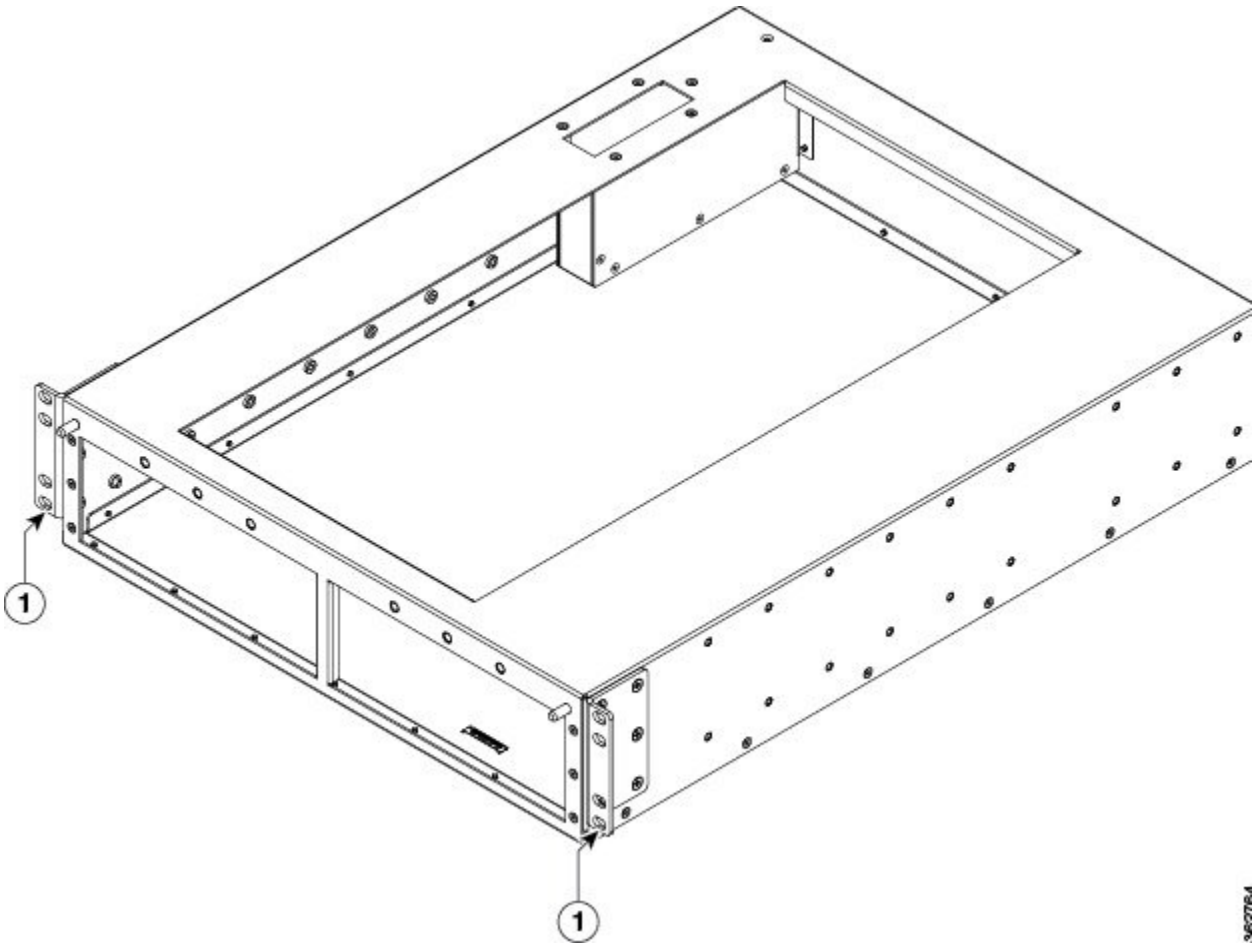
Step 2 Remove the paper liner from the plastic guide strip and install on the right side of the chassis card cage, as shown in the figure below.

Figure 152: Attaching Plastic Glide Strip to Chassis



Step 3 Install the plenum in the rack. Insert and tighten four customer-supplied screws to secure the plenum to the front of the rack-post (two on each side). These screws can vary in size and type depending on the rack that you use. Torque the screws to the weight specified for your particular rack. See Figure 153: Plenum with Pre-Installed Front Mounting Brackets, on page 145 and Figure 154: Installing the Plenum in a Two-Post 19-Inch Rack, on page 146.

Figure 153: Plenum with Pre-Installed Front Mounting Brackets



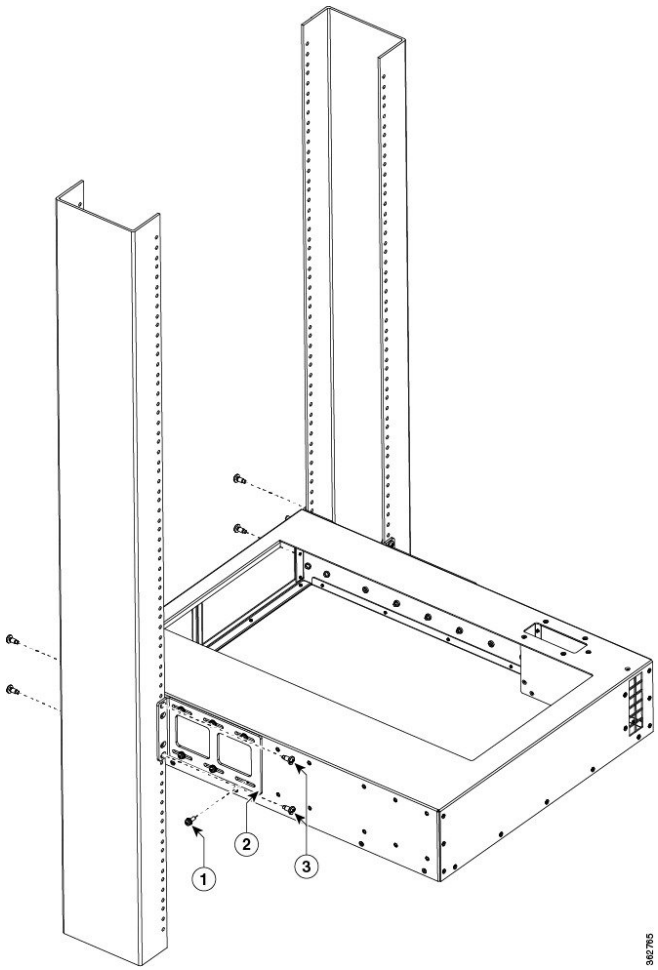
1	Front rack-mounting bracket, pre-installed

Step 4 Attach the rear rack-mounting brackets (part number: 700-47414-01) to the left and right sides of the plenum base, using twelve 8-32 x 0.5 in. pan-head screws ((part number: 48-0828-01), six per bracket.

- If you are installing the chassis in a two-post rack, the rear rack-mounting brackets secure the plenum to the rear of the rack-posts (Figure 154: Installing the Plenum in a Two-Post 19-Inch Rack, on page 146).
- If you are installing the chassis in a four-post rack, rotate the rear rack-mounting brackets by 180 degrees and attach to both sides of the plenum. The rear rack-mounting brackets secure the plenum to the rear rack-posts.

Step 5 Insert and tighten four customer-supplied screws to secure the plenum to the rear of the rack-post (two on each side). These screws can vary in size and type depending on the rack that you use. Torque the screws to the weight specified for your particular rack (see the figure below).

Figure 154: Installing the Plenum in a Two-Post 19-Inch Rack



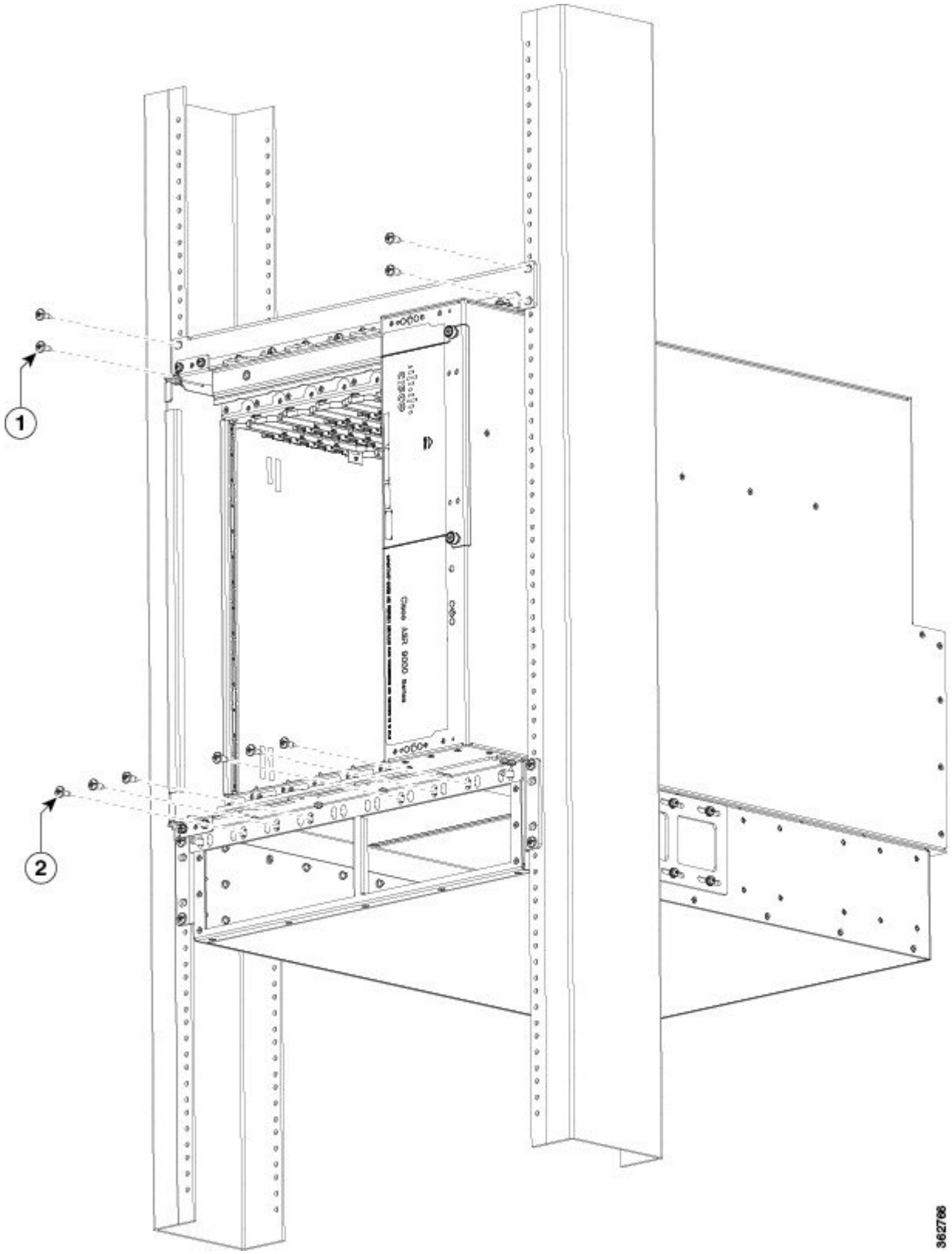
1	Screw attaching rear-rack mounting bracket to plenum (six per bracket)	3	Screws attaching rear-rack mounting bracket bracket)
2	Rear rack-mounting bracket		

Step 6 Turn the chassis sideways and slide it into the rack (Figure 155: Securing the ASR 9006 Router in a Two-Post 19-Inch Rack, on page 147).

Step 7 Insert and tighten four customer-supplied rack-mounting screws to secure the support bracket on the chassis to the front of the rack-post (two on each side). These screws can vary in size and type depending on the rack that you use. Torque the screws to the weight specified for your particular rack (Figure 155: Securing the ASR 9006 Router in a Two-Post 19-Inch Rack, on page 147).

Step 8 Insert six 12-24 x 0.5 in.pan-head screws (part number: 48-0523-01) screws to secure the chassis to the rack-mounted plenum (Figure 155: Securing the ASR 9006 Router in a Two-Post 19-Inch Rack, on page 147).

Figure 155: Securing the ASR 9006 Router in a Two-Post 19-Inch Rack

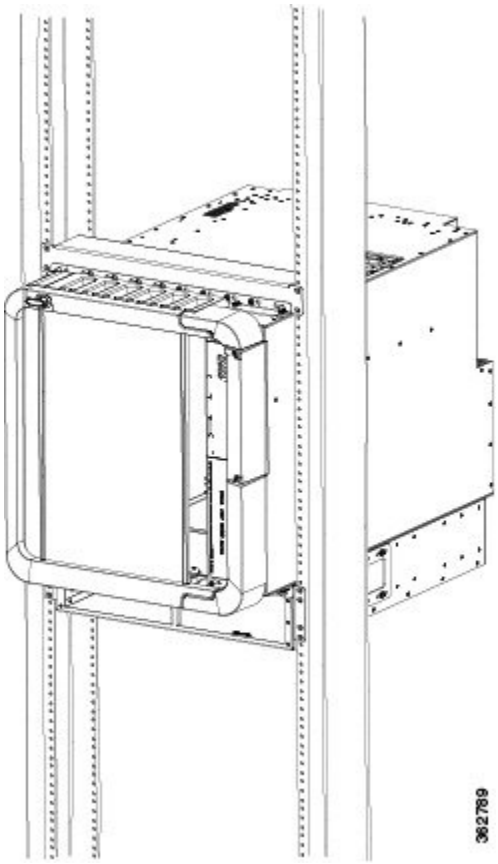

1
2
362766

1	Screws attaching chassis to rack	2	Screws attaching chassis to plenum

Step 9 Install the optional chassis accessories, if desired. See Installing Optional Chassis Accessories on the Cisco ASR 9006 Router, on page 140.

The figure below shows the air baffle accessory kit and Cisco ASR 9006 Router with its optional accessories fully installed in a two-post 19-inch rack.

Figure 156: Cisco ASR 9006 Router Fully Installed with Air Baffle Accessory Kit and Optional Chassis Accessories



Installing Optional Air Baffles on the Cisco ASR 9904 Router

The Cisco ASR 9904 Router has an optional air baffle accessory kit (ASR-9904-BAFFLE=) for mounting the router chassis in a 2-post 23-inch rack. The accessory kit includes:

- Two adapter plates
- Two air baffles (left and right)
- Two air deflectors
- Twenty-eight 12-24 screws for attaching the air baffles and air deflectors to the adapter plate

- Eight 8-32 screws for securing the side baffles to the air deflectors

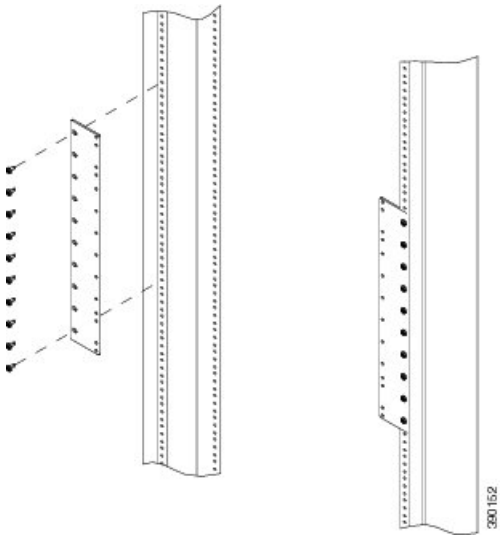
Air baffles allow for front-to-back air flow through the chassis and help isolate exhaust air from the intake air. For air baffle dimensions, see Figure 164: Cisco ASR 9904 Router Air Baffle Dimensions—Top View, on page 155 and Figure 165: Cisco ASR 9904 Router Air Baffle Dimensions—Front View, on page 156.

If you ordered the air baffle accessory kit, follow these steps to install it:

Procedure

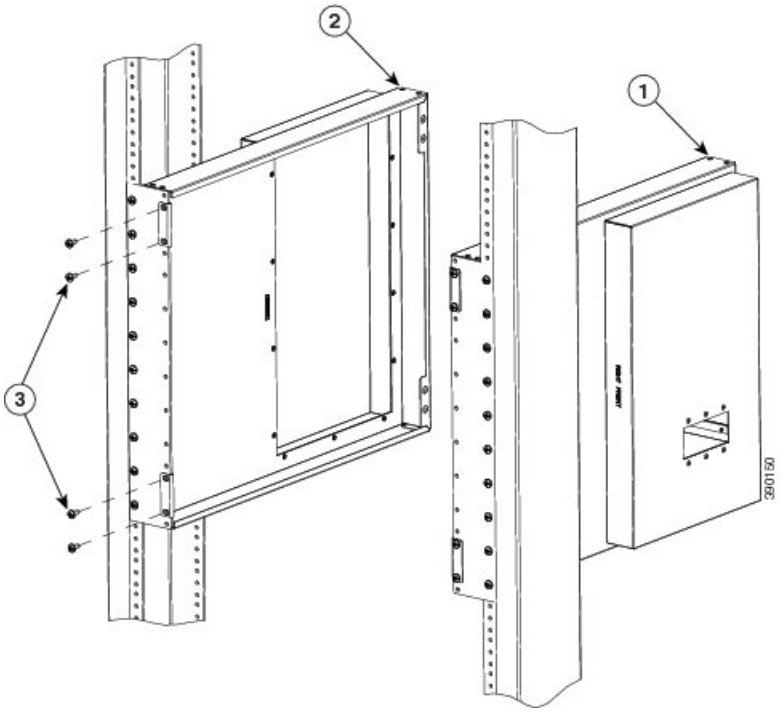
Step 1 Attach the adapter plates (Figure 157: Attaching the Adapter Plates to the Left and Right Rack Rails on the Cisco ASR 9904 Router Chassis , on page 150) to the left and right rack rails using customer-supplied rack screws (we recommend a minimum of ten per side). These screws can vary in size and type depending on the rack that you use. Torque the screws to the weight specified for your particular rack.

Figure 157: Attaching the Adapter Plates to the Left and Right Rack Rails on the Cisco ASR 9904 Router Chassis



Step 2 Loosely attach the left and right side air baffles to the adapter plate (Figure 158: Installing the Air Baffles on the Cisco ASR 9904 Router Chassis , on page 151) with 12-24 screws (four per side). Do not tighten these screws. To ensure the correct orientation, “Left Front” and “Right Front” are stamped on each side of the baffle.

Figure 158: Installing the Air Baffles on the Cisco ASR 9904 Router Chassis

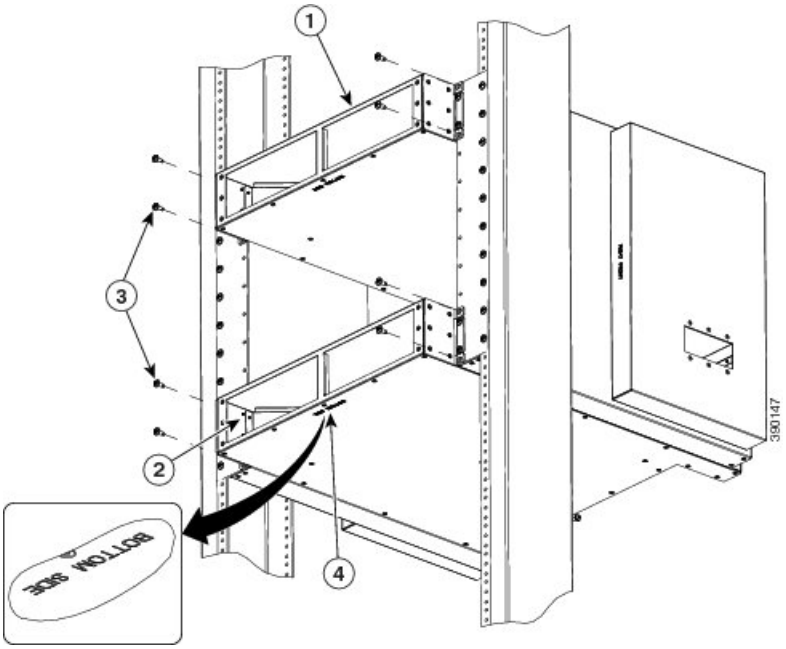


1	Right side air baffle	3	12-24 screws for attaching the baffles (fo
2	Left side air baffle		

Step 3 Install the top and bottom air deflectors (Figure 159: Attaching the Air Deflectors on the Cisco ASR 9904 Router Chassis —Top View, on page 152) with the “bottom side” stamp facing down (note that the top and bottom air deflectors both have the same part number: 800-41357-01).

Step 4 Tighten the screws to a torque of 41 in-lb.

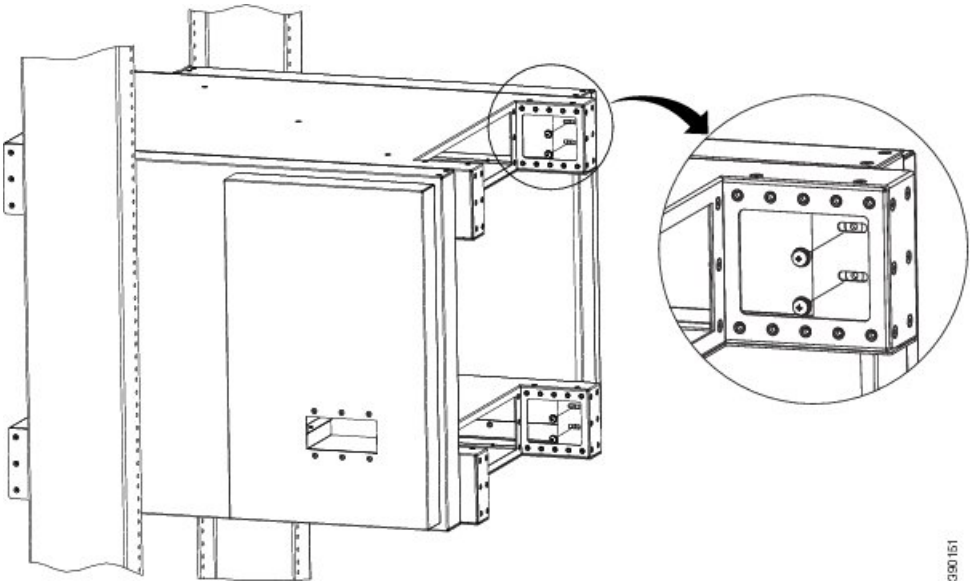
Figure 159: Attaching the Air Deflectors on the Cisco ASR 9904 Router Chassis —Top View



1	Top air deflector	3	12-24 screws for attaching the air deflectors (side)
2	Bottom air deflector	4	Bottom side stamp

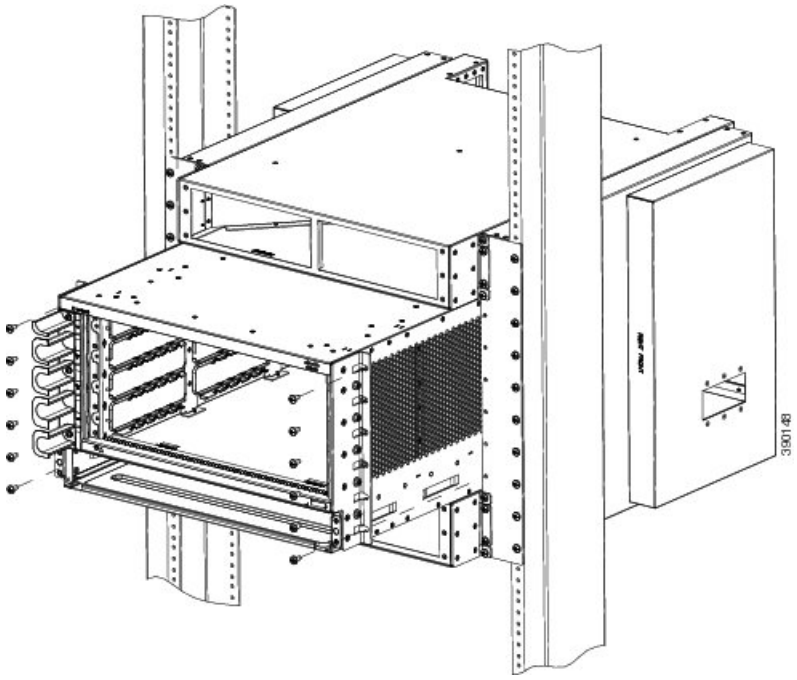
Step 5 Secure the side air baffles to the air deflectors using the supplied 8-32 screws (Figure 160: Securing the Cisco ASR 9904 Router Chassis Side Baffles to the Air Deflectors (Rear View), on page 152). Do not tighten the screws.

Figure 160: Securing the Cisco ASR 9904 Router Chassis Side Baffles to the Air Deflectors (Rear View)



Step 6 Use six 12-24 screws to fasten each side of the chassis to the 23-inch rack. Torque each of the six screws to 41 in-lbs. (Figure 161: Mounting the Cisco ASR 9904 Router Chassis in a 23-Inch Rack, on page 153).

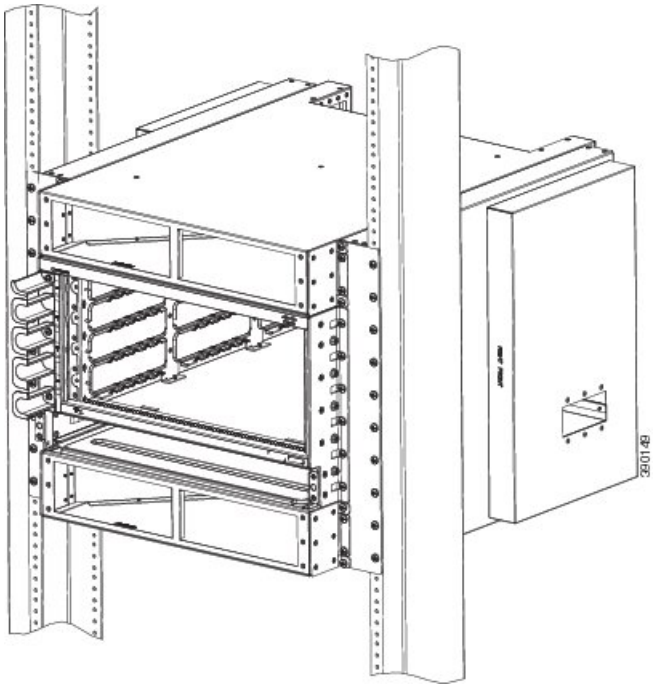
Figure 161: Mounting the Cisco ASR 9904 Router Chassis in a 23-Inch Rack



Step 7 Tighten the remaining loose screws to complete the installation. Torque the 8-32 screws to 18 in-lb and the 12-24 screws to 41 in-lb.

Figure 162: Cisco ASR 9904 Router Chassis with Air Baffle in 2-Post 23-Inch Rack, on page 154 shows the router chassis with the air baffle installed in a 2-post 23-inch rack.

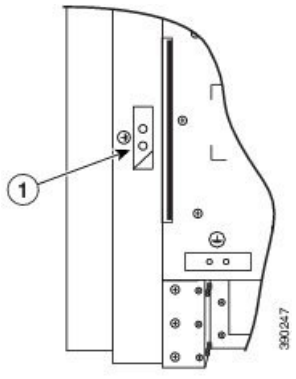
Figure 162: Cisco ASR 9904 Router Chassis with Air Baffle in 2-Post 23-Inch Rack



An electrical conducting path must exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted, or to a grounding conductor. The chassis has two grounding points on each side of the baffle, however only one ground is required. The other will be grounded through the top and bottom air deflectors. Figure 163: Cisco ASR 9904 Router Baffle Ground , on page 154 shows the baffle ground location on the chassis.

You can ground the baffle by either attaching a grounding lug to the chassis (NEBS Supplemental Unit Bonding and Grounding Guidelines, page 1-60), or by using thread-forming mounting screws to establish a metal-to-metal contact. If you are using screws, remove any paint or other non-conductive coatings on the surfaces between the mounting hardware and the enclosure or rack. Clean all surfaces and apply an antioxidant applied before the installation.

Figure 163: Cisco ASR 9904 Router Baffle Ground



1	Baffle ground location

Figure 164: Cisco ASR 9904 Router Air Baffle Dimensions—Top View

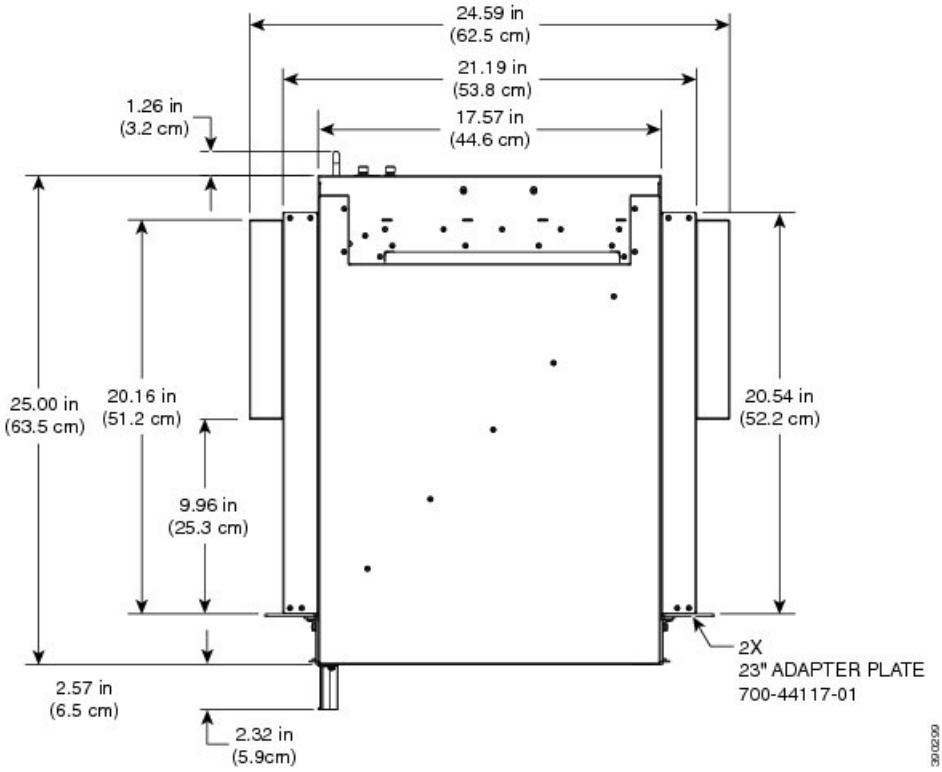
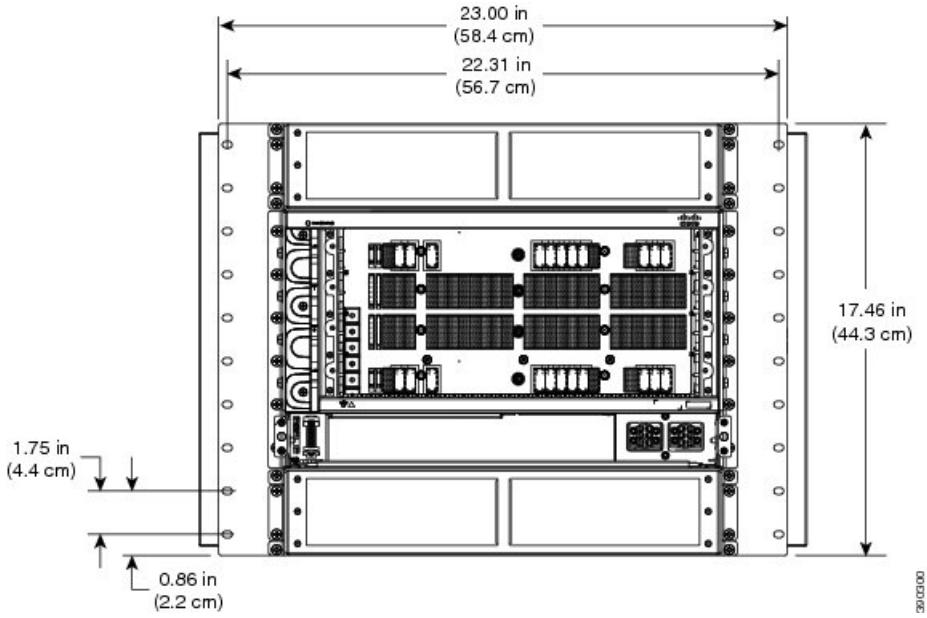


Figure 165: Cisco ASR 9904 Router Air Baffle Dimensions—Front View



Installing Optional Chassis Accessories on the Cisco ASR 9906 Router

The optional chassis accessories for the Cisco ASR 9906 Router include:

- Slide rails - A9K-SLIDE-RAIL
- 2-post rack mounting kit - ASR-9906-2P-KIT
- 4-post rack mounting kit - ASR-9906-4P-KIT

Installing Optional Chassis Accessories on the Cisco ASR 9910 Router

The optional chassis accessories for the Cisco ASR 9910 Router include:

- Side guide rails
- Rear air reflector
- Installation brackets for 2-post and 4-post rack mounting

Installing Optional Chassis Accessories on the Cisco ASR 9922 Router

The optional chassis accessories for the Cisco ASR 9922 Router include:

- Fan tray covers
- Top and bottom card cage front doors
- Rear exhaust air deflector

If you ordered the optional accessories set, follow these steps to install the accessories:

Procedure

Step 1 Remove the two screws that secure the bottom edge of the cable management tray to the chassis.

Note
Four ball studs are preinstalled on the Cisco ASR 9922 Router chassis.

Figure 166: Optional Fan Tray Covers for the Cisco ASR 9922 Router

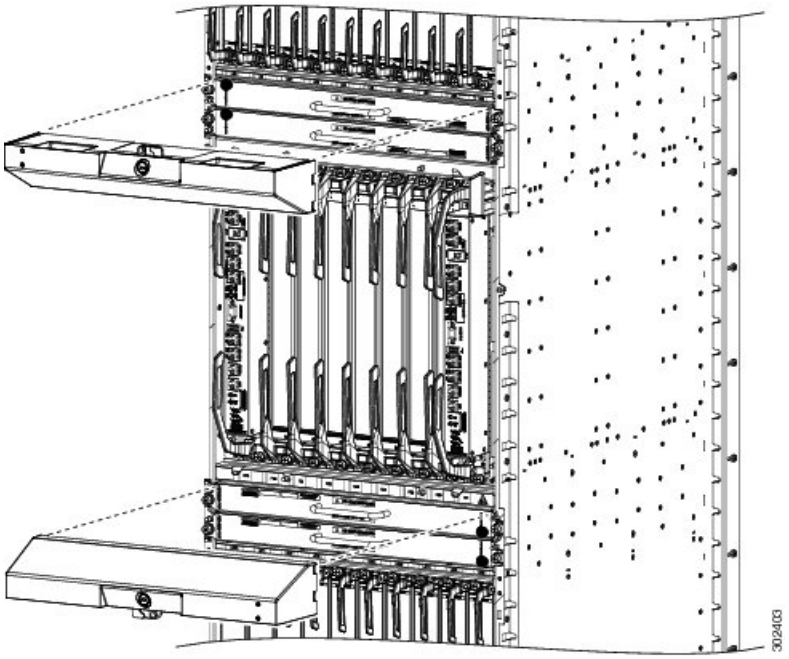
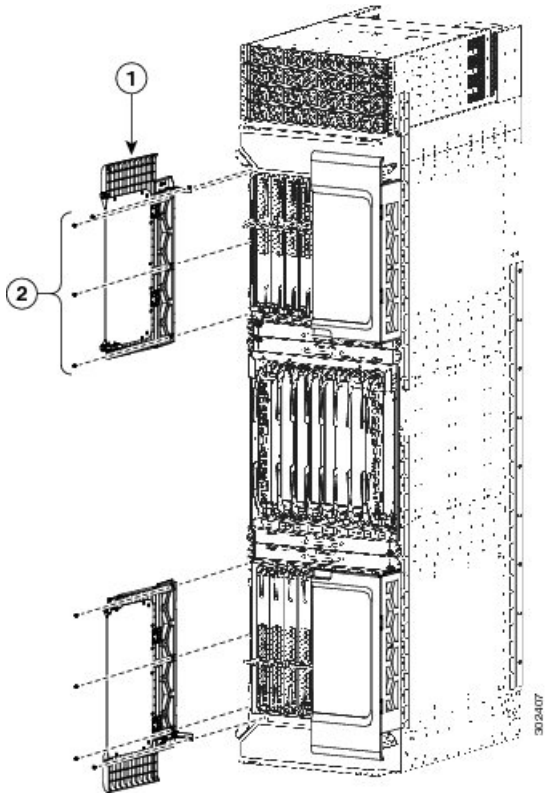


Figure 167: Optional Card Cage Doors for the Cisco ASR 9922 Router



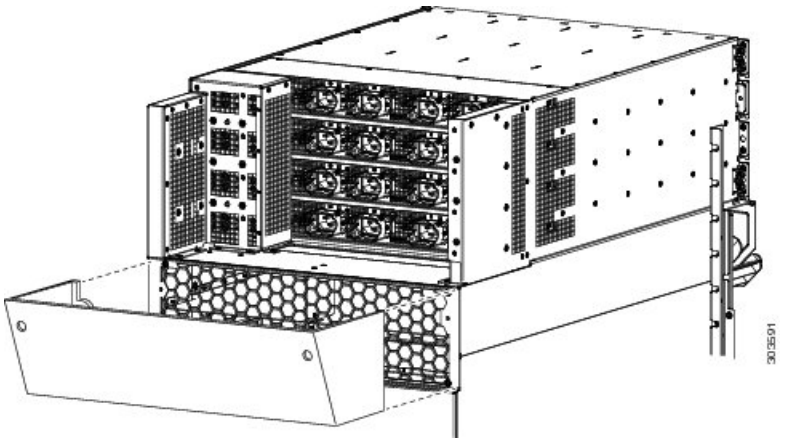
1	Card cage door	2	Hinge bracket

Step 2 Attach the left and right hinge brackets to the chassis using three screws (M4 thread) for each bracket. Tighten the screws to a torque of 11 in-lb (1.20 N-m). The L-shaped brackets should align with the holes in the cable management tray from which you removed the screws.

Step 3 Secure the L-shaped brackets to the chassis and cable management tray by re-inserting and tightening the cable management tray screws you removed.

Step 4 Align the exhaust air deflector at the rear of the chassis behind the top fan tray outlets (see the below figure), and use a screwdriver to tighten the two screws, one on each side of the deflector. The deflector's measurements are width 17.48" x height 4.72" x depth 5.21" and deflects the outgoing exhaust air.

Figure 168: Optional Rear Exhaust Air Deflector on the Cisco ASR 9922 Router



After the chassis has been installed in the rack and all chassis accessories have been attached, you can install the fan trays, power supply modules, RP cards, FCs and LCs. See *Installing Cards and Modules in the Chassis* in the book *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide* for detailed installation instructions.

Installing Base Chassis Accessories on the Cisco ASR 9912 Router

The base chassis accessories for the Cisco ASR 9912 Router include (see the figure below):

- One honeycomb cosmetic cover
- One vented bezel to cover the front of the power system

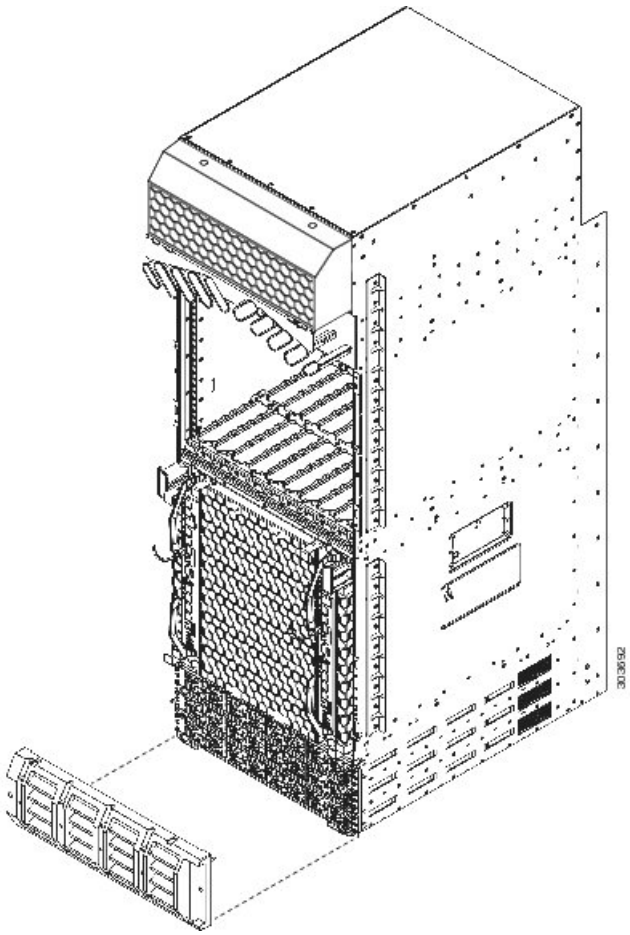
Procedure

Step 1 Attach the honeycomb cosmetic cover to the front of the chassis above the cable management bracket by aligning the cover above the screw tabs on the chassis.

Step 2 Attach the vented bezel cover by snapping it into place in front of the power system.

Note
You will need to remove the vented bezel cover in order to install the power system. After the power system is installed, you can re-install the vented bezel cover.

Figure 169: Installing Base Accessories on the Cisco ASR 9912 Router



After the chassis has been installed in the rack and all chassis accessories have been attached, you can install the fan trays, RP cards, FCs and LCs. See the chapter *Installing Cards and Modules in the Chassis* in the book *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide* for detailed installation instructions.

Installing Optional Chassis Accessories on the Cisco ASR 9912 Router

The optional chassis accessories for the Cisco ASR 9912 Router include:

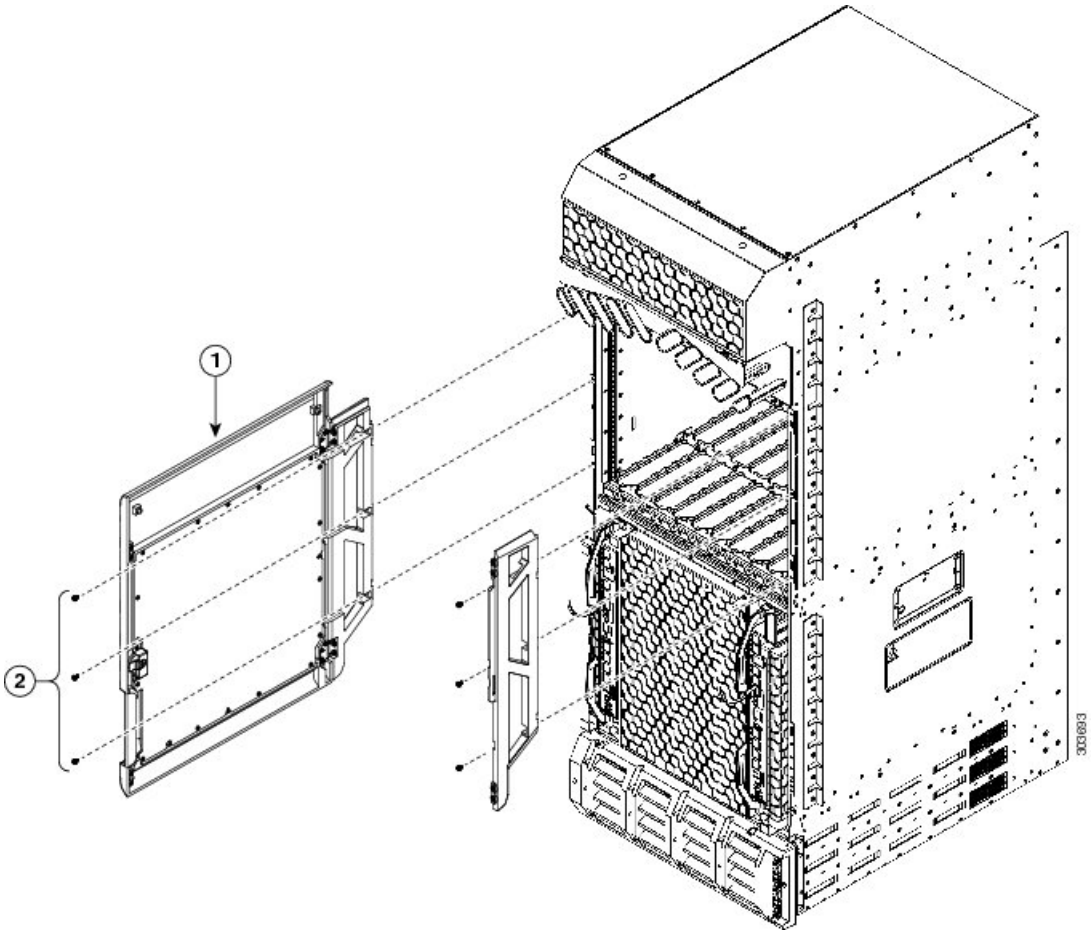
- Front door for the line card cage
- Two hinge brackets (left and right side)
- Six screws for attaching the hinge brackets to the chassis
- Rear exhaust air deflector

If you ordered the optional accessories set, follow these steps to install the accessories:

Procedure

Step 1 Attach the left (if not pre-installed) and right hinge brackets to the chassis using three screws (M4 thread) for each bracket (see the below figure). Tighten the screws to a torque of 11 in-lb (1.20 N-m).

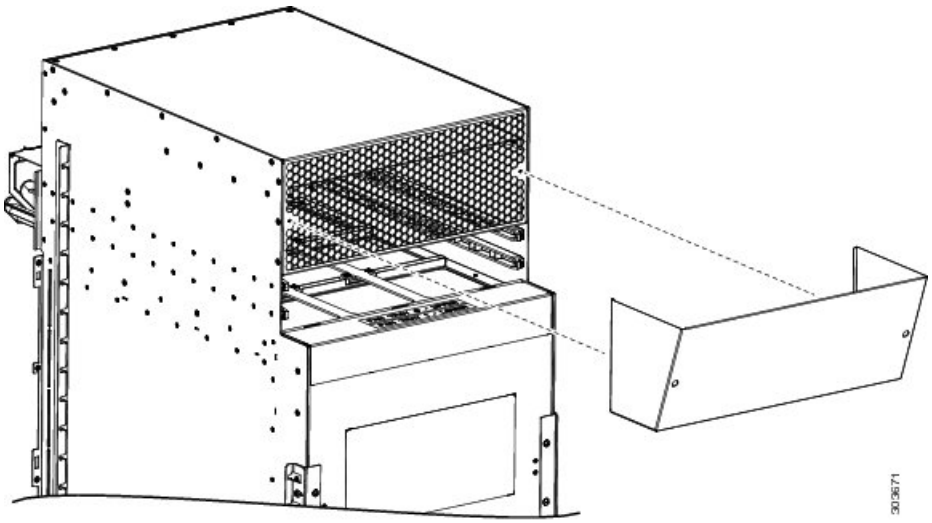
Figure 170: Optional Card Cage Door on the Front of the Cisco ASR 9912 Router



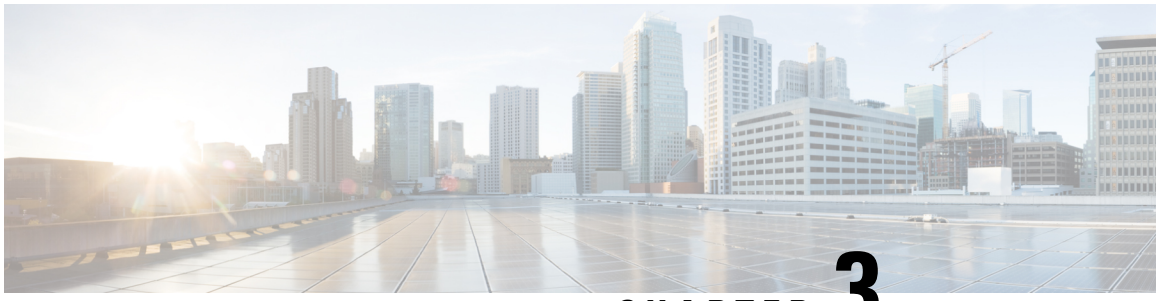
1	Card cage door	2	Hinge bracket

Step 2 Align the exhaust air deflector at the top rear of the chassis above the fan trays (see the below figure), and use a screwdriver to tighten the two screws, one on each side of the deflector.

Figure 171: Optional Rear Exhaust Air Deflector on the Cisco ASR 9912 Router



After the chassis has been installed in the rack and all chassis accessories have been attached, you can install the fan trays, RP cards, FCs, and LCs. See *Installing Cards and Modules in the Chassis* in the book *Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide* for detailed installation instructions.



CHAPTER 3

Installing Cards and Modules in the Chassis

This chapter contains the procedures for installing cards and modules into the chassis after the chassis has been installed into a rack. This chapter also describes how to connect cables to RSP, RP, alarm, and line cards.

Note The procedures in this chapter for all Cisco ASR 9000 Series Routers are identical unless otherwise noted.

- Installing Power Modules, on page 163
- Installing Fan Trays, on page 167
- Installing Cards in the Chassis, on page 168
- Connecting Line Card Network Interface Cables, on page 185
- Connecting Cables to the RSP or RP, on page 190
- Connecting the Alarm Cable, on page 194
- Connecting Power to the Router, on page 195
- Powering On the Router, on page 201

Installing Power Modules

The following procedures describe how to reinstall the power modules back into the chassis. Be sure to follow the correct procedure for the type of power modules that you have.

Caution Never force a power module into the power tray if you feel any resistance! The power modules are keyed to prevent AC modules from being plugged into a DC power tray or a DC module into an AC power tray. Forcing a module into the incorrect tray can cause damage to the module and the tray.

Caution While performing a FPD upgrade of the ASR 9000 6kW AC Power Module Version 3 (PWR-6KW-AC-V3) and the ASR 9000 4.4kW DC Power Module Version 3 (PWR-4.4KW-DC-V3), ensure that you connect both input power cords to the power supply. If the power cords are not connected, the FPD upgrade for the power module will fail.

Note The DC-powered Cisco ASR 9000 series routers power-down if the input voltage goes below 38.5V. The routers automatically power-up again when the input voltage is restored to a value above 42.5V (within the range of 42.5V to 54V).

During voltage drops, the Cisco IOS XR software raises alarms: a minor alarm for <44V, a major alarm for <42V, and a critical alarm for <40V. These alarms can be viewed using the **show alarms** command.

From Release 25.2.1 onwards, to prevent router shut down due to low voltage (between 38.5V and 40V), you can disable graceful system shutdown by executing the **environment graceful-shutdown disabled** command.

Installing AC Power Modules

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

You need the following tool to perform this task:

- 7/16 hex socket and torque wrench, torque 50 in-lb.

Steps

Follow these steps to reinstall the AC power modules back into the chassis (see Figure 172: Installing a Version 1 Power- Module, on page 165 for the version 1 power module, Figure 173: Installing a Version 2 or Version 3 Power Module in the Cisco ASR 9010, 9912, 9922 Routers, on page 165 for the version 2 and version 3 power modules, and Figure 174: Installing a Version 2 Power Module in the Cisco ASR 9904 Router , on page 166 for installing a version 2 power module in the Cisco ASR 9904 Router.

Procedure

Step 1 Slide the power module into the power tray until it mates with its backplane connector.

Step 2 Secure the module:

- Version 1 power module: Pivot the power module door fully to the left until it locks to securely seat the power module to its backplane connector.
- Version 2 and version 3 power modules: Move the handle up and tighten the screw using the 7/16 hex socket and torque wrench with the torque set to 50 in-lb.

Step 3 Repeat for the other AC power modules.

Step 4 Go to Installing Fan Trays, on page 167 to install the fan tray.

Caution
To prevent damage to the power tray backplane connector, do not use excessive force when inserting the power module into the power tray.

Figure 172: Installing a Version 1 Power- Module

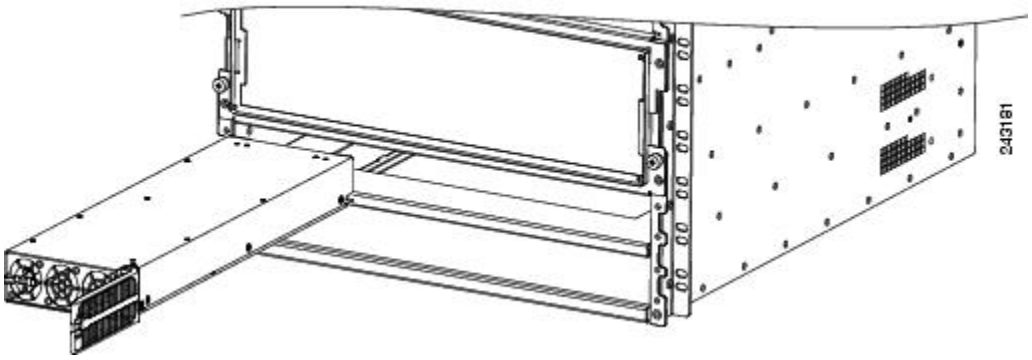


Figure 173: Installing a Version 2 or Version 3 Power Module in the Cisco ASR 9010, 9912, 9922 Routers

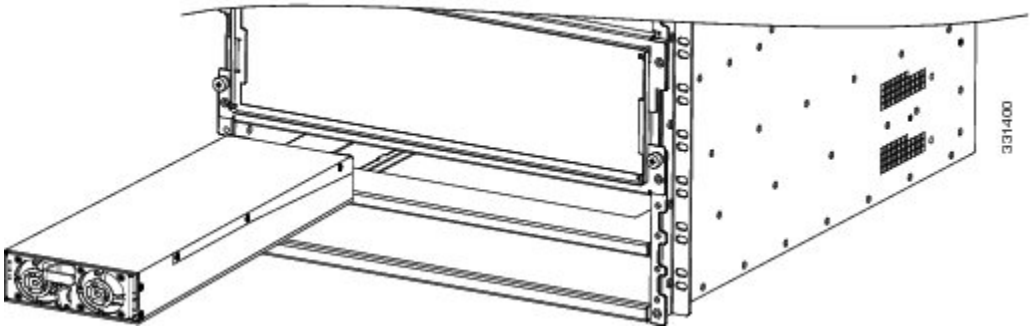
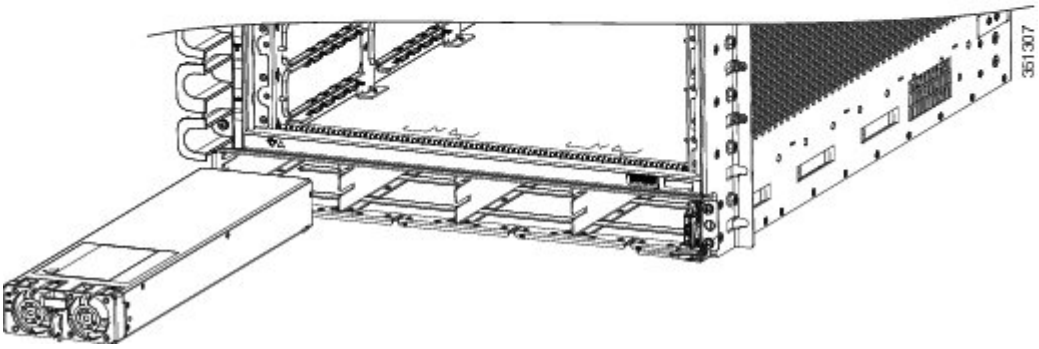


Figure 174: Installing a Version 2 Power Module in the Cisco ASR 9904 Router



Installing DC Power Modules

Required Tools and Equipment

You need the following tool to perform this task:

- 7/16 hex socket and torque wrench, torque 50 in-lb.

Steps

Follow these steps to reinstall the DC power modules back into the chassis (see Figure 172: Installing a Version 1 Power- Module, on page 165 for the version 1 power module or Figure 173: Installing a Version 2 or Version 3 Power Module in the Cisco ASR 9010, 9912, 9922 Routers, on page 165 for the version 2 or version 3 power module.

Procedure

Step 1 Slide the power module into the power tray until it mates with its backplane connector.

Step 2 Secure the module:

- Version 1 power module: Pivot the power module door fully to the left until it locks to securely seat the power module to its backplane connector.
- Version 2 power and version 3 module: Move the handle up and tighten the screw using the 7/16 hex socket and torque wrench with the torque set to 50 in-lb.

Step 3 Repeat for the other DC power modules.

Caution
To prevent damage to the power tray backplane connector, do not use excessive force when inserting the power module into the power tray.

Installing Fan Trays

Prerequisites

Install the power modules before installing the fan trays.

Required Tools and Equipment

You need the following tool to perform this task:

- 6-inch long number 2 Phillips screwdriver, torque 10 inch-lb.

Steps

Note If you are installing a fan tray for the Cisco ASR 9010 Router, install the lower fan tray before attaching the accessory grill. The lower fan tray slot is located behind the accessory grill. See the Installing Chassis Accessories, on page 130

Note The high-density 100G line cards or the Modular 400G line card need the version 2 fan trays.

Before installing the fan tray, first determine its location. Refer to the figure that applies to your router. See Removing Fan Trays, on page 78.

Follow these steps to install fan trays in the chassis.

Procedure

Step 1 Lift the fan tray (with two hands) and slide it halfway into the module bay.

Step 2 Slowly push the fan tray into the chassis until it mates with the backplane connector at the back of the chassis bay.

Caution
To prevent damage to the connectors, do not use excessive force when inserting the fan tray into the chassis.

Step 3 Tighten the captive screw(s) on the fan tray using the 6-inch long number 2 Phillips screwdriver to a torque of 10 in-lb to secure it to the chassis.

Step 4 Repeat Step1 through Step 3 for the second fan tray.

Note
On the Cisco ASR 9922 Router, the third and fourth fan trays (under the middle cage) are installed upside down compared to the first and second fan trays (above the middle cage).

Installing Cards in the Chassis

This section describes how to reinstall the RSP cards, RP cards, FCs, and LCs back into the chassis.

See the Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Hardware Installation Guide for information about installing shared port adapter (SPA) and SPA interface processor (SIP) cards.

Caution Be sure to verify that you are inserting a card into its correct slot. RSP/RP cards must only be inserted in the two slots reserved for RSP/RP cards (RSP0, RSP1, RP0, RP1). FCs must only be inserted in the FC slots of the Cisco ASR 9922 Router and Cisco ASR 9912 Router. All other slots are for LCs.

Caution Unoccupied card slots must have a blank filler card installed for electromagnetic compatibility (EMC) and to ensure proper air flow through the chassis.

Caution Be careful to avoid damaging the electromagnetic interference (EMI) gasket that runs along the full height of the card front panel edges. Damage to the EMI gasket can affect the ability of your system to meet EMC requirements.

Caution Handle all cards by the metal card carrier edges only; avoid touching the board or any connector pins. After removing a card, carefully place it in an antistatic bag or similar environment to protect it from ESD and dust in the optic ports (fiber-optic line cards).

Caution To avoid damaging card mechanical components, never carry an RSP card, RP card, FC, or LC by the captive installation screws or ejector levers. Doing so can damage these components and cause card insertion problems.

Caution Be sure to always tighten the captive installation screws on the RSP card, RP card, FC, or LC. Failure to tighten the screws can cause boot failure or prevent proper router operation.

Installing RSP Cards in the Chassis

Follow these steps to reinstall RSP cards into the chassis (See the Removing RSP Cards and Line Cards from the Cisco ASR 9010 Router, Cisco ASR 9006 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router section for slot numbering):

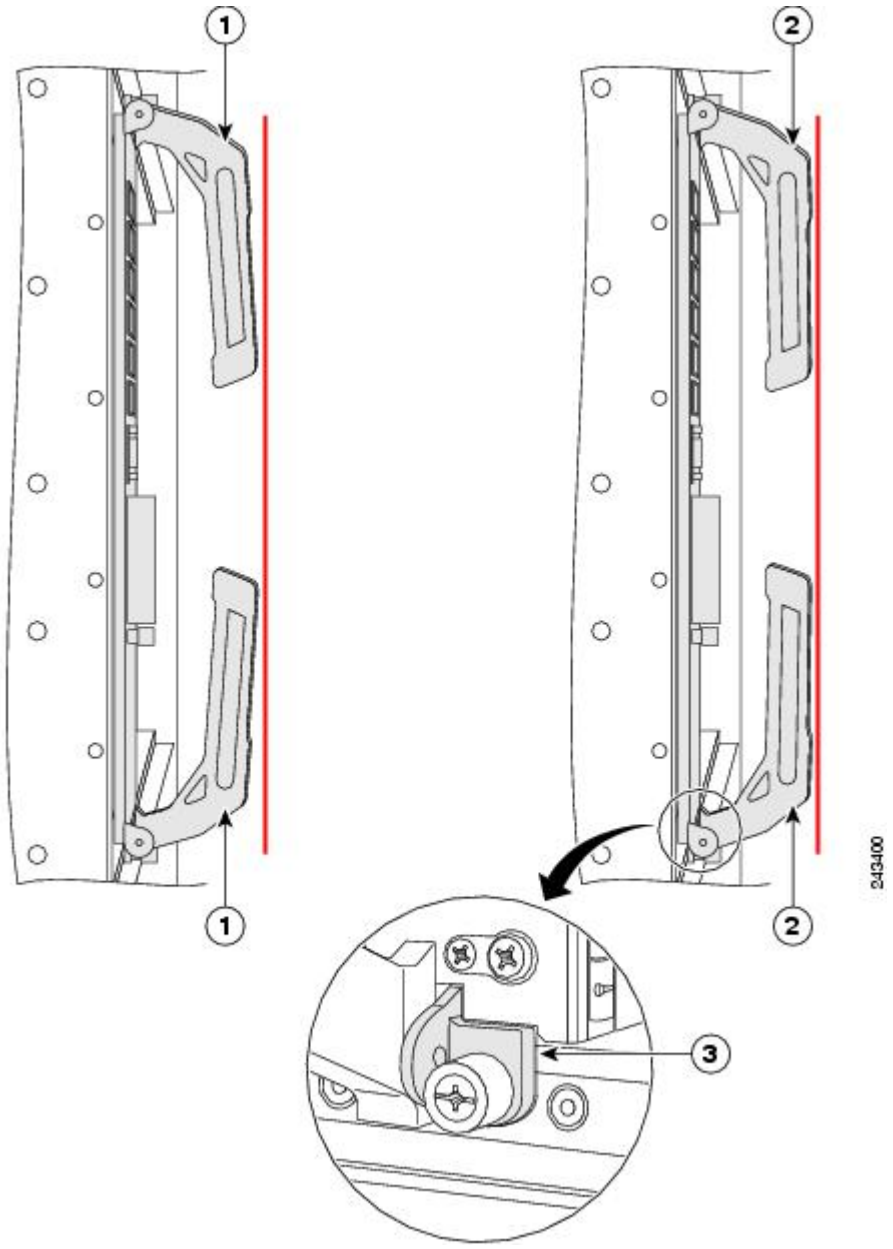
Procedure

Step 1 Starting at slot RSP0, slide the card into the slot.

Step 2 Pivot the ejector levers to seat the card to the backplane connector.

Caution
Do not apply excessive force to the RSP card to seat it. When seated, the RSP card ejector levers are angled slightly outward from the card faceplate (item 1 in the following figure). When the captive installation screws are fully tightened, the ejector levers are parallel to the card faceplate (item 2 in the following figure). Some flexing in the backplane is normal. When you push the ejector levers fully vertical, the card is seated in the backplane connectors. However, when you release the levers, backplane flexing pushes the levers out, so the levers may be slightly loose. Tightening the captive installation screws prevents any additional movement from flexing of the backplane.

Figure 175: RSP Card Ejector Lever Positions During Installation



Note Vertical red lines in the figure indicate a line fully parallel to the RSP card front panel.					
1	Slightly loose position of ejector levers when the RSP card is fully seated in the backplane, but the captive installation screws are not fully tightened	2	Fully parallel position of ejector levers when the RSP card is fully seated in the backplane and captive installation screws are fully tightened	3	Slight gap tha RSP card is fu and captive in tightened

Step 3 Tighten the captive screws at the top and bottom of the front panel to a torque of 10 +/–1 in-lb.

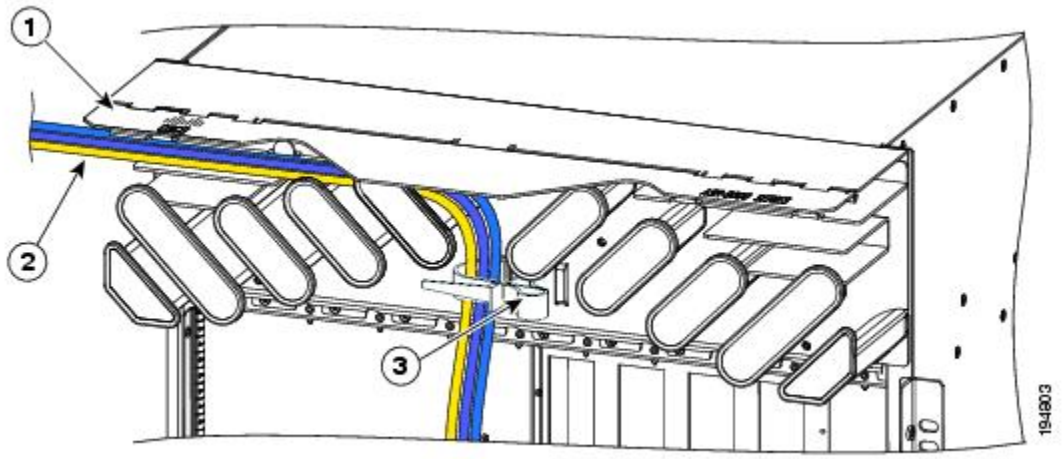
Step 4 Repeat Step 1 through Step 3 to install the second RSP card into slot RSP1.

Note
Even when the RSP card is fully seated with installation screws fully tightened, there may be a slight gap between the card and the chassis (item 3 in the above figure).

RSP Cable Management Ties

The Cisco ASR 9010 Router has cable management ties on the front of the cable management tray assembly. Cables to the RSP cards can be routed as shown in the figure below to separate them from line card cabling.

Figure 176: RSP Cable Management Ties



1	Hinged cover (shown in the raised position)	2	RSP cable bundle routed through the tray	3	RSP cable managemer

Installing RP Cards in the Chassis

Follow these steps to reinstall RP cards into the Cisco ASR 9922 Router (see Figure 2-33 for slot numbering) and Cisco ASR 9912 Router (see Figure 2-37 for slot numbering).

Procedure

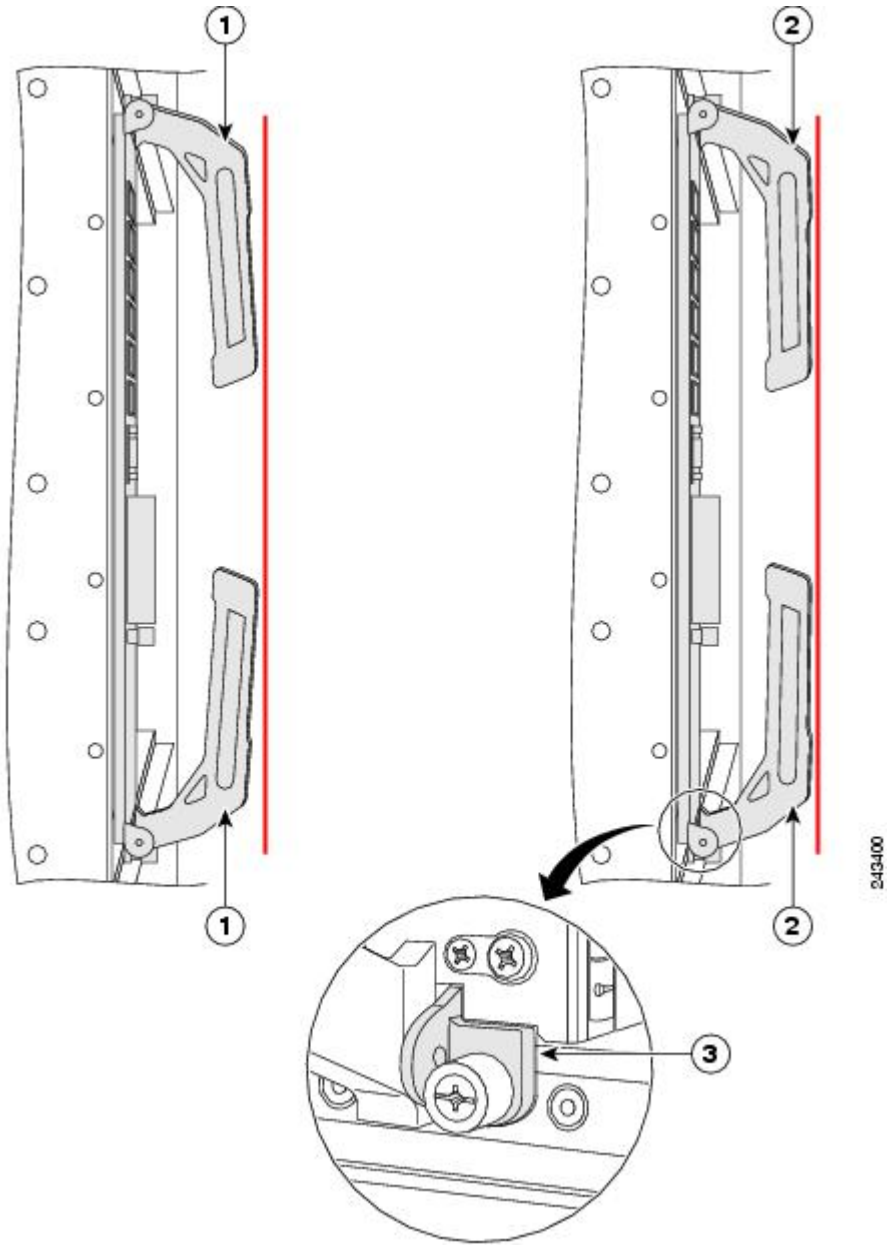
Step 1 Starting at slot RP0, slide the card into the slot.

Step 2 Pivot the ejector levers to seat the card to the backplane connector.

Caution
Do not apply excessive force to the RP card to seat it. When seated, the RP card ejector levers are angled slightly outward from the card faceplate (item 1 in the following figure). When the captive installation screws are fully tightened, the ejector levers are parallel to the card faceplate (item 2 in the following figure). Some flexing in the backplane is normal. When you push the ejector levers fully vertical, the card is seated in the backplane connectors. However, when you release the levers, backplane flexing pushes the levers out, so the

levers may be slightly loose. Tightening the captive installation screws prevents any additional movement from flexing of the backplane.

Figure 177: RP Card Ejector Lever Positions During Installation



Note Vertical red lines in the figure indicate a line fully parallel to the RP card front panel.					
1	Slightly loose position of ejector levers when the RP card is fully seated in the backplane, but the captive installation screws are not fully tightened	2	Fully parallel position of ejector levers when the RP card is fully seated in the backplane and captive installation screws are fully tightened	3	Slight gap tha card is fully s captive install tightened

Step 3 Tighten the captive screws at the top and bottom of the front panel to a torque of 10 +/–1 in-lb.

Step 4 Repeat Step 1 through Step 3 to install the second RP card into slot RP1.

Note
Even when the RP card is fully seated with installation screws fully tightened, there may be a slight gap between the card and the chassis (item 3 in the above figure).

Installing Fabric Cards in the Cisco ASR 9912 and 9922 Router Chassis

Follow these steps to reinstall fabric cards (FCs) into the Cisco ASR 9922 Router (see Figure 2-33 for slot numbering) and Cisco ASR 9912 Router (see Figure 2-37 for slot numbering).

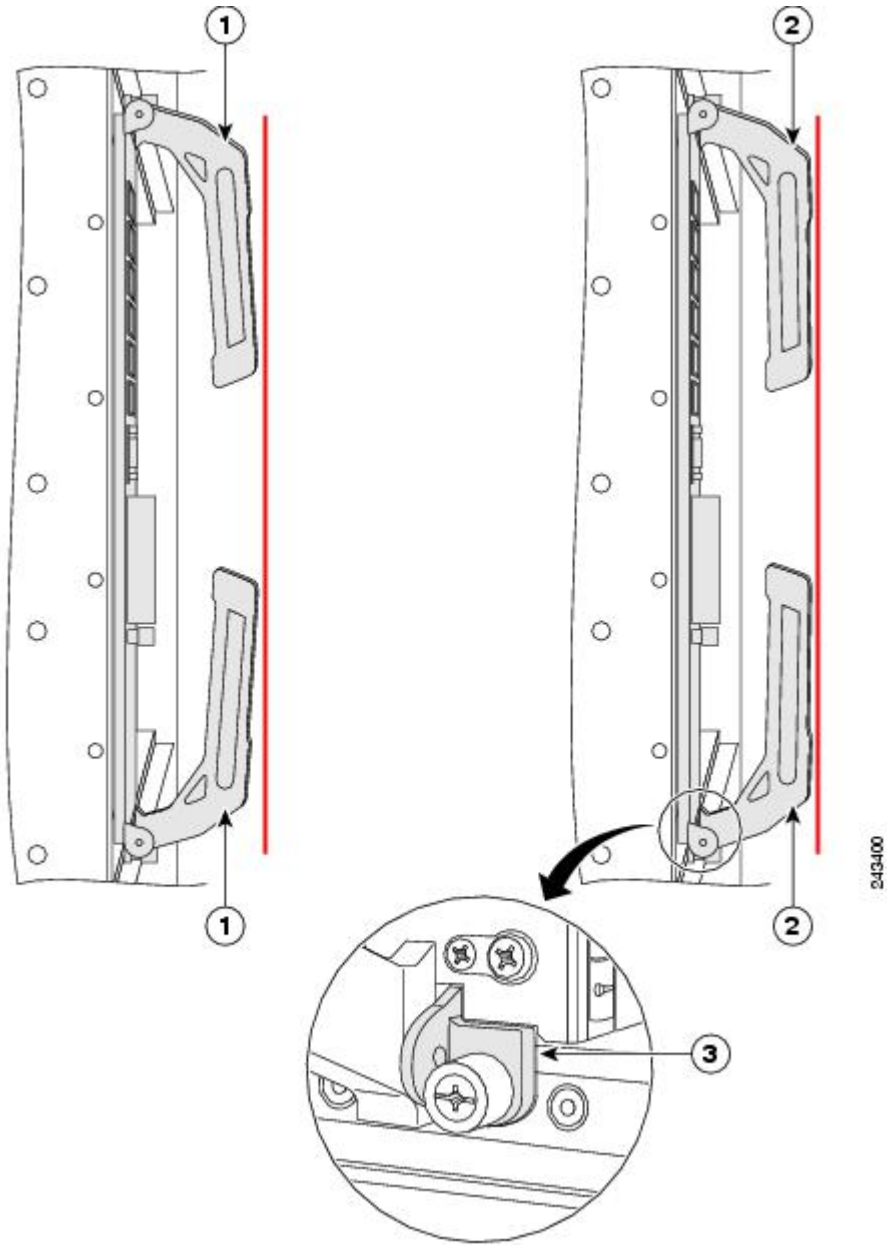
Procedure

Step 1 Starting at slot FC0, slide the card into the slot.

Step 2 Pivot the ejector levers to seat the card to the backplane connector.

Caution
Do not apply excessive force to the FC to seat it. When seated, the FC ejector levers are angled slightly outward from the card faceplate (item 1 in the following figure). When the captive installation screws are fully tightened, the ejector levers are parallel to the card faceplate (item 2 in the following figure). Some flexing in the backplane is normal. When you push the ejector levers fully vertical, the card is seated in the backplane connectors. However, when you release the levers, backplane flexing pushes the levers out, so the levers may be slightly loose. Tightening the captive installation screws prevents any additional movement from flexing of the backplane.

Figure 178: FC Card Ejector Lever Positions During Installation



Note Vertical red lines in the figure indicate a line fully parallel to the FC card front panel.					
1	Slightly loose position of ejector levers when the FC card is fully seated in the backplane, but the captive installation screws are not fully tightened	2	Fully parallel position of ejector levers when the FC card is fully seated in the backplane and captive installation screws are fully tightened	3	Slight gap tha card is fully s captive install tightened

Step 3 Tighten the captive screws at the top and bottom of the front panel to a torque of 10 +/–1 in-lb.

Step 4 Repeat Step 1 through Step 3 to install the remaining FCs into slots FC1 to FC6.

Note
Even when the FC is fully seated with installation screws fully tightened, there may be a slight gap between the card and the chassis (item 3 in the above figure).

Installing Fabric Cards in the Cisco 9906 Router and Cisco ASR 9910 Router Chassis

Follow these steps to reinstall fabric cards (FCs) into the Cisco 9906 Router and Cisco ASR 9910 Router.



Note You must install the fabric cards in the FC slots in the following order: FC0, FC2, FC4, FC1, FC3

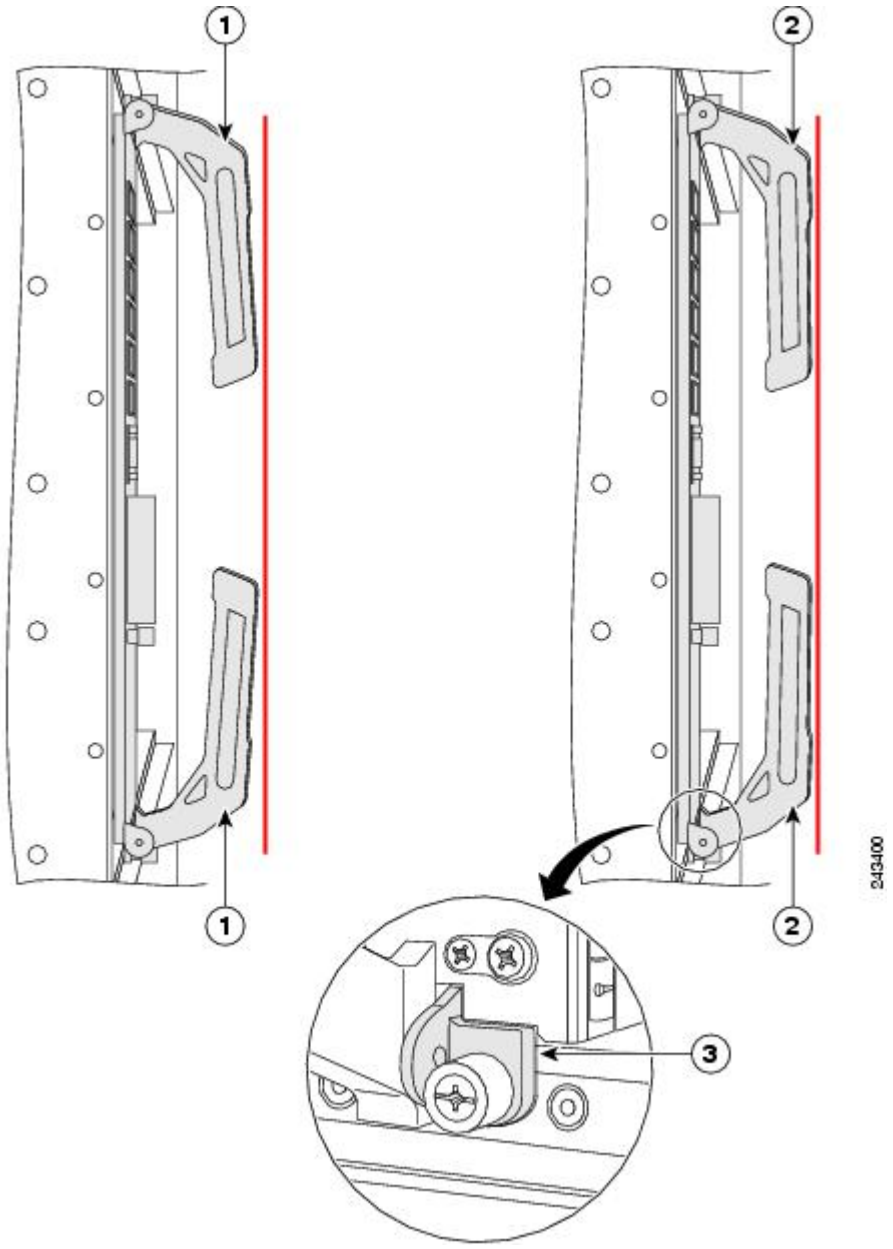
Procedure

Step 1 From rear of the router chassis starting at slot FC0, slide the card into the slot.

Step 2 Pivot the ejector levers to seat the card to the midplane connector.

Caution
Do not apply excessive force to the FC to seat it. When seated, the FC ejector levers are angled slightly outward from the card faceplate (item 1 in the following figure). When the captive installation screws are fully tightened, the ejector levers are parallel to the card faceplate (item 2 in the following figure). Some flexing in the midplane is normal. When you push the ejector levers fully vertical, the card is seated in the midplane connectors. However, when you release the levers, midplane flexing pushes the levers out, so the levers may be slightly loose. Tightening the captive installation screws prevents any additional movement from flexing of the midplane.

Figure 179: FC Card Ejector Lever Positions During Installation



Note Vertical red lines in the figure indicate a line fully parallel to the FC card front panel.					
1	Slightly loose position of ejector levers when the FC card is fully seated in the backplane, but the captive installation screws are not fully tightened	2	Fully parallel position of ejector levers when the FC card is fully seated in the backplane and captive installation screws are fully tightened	3	Slight gap tha card is fully s captive install tightened

Step 3 Tighten the captive screws at the top and bottom of the front panel to a torque of 10 +/–1 in-lb.

Note
Even when the FC is fully seated with installation screws fully tightened, there may be a slight gap between the card and the chassis (item 3 in the above figure).

Step 4 Repeat Step 1 through Step 3 to install the remaining FCs into slots FC2, FC4, FC1, and FC3.

Installing Line Cards in the Chassis

Before you begin reinstalling cards in the card cage, identify slot assignments by referring to the written list you prepared when you removed the cards (see the Removing RSP Cards and Line Cards from the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router section for slot numbering).

Caution Be careful to avoid damaging the EMI gasket that runs along the full height of the card front panel edges. Damage to the EMI gasket can affect the ability of your system to meet EMI requirements.

Follow these steps to reinstall line cards in the chassis card cage:

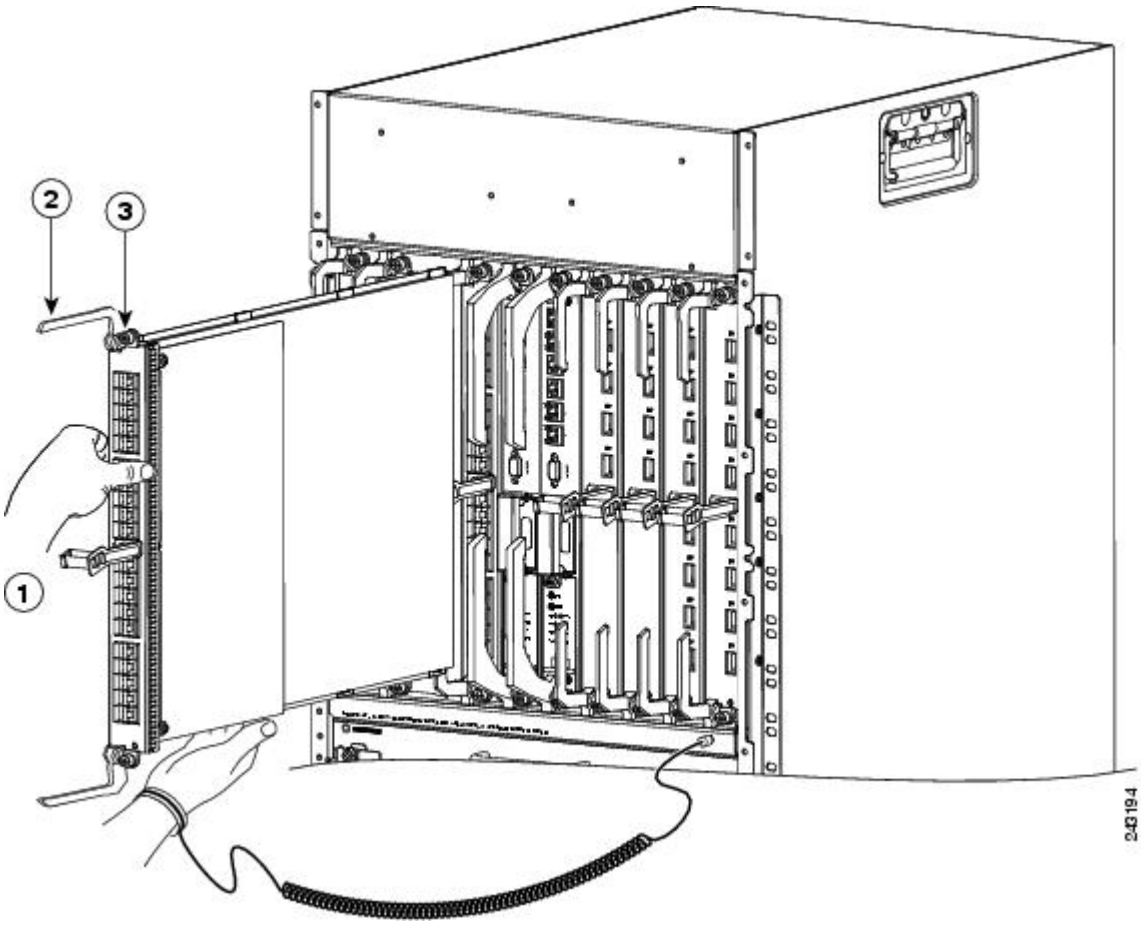
Procedure

Step 1 Starting at the lowest numbered line card slot, slide the card into the slot (see the figure below, Figure 181: Installing a Line Card into the Cisco ASR 9006 Router Chassis , on page 179, or Figure 186: Installing a Line Card into the Cisco ASR 9912 Router Chassis , on page 184 or Figure 185: Installing a Line Card into the Cisco ASR 9922 Router Chassis , on page 183) until it mates with the backplane connector.

Step 2 Pivot the ejector levers to seat the card into the backplane connector.

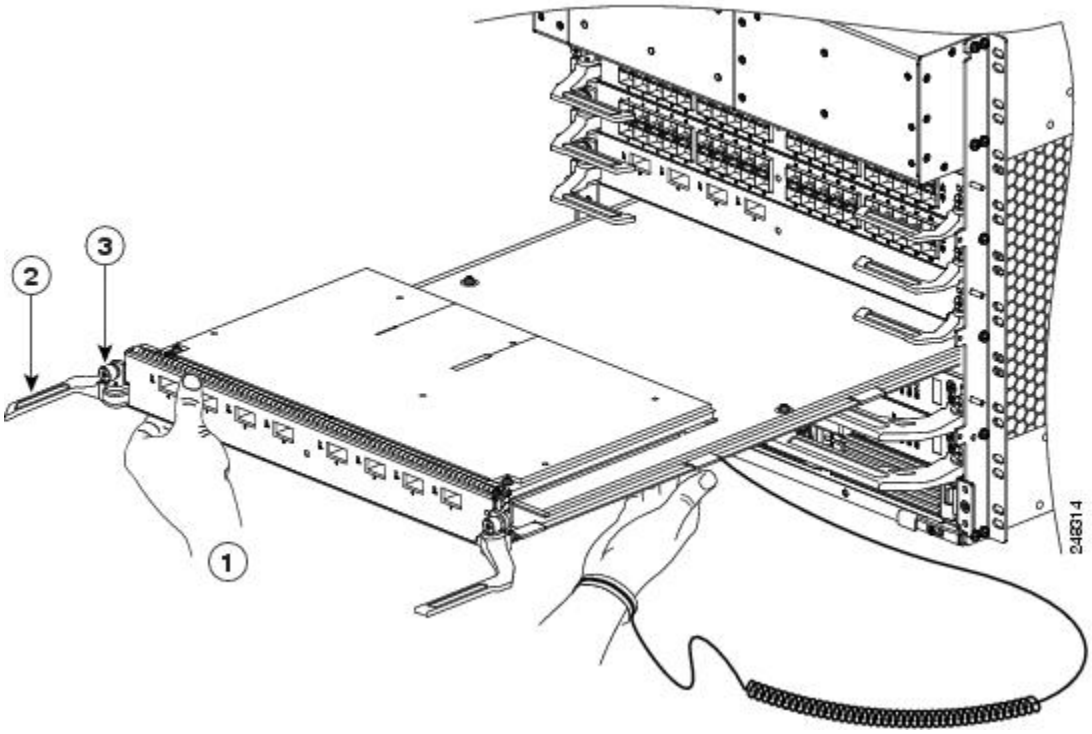
Step 3 Tighten the captive screws at the top and bottom of the front panel to a torque of 10 +/–1 in-lb.

Figure 180: Installing a Line Card into the Cisco ASR 9010 Router Chassis



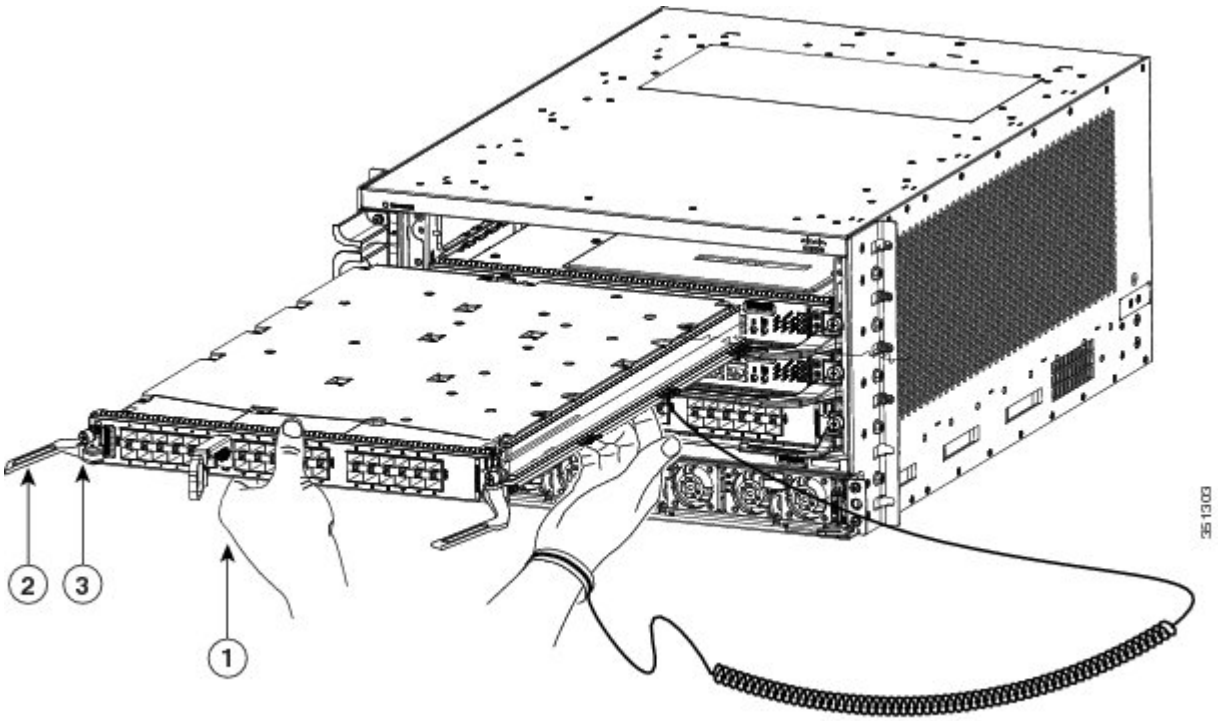
1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten the ca

Figure 181: Installing a Line Card into the Cisco ASR 9006 Router Chassis



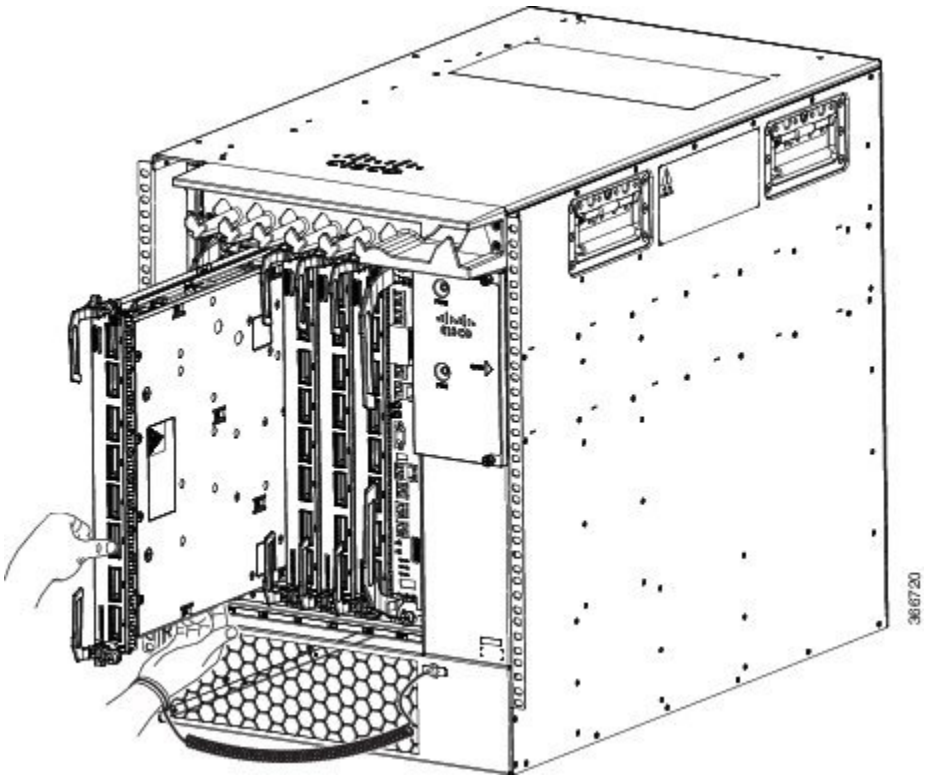
1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten th

Figure 182: Installing a Line Card in the Cisco ASR 9904 Router Chassis



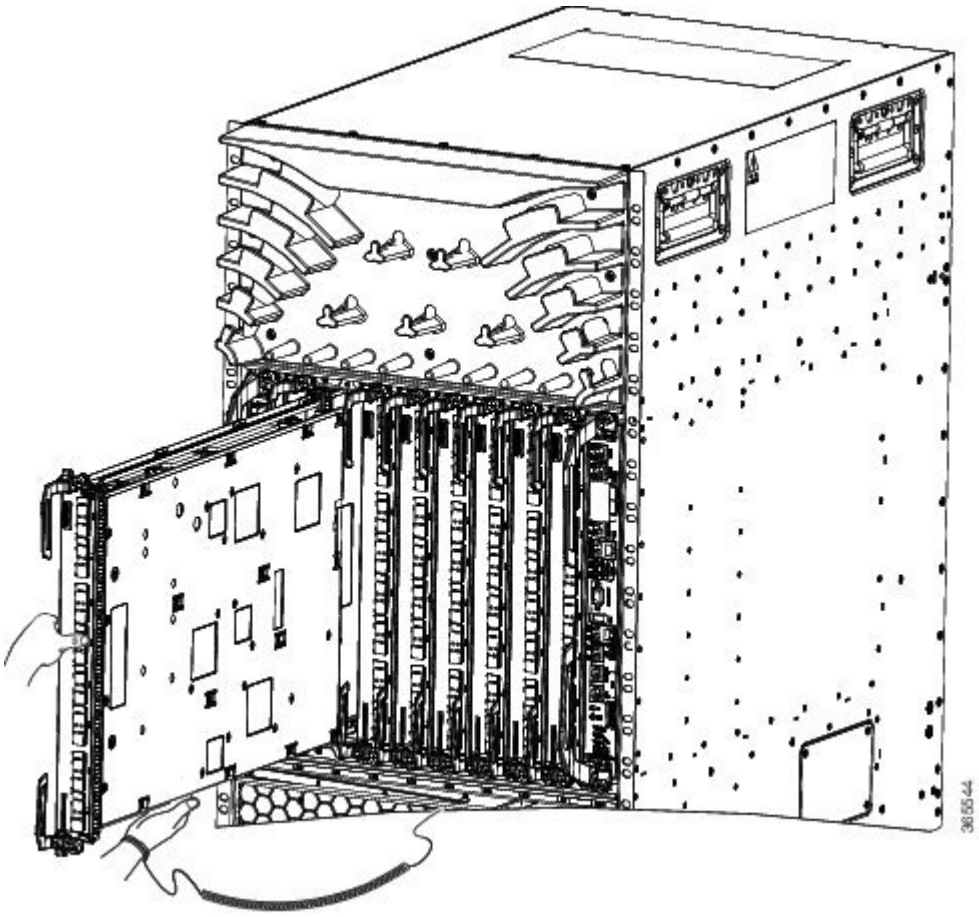
1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten the ca

Figure 183: Installing a Line Card into the Cisco ASR 9906 Router Chassis



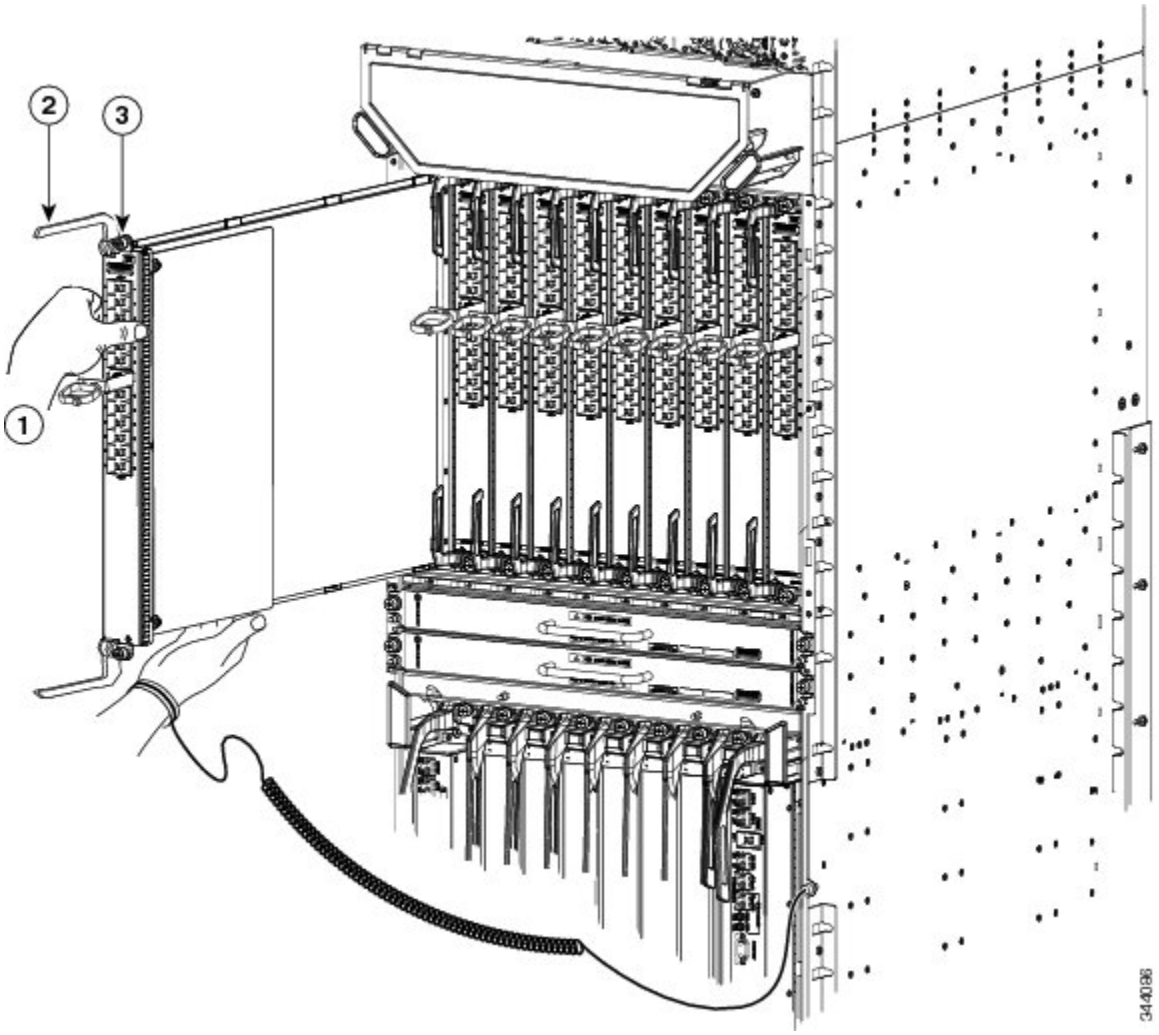
1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten th

Figure 184: Installing a Line Card in the Cisco ASR 9910 Router Chassis



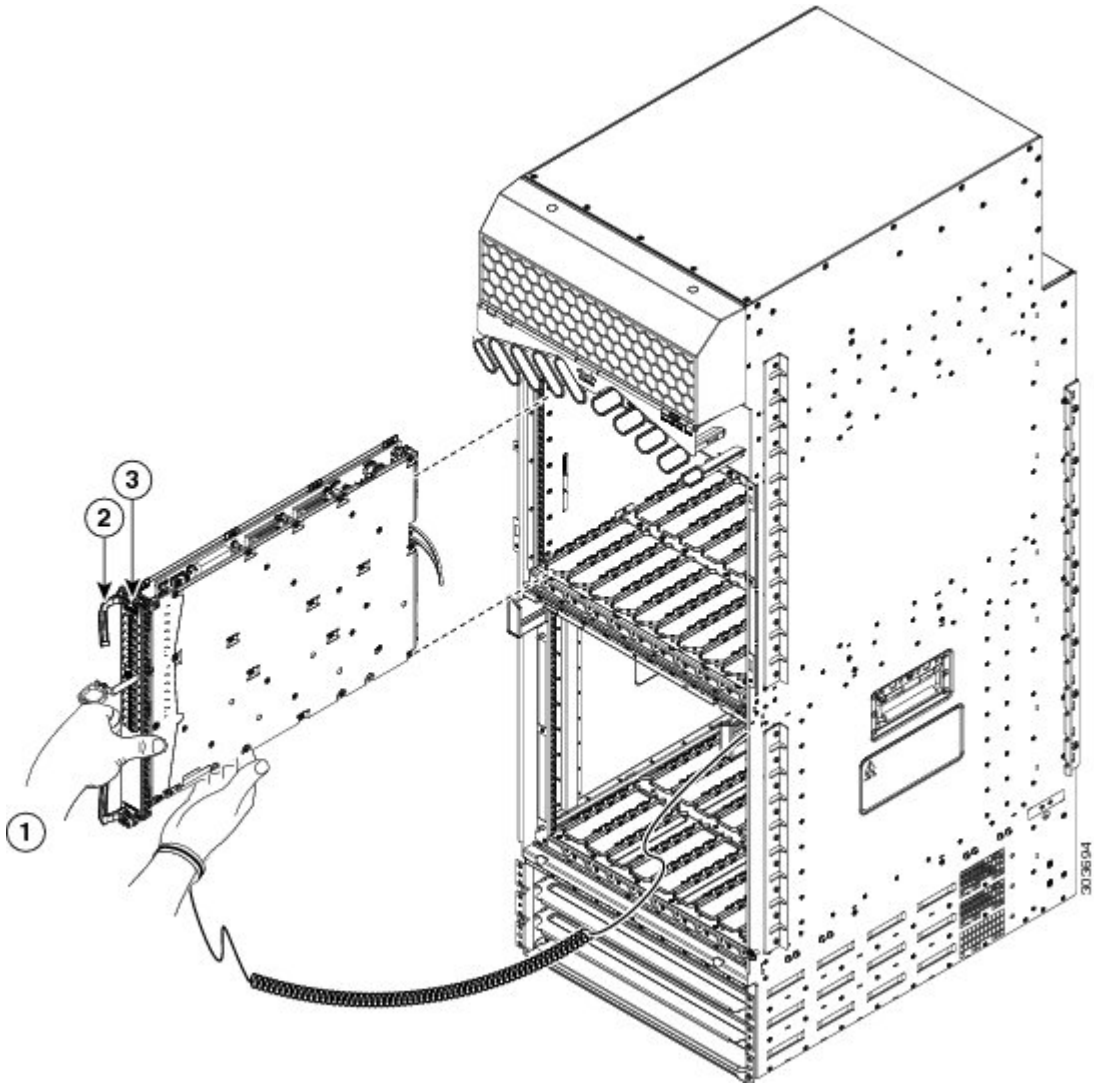
1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten the ca

Figure 185: Installing a Line Card into the Cisco ASR 9922 Router Chassis



1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten th

Figure 186: Installing a Line Card into the Cisco ASR 9912 Router Chassis



1	Slide the card into the chassis.	2	Pivot the ejector levers to seat the card into the backplane connector.	3	Tighten the ca

Step 4 Repeat Step 1 through Step 3 for each line card.

Note
In the Cisco ASR 9922 Router, up to ten line cards are installed in slots 0 through 9 in the top card cage, and up to ten line cards are installed upside down in slots 10 through 19 in the bottom card cage.

Step 5 Go to the Connecting Line Card Network Interface Cables, on page 185 to connect the network interface cables.

Connecting Line Card Network Interface Cables

This section describes how to route the network interface cables through the router cable-management system and attach the network interface cables to the line card ports.

This procedure uses an 40x1GE line card as an *example* to describe how to attach a network interface cable to a line card port and route the cable through the cable-management system. Depending on which line cards are installed in your system, your cable connection procedure might differ slightly from this example. For cable connection information for your specific line card, refer to the installation and configuration note for that line card.

Note You can access the most current Cisco line card documentation online at: http://www.cisco.com

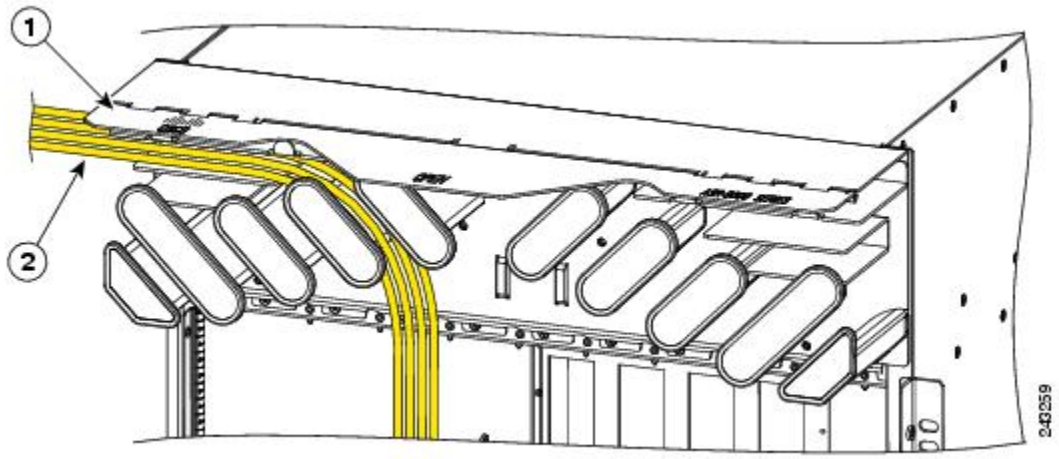
Follow these steps as an example to route the network interface cables through the cable-management system and connect them to the line card:

Procedure

Step 1 Route an interface cable across the horizontal cable management tray (see the figure below), and down through the cable tray opening to connect it to the line card.

Note
Each line card has its own cable routing slot in the cable management tray. For example, the figure below shows cables being routed to line card 3 in slot 3 in a Cisco ASR 9010 Router.

Figure 187: Routing Interface Cables through the Cable Management Tray



1	Hinged cover (shown in the raised position)	2	Line card cable bundle routed through the tray

Step 2 Attach a line card cable management bracket to the line card front panel (Figure 188: Attaching a Line Card Cable Management Bracket, on page 187). This bracket is shipped with the line card.

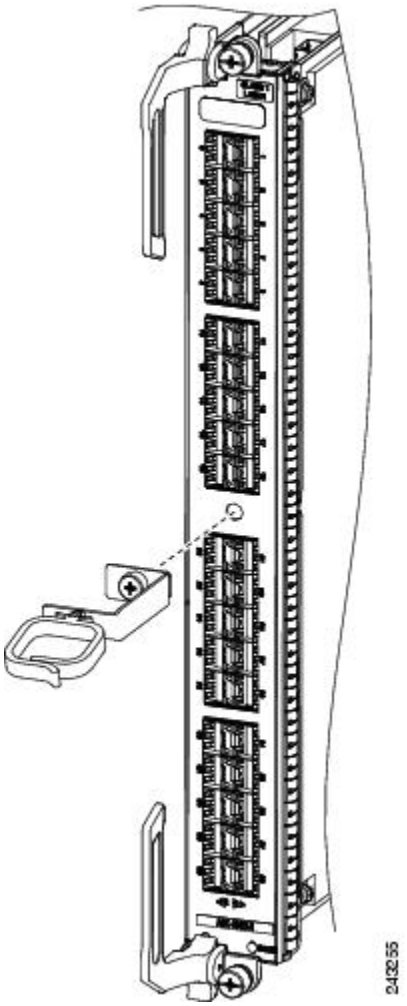
Step 3 Route the cable through the cable-management bracket and carefully press the cable into the channel so it is held in place by the cable clips, as shown in Figure 189: Interface Cable Routing Using the Line Card Cable Management Bracket , on page 188.

- For an example of cable routing in the Cisco ASR 9006 Router, see Figure 190: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9006 Router, on page 189.
- For an example of cable routing in the Cisco ASR 9904 Router, see Figure 191: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9904 Router, on page 189.
- For an example of cable routing in the Cisco ASR 9910 Router, see Figure 192: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9910 Router , on page 190.

Step 4 Insert the cable connector into its assigned port.

Step 5 Repeat Step 1 through Step 4 for each additional cable connection to that line card.

Figure 188: Attaching a Line Card Cable Management Bracket



Caution

Make sure the interface cables do not have any kinks or sharp bends, which can destroy or degrade the ability of the optical fiber to propagate the signal-encoded beam of light accurately from one end of the cable to the other. Always allow adequate strain relief in the interface cable.

Figure 189: Interface Cable Routing Using the Line Card Cable Management Bracket

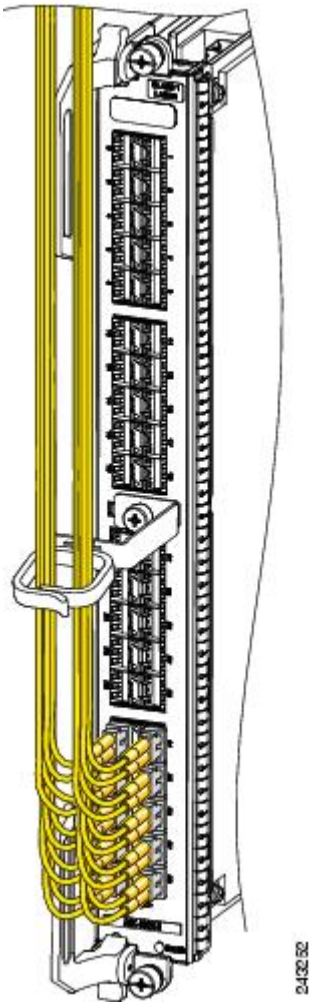


Figure 190: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9006 Router

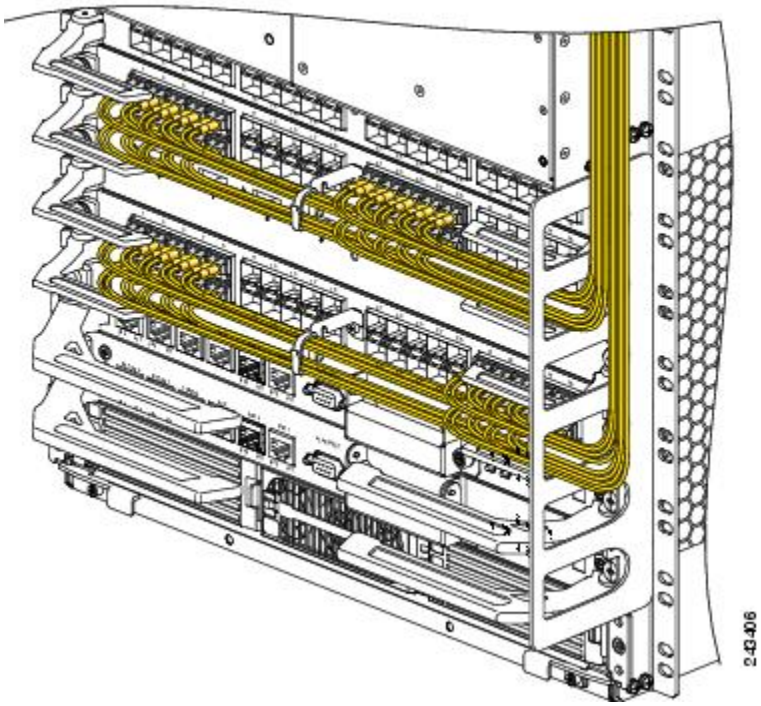


Figure 191: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9904 Router

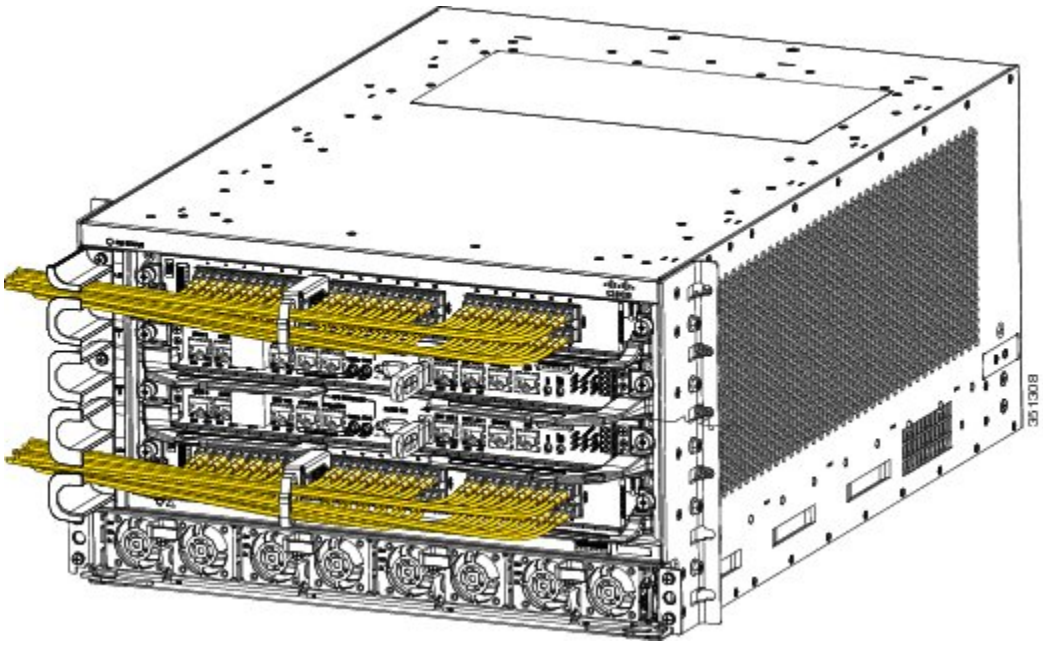
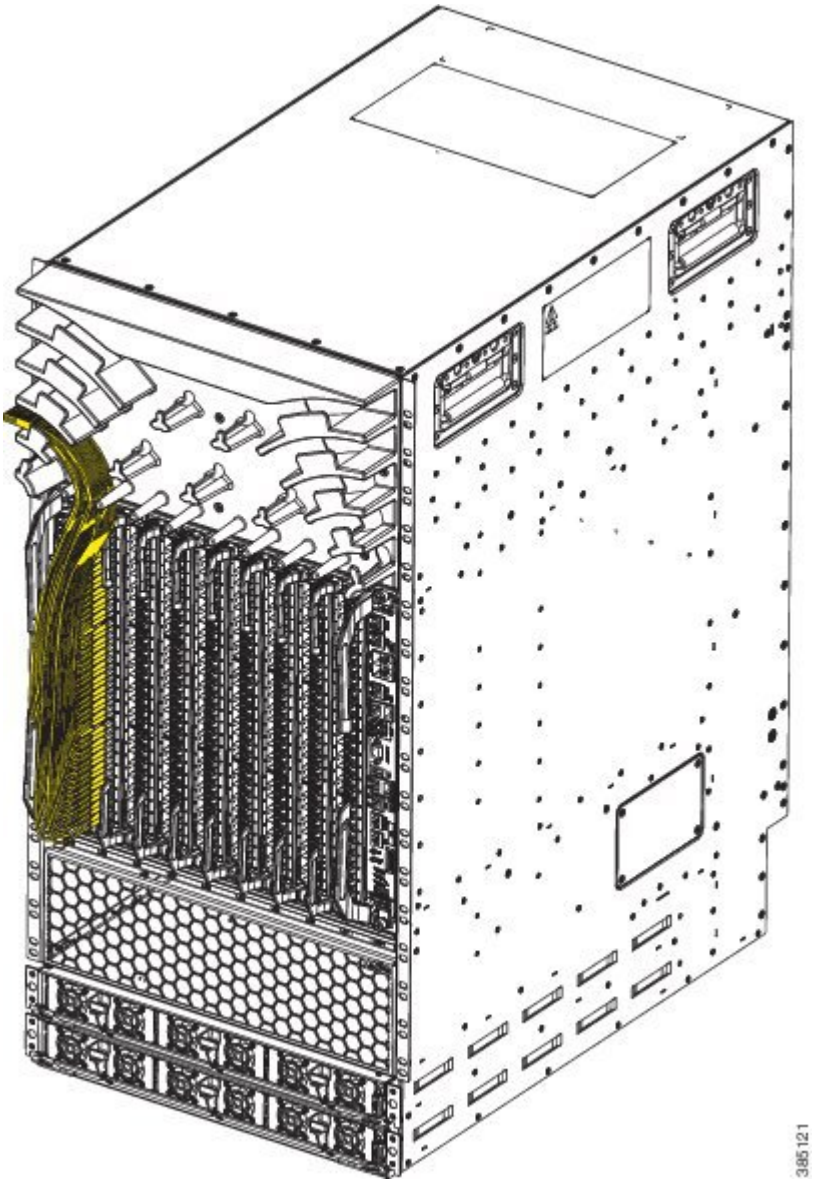


Figure 192: Interface Cable Routing Using the Line Card and Chassis Cable Management Bracket on the Cisco ASR 9910 Router

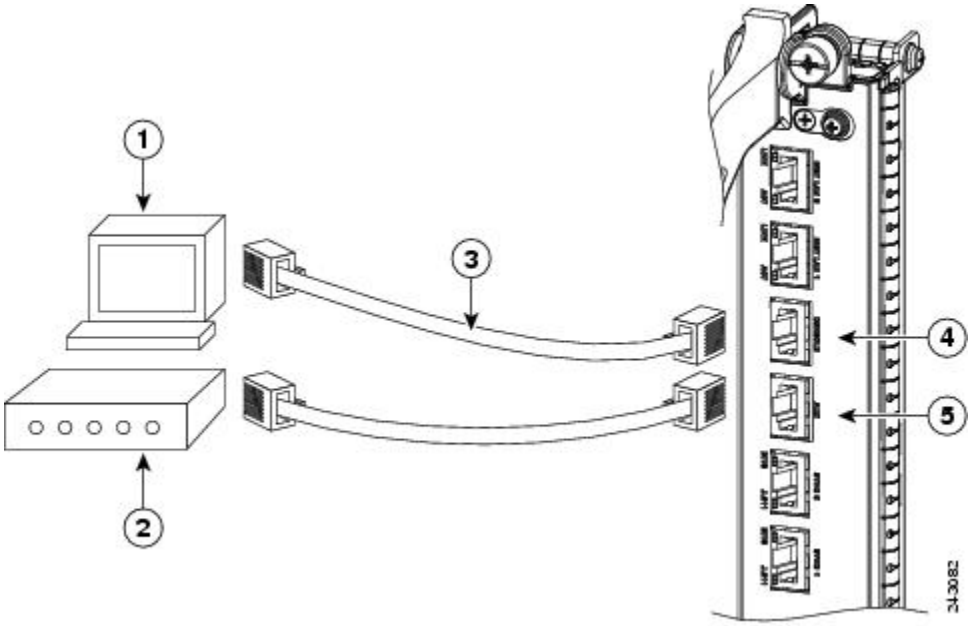


Connecting Cables to the RSP or RP

This section describes how to connect cables to the console, auxiliary, and Ethernet ports on the RSP/RP. The console and auxiliary ports are both asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. For example, most modems are asynchronous devices.

The figure below shows an example of an RSP with data terminal and modem connections called out.

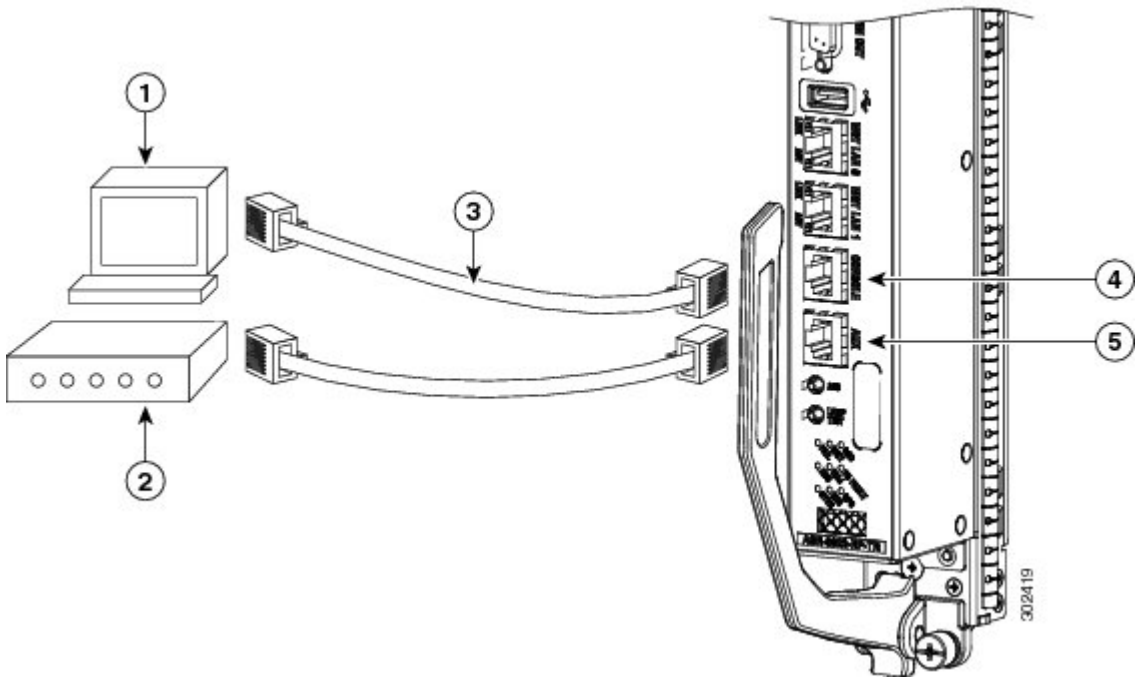
Figure 193: RSP Console and Auxiliary Port Connections



1	Console terminal	4	Console port
2	Modem	5	Auxiliary (AUX) port
3	RJ-45 Ethernet cables		

The figure below shows an example of an RP with data terminal and modem connections called out.

Figure 194: RP Console and Auxiliary Port Connections



1	Console terminal	4	Console port
2	Modem	5	Auxiliary (AUX) port
3	RJ-45 Ethernet cables		

Caution The ports labeled Ethernet, Console, and Auxiliary (AUX) are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits.

Note RSP/RP cables are not available from Cisco, but they are available from any commercial cable vendor.

Note To comply with the intra-building lightning surge requirements of Telecordia GR-1089-CORE, Issue II, Revision 01, February 1999, you must use a shielded cable when connecting to the console, auxiliary, and Ethernet ports. The shielded cable is terminated by shielded connectors on both ends, with the cable shield material tied to both connectors.

Connecting to the Console Port

The system console port on the RSP/RP is an RJ-45 receptacle for connecting a data terminal to perform the initial configuration of the router. The console port requires a straight-through RJ-45 cable.

See RSP and RP Port Connection Guidelines, page 1-63 for additional information about the console port.

Follow this procedure to connect a data terminal to the RSP/RP console port:

Procedure

Step 1 Set your terminal to these operational values:

- 115200 Baud, 8 data, no parity, 2 stop bits with flow control none for the RP2 card on the Cisco ASR 9922 Router and the Cisco ASR 9912 Router
- 9600 Baud, 8 data, no parity, 2 stop bits with flow control none for all other RSP/RP cards

Step 2 Power off the data terminal.

Step 3 Attach the terminal end of the cable to the interface port on the data terminal.

Step 4 Attach the other end of the cable to the RSP/RP console port.

Step 5 Power on the data terminal.

Connecting to the Auxiliary Port

The auxiliary port on the RSP/RP is a RJ-45 receptacle for connecting a modem or other data communication equipment (DCE) device (such as another router) to the RSP/RP. The asynchronous auxiliary port supports hardware flow control and modem control.

See RSP and RP Port Connection Guidelines, page 1-63 for additional information about the auxiliary port.

Follow this procedure to connect an asynchronous serial device to the RSP/RP auxiliary port:

Procedure

Step 1 Power off the asynchronous serial device.

Step 2 Attach the device end of the cable to the interface port on the asynchronous serial device.

Step 3 Attach the other end of the cable to the RSP/RP auxiliary port.

Step 4 Power on the asynchronous serial device.

Connecting to the Ethernet Management Ports

To connect cables to the RSP/RP management ports, attach Category 5 UTP cables directly to the MGT LAN 0 and MGT LAN 1 RJ-45 receptacles on the RSP/RP.

See Management LAN Ports Connection Guidelines, page 1-65 for additional information about the Ethernet management LAN ports.

Note RJ-45 cables are not available from Cisco Systems; they are available from outside commercial cable vendors. Use cables that comply with EIA/TIA-568 standards.

Caution Ethernet management ports are primarily used as Telnet ports into the Cisco ASR 9000 Series Router, and for booting or accessing Cisco software images over a network to which an Ethernet port is directly connected. We strongly caution you to consider the security implications of enabling routing functions on these ports.

Note The Ethernet interfaces on the RSP/RP are endstation devices only, not repeaters.

Follow these steps to connect an Ethernet cable to the RSP/RP RJ-45 Ethernet receptacle:

Procedure

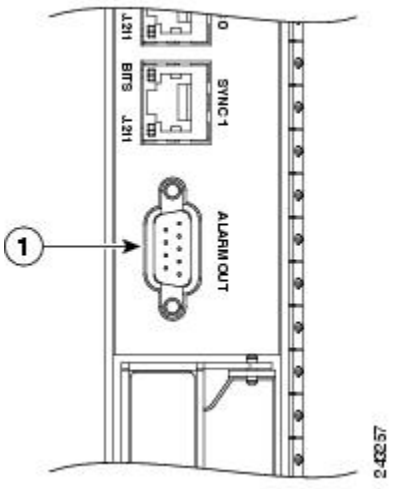
Step 1 Plug the cable directly into the RJ-45 receptacle.

Step 2 Connect the network end of your RJ-45 cable to a switch, hub, repeater, or other external equipment.

Connecting the Alarm Cable

The router alarm connector, located on the RSP/RP front panel, is a 9-pin D-subconnector, labeled Alarm Out (see the figure below).

Figure 195: Alarm Out Cable Connector



1	Alarm Out cable connector

The alarm subconnector can be used to connect the router to an external site alarm maintenance system. Any critical, major, and minor alarms generated by the router also energize alarm relays on the alarm card and activate the external site alarm. The alarm relay contacts on the RSP/RP card consist of standard common, normally open, and normally closed relay contacts that are wired to the Alarm Out connector pins.

Table 8: Alarm Connector Pinout , on page 55 lists the pin-to-signal correspondence between the connector pins and the alarm relay contacts. Because alarm contact cables are entirely dependent on installation site circumstances, alarm connector cables are not available from Cisco. For information about alarm connector wiring requirements and the pinouts for the alarm connector interface, see Alarm Connection Guidelines, page 1-67 .

Caution Only safety extra-low voltage (SELV) circuits can be connected to the Alarm Out connector. Maximum rating for the alarm circuit is 100 mA, 50 V.

Note To comply with the intra-building lightning surge requirements of GR-1089-CORE, Issue II, Revision 01, February 1999, you must use a shielded cable when connecting to the external alarm port on the RSP/RP card. The shielded cable is terminated by shielded connectors on both ends, with the cable shield material tied to both connectors.

Connecting Power to the Router

Use the one of the following procedures to connect power to your router.

Caution A router must be operated with all its power modules installed at all times for electromagnetic compatibility (EMC).

Connecting Power to an AC-Powered Router

Follow these steps to connect the AC power cords to the router.

Note Connect each AC power supply to a dedicated power source (branch circuit). Each AC input power supply operates at a nominal input level of 200 to 240 VAC. For more information on AC power input levels, see Power Connection Guidelines, on page 32.

Procedure

Step 1 Check that the power switch is set to the STANDBY (0) position.

- On version 1 power trays, this switch is at the rear of the power tray.
- On version 2 and version 3 power trays, this switch is at the front of the power tray.

Step 2 Check that the circuit breaker assigned to the AC power source you are connecting is set to OFF.

Step 3 Connect the permanent ground connection (central office grounding system) to the NEBS grounding location on the router chassis.

Caution
To ensure that power remains off while you are performing this procedure, lock-out/tag-out the circuit breaker switch in the off (0) position until you are ready to turn it on.

Step 4 Plug the AC power cord into the receptacle at the rear of the AC power tray (see the figure *Typical AC Power Connections to an AC Power Tray—Version 1 Power System* for the version 1 power tray and see figure *Typical AC Power Connections to an AC Power Tray—Version 2 and Version 3 Power System* for the version 2 and version 3 power tray).

Step 5 Close the retainer bracket to secure the AC power cord plug to the version 1 power tray receptacle. For the version 2 and version 3 power tray, tighten the screw that clamps the AC power cord plug in place.

Figure 196: Typical AC Power Connections to an AC Power Tray—Version 1 Power System

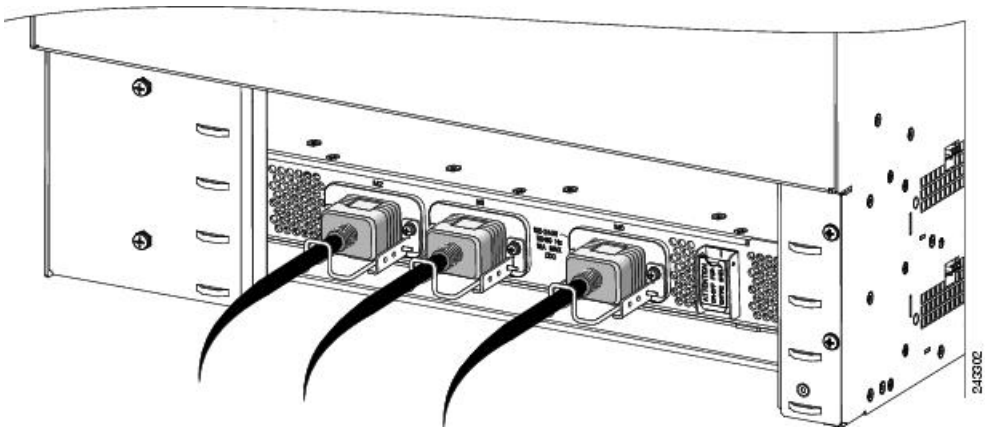
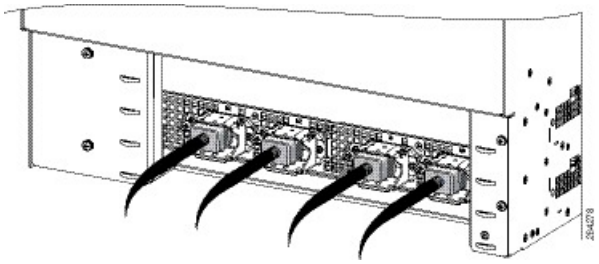


Figure 197: Typical AC Power Connections to an AC Power Tray—Version 2 and Version 3 Power System



Step 6 Plug the other end of the AC power cord into the AC source receptacle.

Step 7 Proceed to the Powering On the Router, on page 201.

Connecting Power to a DC-Powered Router

This section contains the procedures to connect the DC source power cables to a DC-powered router.

The color coding of source DC power cable leads depends on the color coding of the site DC power source. Because there is no color code standard for source DC wiring, you must be sure that power source cables are connected to the power module with the proper positive (+) and negative (–) polarity:

- In some cases, the source DC cable leads might have a positive (+) or a negative (–) label. This is a relatively safe indication of the polarity, *but you must verify the polarity by measuring the voltage between the DC cable leads* . Be sure that the positive (+) and negative (–) cable leads match the positive (+) and negative (–) labels on the power module when making the measurement.
- Green (or green and yellow) cable typically indicates that it is a ground cable.

Caution DC power modules contain circuitry to trip the breaker on the power module if the power module detects a reverse polarity condition. No damage should occur from reverse polarity, but you should correct a reverse-polarity condition immediately.

Note The length of the cables depends on the location of your router in relation to the source of DC power. These cables and the cable lugs used to attach the cables to the router chassis are not available from Cisco Systems. They are available from any commercial cable vendor. For more information on site power and source DC cable requirements, seePower Connection Guidelines, on page 32 .

Caution To ensure that power remains off while you are performing this procedure, lock-out/tag-out the DC circuit breaker switch in the off (0) position until you are ready to turn it on.

Follow these steps to connect the DC source power cables to a DC power tray:

Procedure

Step 1 Verify that the power tray switch is set to the STANDBY (0) position.

Step 2 Remove the clear plastic safety covers that fit over the DC power connection terminal studs.

Step 3 Connect the DC power cables in the following order (see Figure 198: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 1 Power System, on page 199 for the version 1 power system, Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for the version 2 power system, and Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for the version 3 power system.

a) Ground cables first.
b) Positive cables next.
c) Negative cable last.

Step 4 Repeat Step 3 for the other power modules installed in the tray.

Caution
To prevent injury and damage to the equipment, always attach the ground and source DC power cable lugs to power tray terminals in the following order: (1) ground to ground, (2) positive (+) to positive (+), (3) negative (–) to negative (–).

Caution
Do not overtighten the nuts that secure the DC power cables to the power tray terminals. Using the 7/16 hex socket and torque wrench the nuts should be tightened to a torque of 45 to 50 in-lb.

Figure 198: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 1 Power System

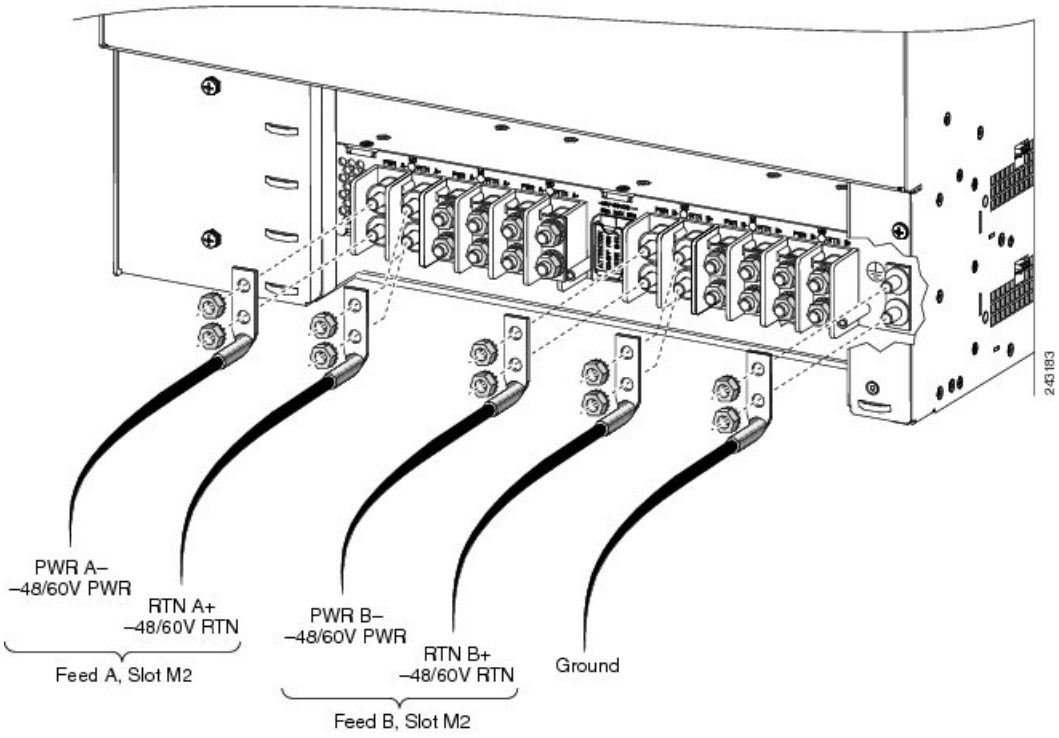


Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System

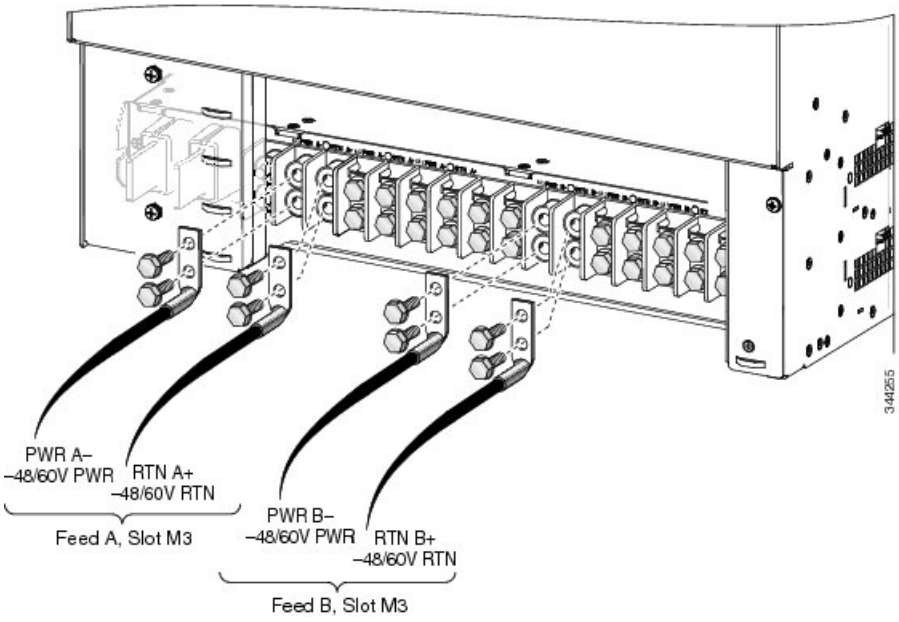


Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System

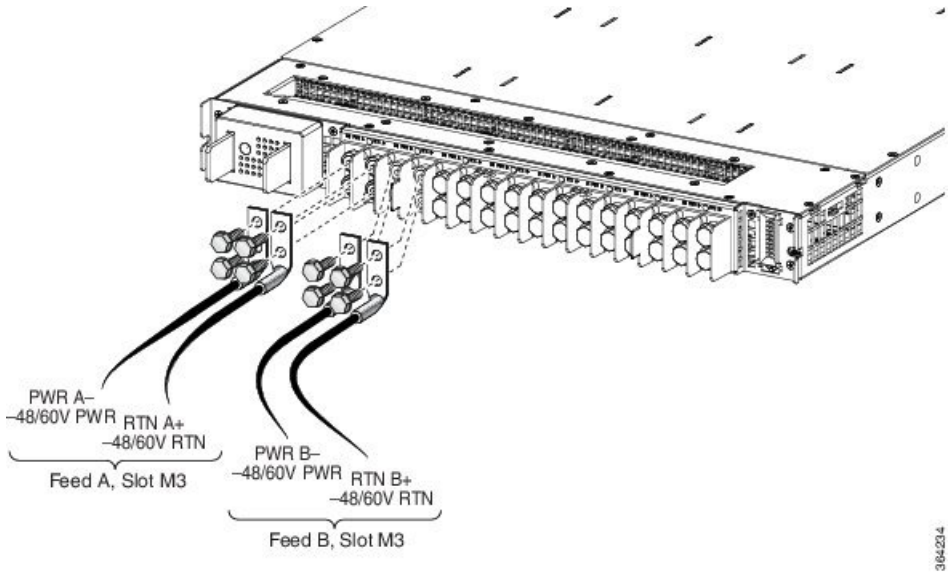
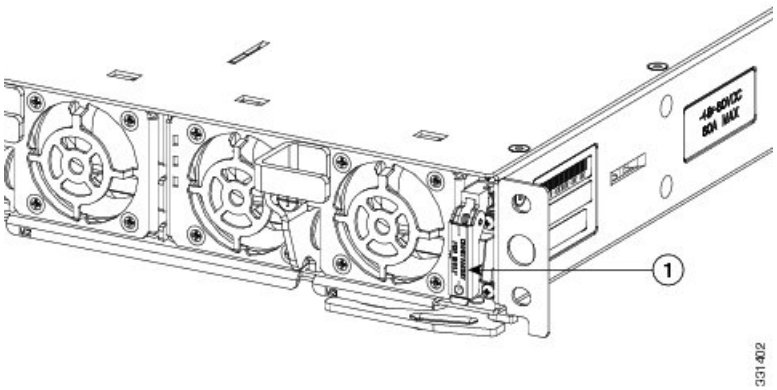


Figure 201: Location of DC Power Switch—Version 2 and Version 3 Power System



1	Power switch

Step 5 Replace the clear plastic safety covers over the connection terminal studs. Step 6 shows the plastic safety cover being installed over the version 2 DC power tray connection terminals. The plastic covers for the version 2 DC power tray are similar.

Step 6 Proceed to Powering On the Router, on page 201.

Powering On the Router

Note This equipment is designed to boot up in less than 30 minutes, depending on its neighboring devices be fully up and running.

Follow these steps to turn on power to an AC-powered or DC-powered router:

Procedure

Step 1 Power on the circuit breaker to your power sources.

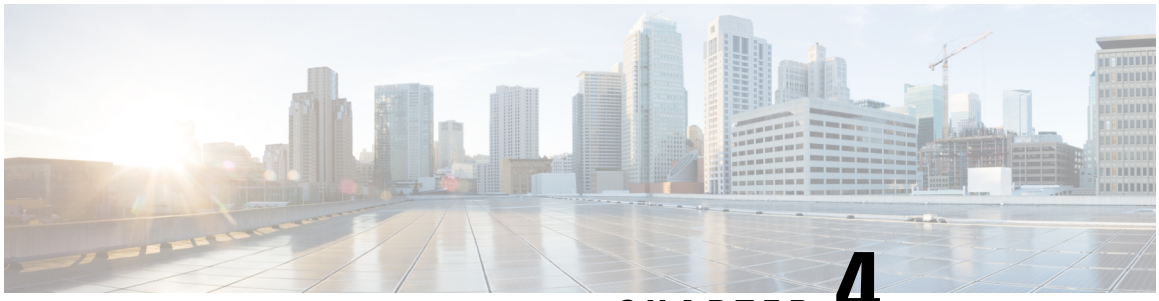
Step 2 Verify that the Power Input LED on each power module in the tray is lit.

Note
On the DC power tray, the Power Input LED is lit solid green if both DC feeds are valid and blinks green if only a single DC feed is valid.

Step 3 Set the power tray switch for Feed A Slots M03 to the ON (1) position. For the feeds, see Figure 196: Typical AC Power Connections to an AC Power Tray—Version 1 Power System, on page 197 for the version 1 Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for the version 2 power system, and Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for the version 3 power system. For the locations of the power switch, see Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for the version 1 power system Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for the version 2 and version 3 power systems.

Step 4 Verify that the Power Output LED on each power module in the tray is lit.

Step 5 Repeat Step 3 and Step 4 for Slots M03 for Feed B.



CHAPTER 4

Troubleshooting the Installation

This chapter contains general troubleshooting information to help isolate the cause of any difficulties you might encounter during the installation and initial startup of the system.

Although an overtemperature condition is unlikely at initial startup, environmental monitoring functions are included in this chapter because they also monitor internal voltages.

- Troubleshooting Overview, on page 203
- Troubleshooting the Power Subsystem, on page 209
- Troubleshooting the Route Processor Subsystem, on page 221
- Troubleshooting the Cooling Subsystem, on page 222

Troubleshooting Overview

This section describes the methods used in troubleshooting the router. The troubleshooting methods are organized according to the major subsystems in the router.

If you are unable to solve a problem on your own, you can contact a Cisco customer service representative for assistance. Cisco customer service and technical support can be reached at:

http://www.cisco.com/en/US/support/tsd_cisco_worldwide_contacts.html

When you call, please have the following information ready:

- Date you received the router and the chassis serial number (located on a label on the back of the chassis).
- Installed line cards and Cisco software release number:
  - Use the **show version** command to determine which line cards are installed and the Cisco software release number, if possible.
- Brief description of the symptoms and steps you have taken to isolate and solve the issue.
- Maintenance agreement or warranty information.

Troubleshooting Using a Subsystem Approach

To solve a system problem, try to isolate the problem to a specific subsystem. Compare current router behavior with expected router behavior. Because a startup issue is usually attributable to one component, it is most efficient to examine each subsystem, rather than trying to troubleshoot each router component.

This table describes the subsystems for the Cisco ASR 9000 Series Routers:

Table 13: Subsystem Descriptions for the Cisco ASR 9000 Series Routers

Type of Subsystem	Description
Power subsystem	• Up to 8 AC input or DC input power supply modules can be installed in the Cisco ASR 9010 Router chassis. • Up to 4 AC input or DC input power supply modules installed in the Cisco ASR 9006 Router chassis. • Up to 6 AC input or DC input power supply modules installed in the Cisco ASR 9904 Router chassis. • Up to 3 AC input power supply modules or 4 DC input power supply modules can be installed in the Cisco ASR 9906 Router chassis. • Up to 6 AC input power supply modules or 8 DC input power supply modules can be installed in the Cisco ASR 9910 Router chassis. • Up to 12 AC input or DC input power supply modules installed in the Cisco ASR 9912 Router chassis. • Up to 16 AC input or DC input power supply modules installed in the Cisco ASR 9922 Router chassis.
Chassis backplane power distribution	The system transfers –54 VDC power from the power modules to the chassis backplane and distributes it to all the cards through the backplane connectors.
Processor subsystem	
Cisco ASR 9010 Router Cisco ASR 9006 Router Cisco ASR 9904 Router Cisco ASR 9906 Router Cisco ASR 9910 Router	Includes the active Route Switch Processor (RSP) card (and optional, redundant RSP card, if installed). Up to eight line cards in the Cisco ASR 9010 Router and Cisco ASR 9910 Router, four line cards in the Cisco ASR 9006 Router and Cisco ASR 9906 Router, and two line cards in the Cisco ASR 9904 Router. **Note** The RSP and line cards are equipped with onboard processors. The RSP downloads a copy of the Cisco software image to each line card processor. The system uses an alphanumeric display on the active RSP to display status and error messages, which can help in troubleshooting.
Cisco ASR 9922 Router Cisco ASR 9912 Router	Includes the active Route Processor (RP) card, standby redundant RP card. Up to 20 line cards in the Cisco ASR 9922 Router or 10 line cards in the Cisco ASR 9912 Router. **Note** The RP and line cards are equipped with onboard processors. The RP downloads a copy of the Cisco software image to each line card processor. The system uses an alphanumeric display on the active RP to display status and error messages, which can help in troubleshooting.
Cooling subsystem	

Type of Subsystem	Description
Cisco ASR 9010 Router Cisco ASR 9006 Router Cisco ASR 9904 Router Cisco ASR 9906 Router Cisco ASR 9910 Router Cisco ASR 9912 Router	Consists of one or two fan trays, which circulate air through the card cage to cool the cards, and two fans in each of the power modules, which circulate cooling air through the power module.
Cisco ASR 9922 Router	Consists of four fan trays, which circulate air through the top and bottom line card cages to cool the cards, and two fans in each of the power modules, which circulate cooling air through the power module.

Note There are two types of image files, -P PIE files, and x86-based -PX PIE files. -P PIE files are for use on Cisco ASR 9000 Series Routers with RSP route switch processors (RSP-4G and RSP-8G). -PX PIE files are for use on the routers with RSP-440/RSP-440 Lite and RSP-880/RSP880-LT route switch processors, and the Cisco ASR 9922 Router and Cisco ASR 9912 Router route processors.

Normal Router Startup Sequence

You can generally determine when and where the router failed during the startup sequence by checking the status LEDs on the power modules, and the alphanumeric displays on the RSP, RP, and line cards.

In a normal router startup sequence, the following sequence of events and conditions occur:

1. The fan in each power module receives power and begins drawing air through the power supply.

The power module input power and output power indicators are on.

1. The fans in the fan tray receive power and begin drawing air through the chassis.

The fan tray OK indicator is on.

1. As the power-on and boot process progresses for the RSP/RP, the status of the RSP/RP appears on the alphanumeric display on the front panel of the card.

Identifying Startup Issues

This table shows the contents of the alphanumeric displays on the various RSP/RP cards, as well as the normal LED states on the power modules (AC or DC) and the fan tray after a successful system startup.

Note For the RSP/RP card to communicate properly to a power module in a power tray, the appropriate input power should be present.

Table 14: Alphanumeric Displays and LEDs at System Startup

Component	Type of Indicator	Display Contents/LED Status and Meaning
RSP card	Alphanumeric display	INIT—Card is inserted and microcontroller is initialized BOOT—Board is powered on and CPU is booting IMEM—Start initializing memory IGEN—Start initializing the board ICBC—Start initializing communication with the microcontroller PDxy—Loading programmable devices (x = FPGA, y = ROMMON) PSTx—Power on self test x RMN—All tests are finished and ROMMON is ready for commands LOAD—Downloading Minimum Boot Image (MBI) image to CPU MBI—Starting execution of MBI IOXR—Cisco IOS XR software is starting execution ACTV—RSP role is determined to be active RSP STBY—RSP role is determined to be standby RSP PREP—Preparing disk boot

Component	Type of Indicator	Display Contents/LED Status and Meaning
RSP-440 RSP-440 Lite RSP-880 RSP880-LT RSP4-S	Alphanumeric display	INIT—Card is inserted and microcontroller is initialized BOOT—Board is powered on and CPU is booting IMEM—Start initializing memory IGEN—Start initializing the board ICBC—Start initializing communication with the microcontroller SCPI—Board is not plugged in properly RSP-440/RSP 440-Lite: • STID—CBC was unable to read slot ID pins correctly • PSEQ—CBC detected power sequencer failure • DBPO—CBC detected an issue during board power up • KPWR—CBC detected an issue during board power up • LGNP—CBC detected an issue during board power up • LGNI—CBC detected an issue during board power up RMN—All tests are finished and ROMMON is ready for commands LOAD—Downloading MBI image to CPU RRST—ROMMON is performing a soft reset after 5 consecutive MBI validation requests timed out MVB—ROMMON trying MBI validation boot MBI—Starting execution of MBI IOXR—Cisco IOS XR software is starting execution LDG—The RSP is loading (MBI started and card preparing for activity) INCP—The software or configuration is incompatible with the RSP OOSM—The RSP is in Out of Service, Maintenance mode ACTV—RSP role is determined to be active RSP STBY—RSP role is determined to be standby RSP PREP—Preparing disk boot

Component	Type of Indicator	Display Contents/LED Status and Meaning
RP card RP2 card	Alphanumeric display	INIT—Card is inserted and microcontroller is initialized BOOT—Board is powered on and CPU is booting IMEM—Start initializing memory IGEN—Start initializing the board ICBC—Start initializing communication with the microcontroller SCPI—Board is not plugged in properly STID—CBC was unable to read slot ID pins correctly PSEQ—CBC detected power sequencer failure DBPO—CBC detected an issue during board power up KPWR—CBC detected an issue during board power up LGNP—CBC detected an issue during board power up LGNI—CBC detected an issue during board power up RMN—All tests are finished and ROMMON is ready for commands LOAD—Downloading MBI image to CPU RRST—ROMMON is performing a soft reset after 5 consecutive MBI validation requests timed out MVB—ROMMON trying MBI validation boot MBI—Starting execution of MBI IOXR—Cisco IOS XR software is starting execution LDG—The RP is loading (MBI started and card preparing for activity) INCP—The software or configuration is incompatible with the RP OOSM—The RP is in Out of Service, Maintenance mode ACTV—RP role is determined to be active RP STBY—RP role is determined to be standby RP PREP—Preparing disk boot
Line Cards	Status LED	Green: The line card is enabled and ready for use.
AC Power Modules	Power status LEDs	Input power indicator on (green): Input AC power OK. Output power indicator on (green): Output DC power OK. Fault LED off (red): No fault is present. The correct power module voltages are present and no faults have been detected.

Component	Type of Indicator	Display Contents/LED Status and Meaning
DC Power Modules	Power status LEDs	Input power indicator on (green): Input DC power OK. On the DC power tray, the Power Input LED is lit solid green if both DC feeds are valid and blinks green if only a single DC feed is valid. Output power indicator on (green): Output DC power OK. Fault LED off (red): No fault is present. The correct power module voltages are present and no faults have been detected.
Fan Trays	Fan tray status LED	Green LED on: Fan Tray OK. The fan tray fans are operating correctly.

Troubleshooting the Power Subsystem

This section contains information to troubleshoot the power subsystems:

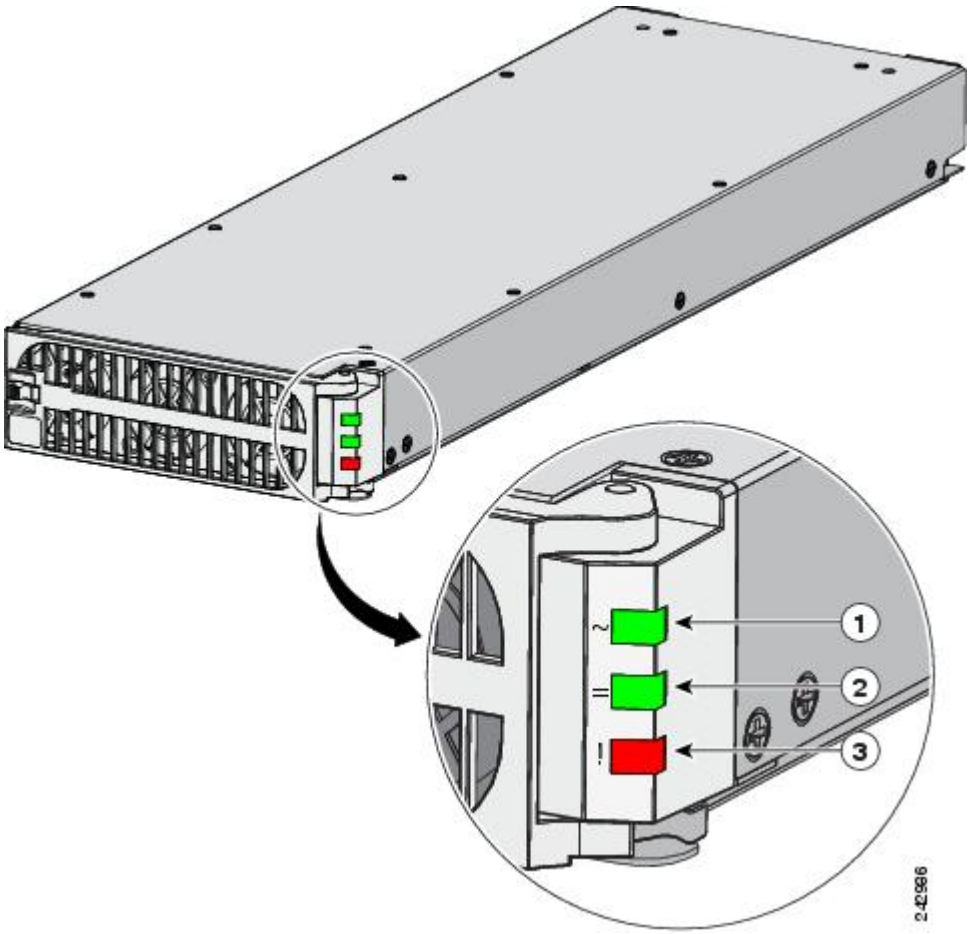
Note For the RSP/RP card to communicate properly to a power module in a power tray, input power to at least one of the three power modules in the power tray should be present.

Troubleshooting the AC Input Power Subsystem

AC input power modules are monitored for internal temperature, voltage, and current load by the RSP/RP. If the router detects an extreme condition, it generates an alarm and logs the appropriate warning messages on the console.

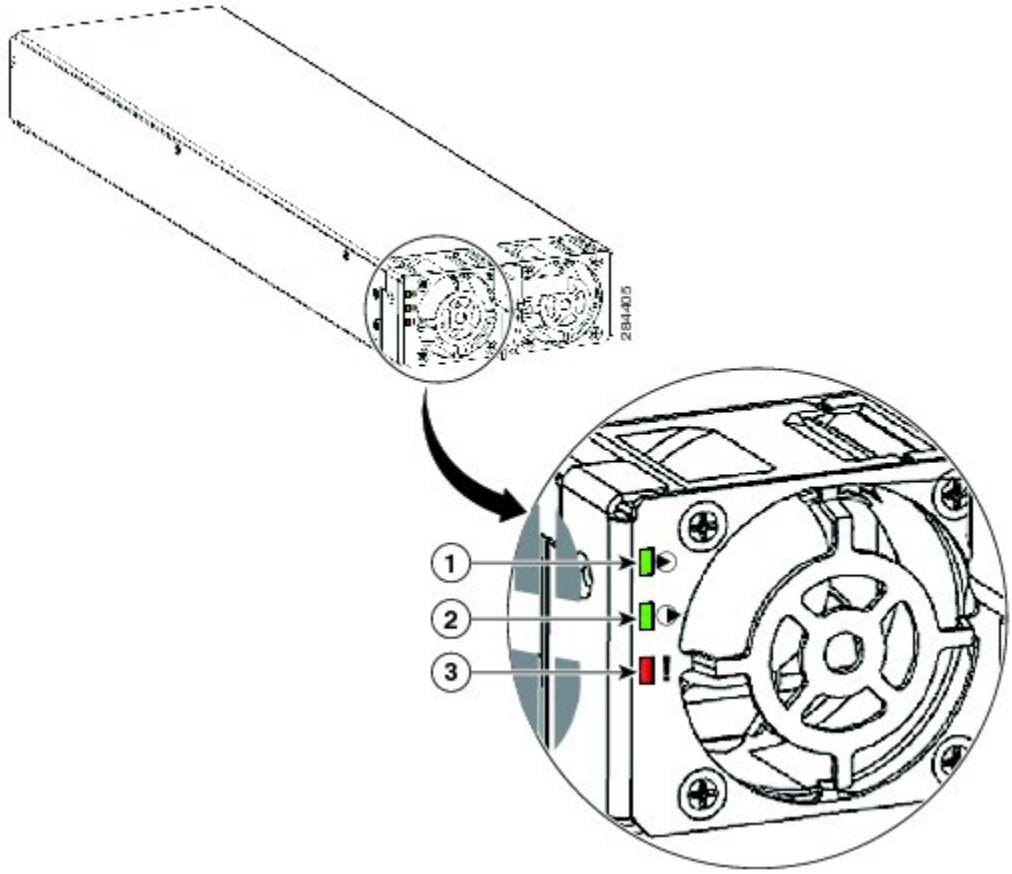
The figure titled "Version 1 Power Module Status Indicators" shows the status indicators for the version 1 power module. The figure titled "Version 2 Power Module Power Module Status Indicators" shows the status indicators for the version 2 power module, and the figure titled "Version 3 AC Power Module Status Indicators" shows the status indicators for the version 3 AC power module. The indicator definitions follow the two figures.

Figure 202: Version 1 Power Module Status Indicators



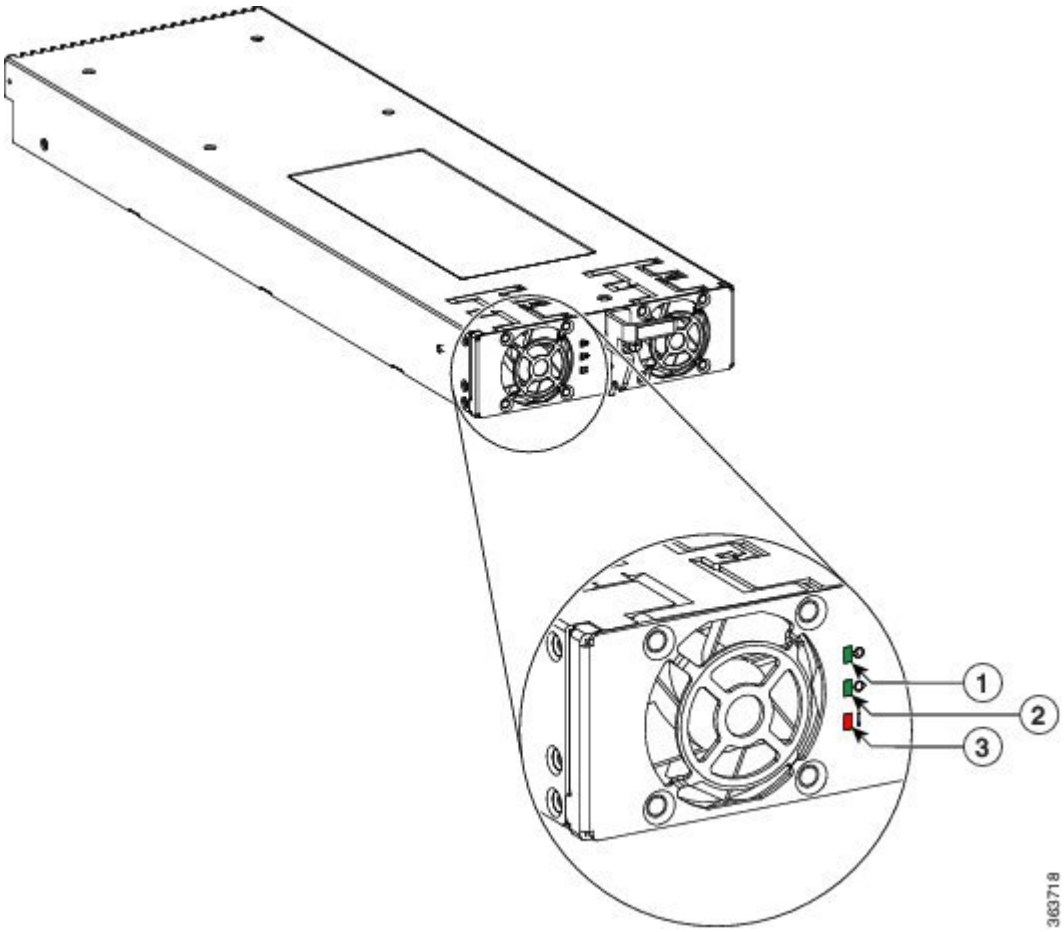
1	Input power LED	ON continuously when the input voltage is present and within the cor range BLINKING when the input voltage is out of acceptable range OFF when no input voltage is present
2	Output power LED	ON when the power module output voltage is present BLINKING when the power module is in a power limit or overcurren condition
3	Fault LED	ON to indicate that a power module failure has occurred

Figure 203: Version 2 Power Module Power Module Status Indicators



1	Input power LED	ON continuously when the input voltage is present and within the range BLINKING when the input voltage is out of acceptable range OFF when no input voltage is present
2	Output power LED	ON when the power module output voltage is present BLINKING when the power module is in a power limit or overcur condition
3	Fault LED	ON to indicate that a power module failure has occurred

Figure 204: Version 3 AC Power Module Status Indicators



1	Input power LED	ON continuously when the input voltage is present and within the corr range BLINKING when the input voltage is out of acceptable range OFF when no input voltage is present
2	Output power LED	ON when the power module output voltage is present BLINKING when the power module is in a power limit or overcurren condition
3	Fault LED	ON to indicate that a power module failure has occurred

Follow these steps to troubleshoot the AC power module if it is not operating properly.

Procedure

Step 1 Make sure the power module is seated properly by ejecting and reseating the power module. Check that:

- Latch on the door/ejector lever is locked securely.
- Power switch on the power tray is set to the ON (1) position.

Step 2 Make sure the router is powered on and that all power cords are connected properly. Check that the:

- Power cords plugged into the power tray receptacles are secured in place with their retention clips.
- Power cords at the power source end are securely plugged into their own AC power outlets.
- Source AC circuit breaker is switched on.

Step 3 Check the power supply status LED indicators:

- Input power LED (green)—Indicates that the AC power input is operating normally, and the source AC input voltage of 200 to 240 VAC is within the nominal operating range.

  If the input power LED is blinking, the input voltage is out of acceptable range. Verify that each AC power source is operating in the nominal range of 200 to 240 VAC.

  Note
  On the DC power tray, the Power Input LED is lit solid green if both DC feeds are valid and blinks green if only a single DC feed is valid.

- Output power LED (green)—Indicates that the DC power output is operating normally and the –54 VDC output voltage to the backplane are within the nominal operating range. This indicator lights only when the power switch at the rear of the power tray is set to the ON (1) position. See Figure 201: Location of DC Power Switch—Version 2 and Version 3 Power System, on page 200.
  - If the Output power LED remains off after checking all the power sources, replace the power supply with a spare. If the spare power module does not work, troubleshoot the power tray in which the module is plugged.
  - If the output power LED is blinking, the power module is in a power limit or overcurrent condition. Make sure that each power cord is connected to a dedicated AC power source. Verify that each AC power source is operating in the nominal range of 200 to 240 VAC and is supplying a minimum service of 20 A, North America (or 13 A, international).

- Fault LED (red)—Indicates that the system has detected a fault within the power supply. This indicator remains off during normal operation. If the fault LED is on:
  - If your system has more than one power tray (Cisco ASR 9010 Router, Cisco ASR 9922 Router, and Cisco ASR 9912 Router) with power modules installed for redundancy, you can toggle the power switch at the rear of the first power tray off and then on. If the fault LED remains on after several attempts to power it on, replace the power module with a spare.
  - If the spare power module also fails, the problem could be a faulty power tray backplane connector. Power off the router and contact a Cisco service representative for assistance.
  - Verify that the power module fans are operating properly.
  - Verify that the fan tray is operating properly.

If the power module fans and the fan trays are operating properly, replace the existing power module with a spare.

Caution

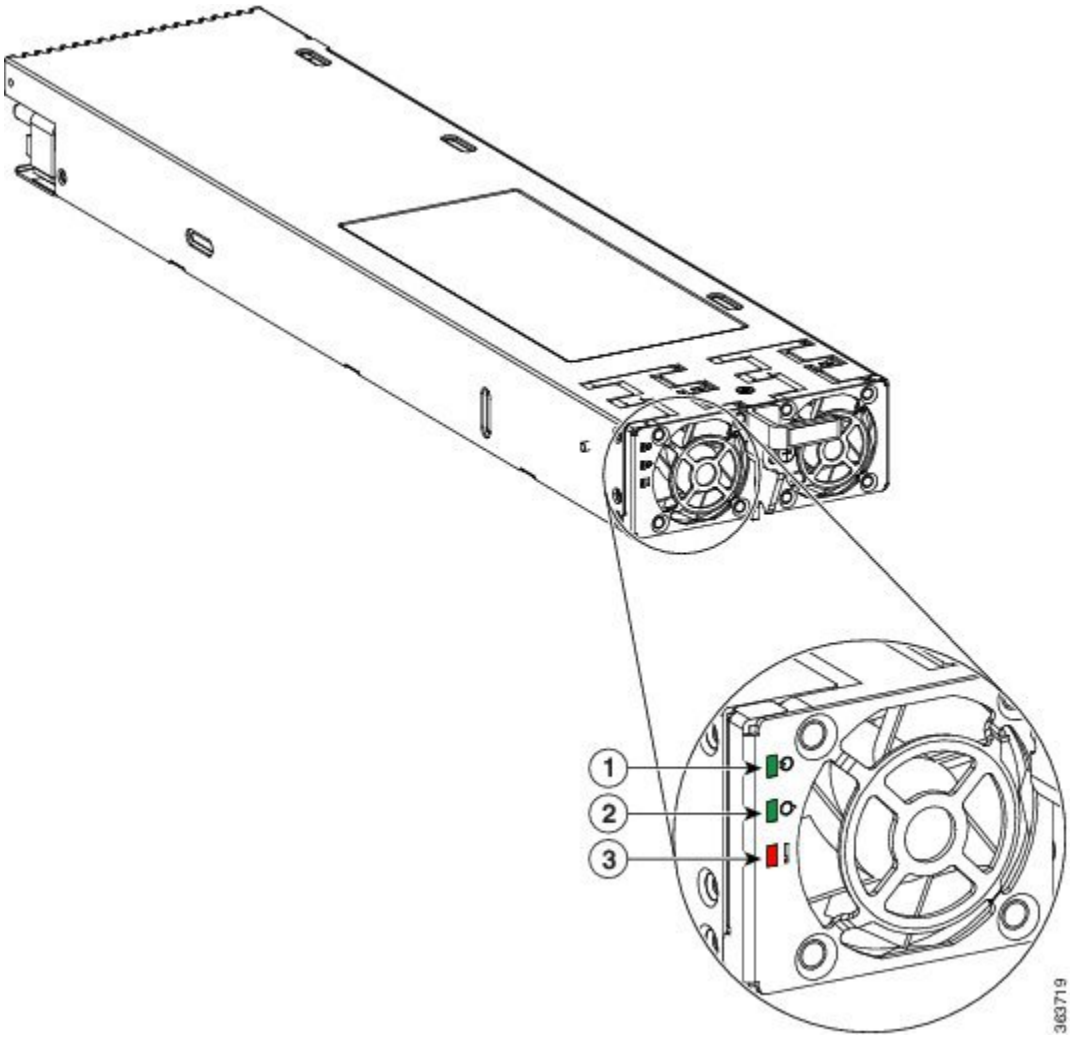
Because the AC input power subsystems use redundant power modules, a problem with the DC output voltage to the backplane from only one power module should not affect router operation. When the router is equipped with two AC power supplies, it powers on and operates even if one power supply fails. However, complete router functionality may be affected depending on the system load.

Troubleshooting the DC Input Power Subsystem

DC input power supplies are monitored for internal temperature, voltage, and current load by the RSP/RP. If the router detects an extreme condition, it generates an alarm and logs the appropriate warning messages on the console.

The figure titled *Version 1 Power Module Status Indicators* shows the status indicators for the version 1 power module, and the figure titled *Version 2 Power Module Power Module Status Indicators* shows the status indicators for the version 2 power module, and the figure titled *Version 3 DC Power Module Status Indicators* shows the status indicators for the version 3 DC power module. The indicator definitions follow the two figures.

Figure 205: Version 3 DC Power Module Status Indicators



1	Input power LED	ON continuously when the input voltage is present and within the range BLINKING when the input voltage is out of acceptable range **Note** On the DC power tray, the Power Input LED is lit solid green if bo feeds are valid and blinks green if only a single DC feed is valid. OFF when no input voltage is present
2	Output power LED	ON when the power module output voltage is present BLINKING when the power module is in a power limit or overcur condition
3	Fault LED	ON to indicate that a power module failure has occurred

Troubleshooting a DC Power Module

Follow these steps to troubleshoot a DC power module if it is not operating properly.

Procedure

Step 1 Make sure the power module is seated properly by ejecting and reseating the power module. Check that:

- Latch on the door/ejector lever is locked securely.
- Power switch on the power tray is set to the ON (1) position.

Step 2 Make sure the router is powered on and that all power cords are connected properly. Check that the:

- Power cables are securely attached to their power module terminal studs.
- Power cables are securely attached at the DC source end.
- Source DC circuit breaker is switched on.

Step 3 Check the power supply status LED indicators:

- Input power LED (green)—Indicates that the DC power input is operating normally, and the source DC input voltage is within the nominal operating range of –40 to –72 VDC.
  - If the input power LED is blinking, input connections to the power module are loose or not connected, or the input voltage is below the minimum. Verify that DC power from the source is operating in the nominal range of –40 to –72 VDC.

    Note
    On the DC power tray, the Power Input LED is lit solid green if both DC feeds are valid and blinks green if only a single DC feed is valid. Check the input connections to the power module.

  - If the indicator is still flashing after you perform the above checks, replace the power module.

- Output power LED (green)—Indicates that the DC power output is operating normally, and the –54 VDC output voltage to the backplane is within the nominal operating range. This indicator lights only when the power switch at the rear of the power tray is set to the ON (1) position. See Figure 201: Location of DC Power Switch—Version 2 and Version 3 Power System, on page 200.
  - If the output power LED remains off after checking all the power sources, replace the power module with a spare. If the spare power module does not work, troubleshoot the power tray in which the module is plugged.
  - If the output power LED is blinking, the power module is in a power limit or overcurrent condition. Make sure that each power cable is connected to a dedicated DC power source. Verify that each DC power source is operating in the nominal range of –40 to –72 VDC.

- Fault LED (red)—Indicates that the system has detected a fault within the power supply. This indicator remains off during normal operation. If the fault LED is on, check the following:
  - If your system has more than one power tray (Cisco ASR 9010 Router, Cisco ASR 9922 Router, and Cisco ASR 9912 Router) with power modules installed for redundancy, you can toggle the power switch at the rear of the first power tray off and then on. If the fault LED is still on, eject and

reseat the power module. If the fault LED remains on after several attempts to power it on, replace the power module with a spare.

- If the spare power module also fails, the problem could be a faulty power tray backplane connector. Power off the router and contact a Cisco service representative for assistance.
- Verify that the power module fans are operating properly.
- Verify that the fan tray is operating properly.
- If the power module fans and the fan trays are operating properly, replace the faulty power module with a spare.

Caution
Because there are redundant power modules, a problem with the DC output voltage to the backplane from only one power module should not affect router operation. When the router is equipped with two DC power supplies, it powers on even if one power supply fails. However, complete router functionality may be affected depending on the system load.

Additional Power Subsystem Troubleshooting Information

This section contains additional troubleshooting information to help you isolate the cause of a power problem.

Obtaining Temperature and Environmental Information

If both the RSP/RP and fan trays are operating, all internal correct DC voltages are present.

Enter the **show environment** command at the router admin prompt to display temperature and voltage information for each installed card, fan tray, and power module as shown in this example:

```
RP/0/RSP0/CPU0:router(admin) #show environment

Temperature Information
-----------------------------------------------

R/S/I Modules Inlet Hotspot
Temperature Temperature
(deg C) (deg C)

0/RSP0/*
host 25.3 41.6

0/0/*
host 29.2 30.0
0/1/*
host 35.0 46.6

0/FT0/*
host 21.2 20.8
0/FT1/*
host 22.0 21.5


Voltage Information
-----------------------------------------------
```

```
R/S/I Modules Sensor (mV) Margin
0/RSP0/*

host VP3P3_CAN 3300 n/a
host VP2P5 2499 n/a
host VP3P3 3299 n/a
host VP1P2 1199 n/a
host VP1P5 1500 n/a
host VP1P8 1800 n/a
host VP5P0 5000 n/a
host VP7P0 6999 n/a
host VP2P5_DB 2499 n/a
host VP1P8_DB 1800 n/a
host VP1P5_DB 1500 n/a
host VP1P2_DB 1199 n/a
host VP0P75_DB 750 n/a
host VP1P05_DB 1050 n/a
host VP1P8_ENSO 1800 n/a
host VP1P0_SAC0_VDDA 1000 n/a
host VP1P0_SAC0_VDDD_VDDACM 999 n/a
host VP1P2_SERDES_PLL_LGN 1199 n/a
host VP1P0_SAC1_VDDD_VDDACM 999 n/a
host VP1P0_SAC1_VDDA 999 n/a
host VP1P0_SAC1_VDD 1000 n/a
host VP1P0_SAC0_VDD 1000 n/a
host VP1P0_DAO 999 n/a
host VP1P0_KAW_LDO 1000 n/a
host VP1P0_MGTVCC_DAO 1000 n/a
host VP1P2_SERDES_PLL_DAO 1200 n/a
host VP1P0_SKT_IO 1000 n/a
host VP1P0_SKT_CORE 1000 n/a
host VP1P9_LDO 1900 n/a
host VP1P8_10GPHY_LDO 1800 n/a
host VP1P2_10GPHY_01 1200 n/a
host VP0P75_TMX_VTT 743 n/a
host VP3P3_OCXO 3300 n/a
host VP1P8_OCXO 1799 n/a
host VP1P0_ARB 999 n/a

0/0/*
host IBV 10552 n/a
host 5.0V 4939 n/a
host VP3P3_CAN 3275 n/a
host 3.3V 3303 n/a
host 2.5V 2515 n/a
host 1.8VB 1803 n/a
host 1.2VB 1203 n/a
host 1.8VA 1795 n/a
host 0.9VB 881 n/a
host 1.2V_LDO_BRG0 1195 n/a
host 1.2V_LDO_BRG1 1196 n/a
host 1.8VC 1806 n/a
host 1.5VB 1504 n/a
host 1.5VA 1499 n/a
host 1.1V(1.05V_CPU) 1051 n/a
host 0.75VA 749 n/a
host 0.75VB_0.75VC 754 n/a
host 1.1VB 1101 n/a
host 1.2V_TCAM0 1203 n/a
host 1.2V_TCAM1 1202 n/a
host 1.0V_Bridge_LDO 995 n/a
host 1.0VB 1046 n/a
host 0.75VD_and_0.75VE 755 n/a
host 1.2V_TCAM2 1208 n/a
```

```
host 1.2V_TCAM3 1203 n/a
host 1.5VC 1507 n/a
host 1.8VD 1793 n/a
host 1.1VC 1105 n/a
host ZARLINK_3.3V 3284 n/a
host ZARLINK_1.8V 1810 n/a
host 1.2V_DB 1200 n/a
host 3.3V_DB 3320 n/a
host 2.5V_DB 2498 n/a
host 1.5V_DB 1493 n/a
host 1.8V_DB 1827 n/a
host 5.0V_XFP_DB 5034 n/a
host 1.2VB_DB 1226 n/a

0/1/*
host IBV 10460 n/a
host 5.0V 4920 n/a
host VP3P3_CAN 3283 n/a
host 3.3V 3294 n/a
host 2.5V 2510 n/a
host 1.8VB 1804 n/a
host 1.2VB 1203 n/a
host 1.8VA 1794 n/a
host 0.9VB 882 n/a
host 1.2V_LDO_BRG0 1191 n/a
host 1.2V_LDO_BRG1 1194 n/a
host 1.8VC 1816 n/a
host 1.5VB 1508 n/a
host 1.5VA 1497 n/a
host 1.1V(1.05V_CPU) 1054 n/a
host 0.75VA 749 n/a
host 0.75VB_0.75VC 755 n/a
host 1.1VB 1104 n/a
host 1.2V_TCAM0 1205 n/a
host 1.2V_TCAM1 1207 n/a
host 1.0V_Bridge_LDO 995 n/a
host 1.0VB 1047 n/a
host 0.75VD_and_0.75VE 753 n/a
host 1.2V_TCAM2 1207 n/a
host 1.2V_TCAM3 1199 n/a
host 1.5VC 1503 n/a
host 1.8VD 1805 n/a
host 1.1VC 1102 n/a
host ZARLINK_3.3V 3272 n/a
host ZARLINK_1.8V 1811 n/a
host 1.2V_DB 1197 n/a
host 3.3V_DB 3318 n/a
host 2.5V_DB 2540 n/a
host 1.5V_DB 1511 n/a


LED Information
-----------------------------------------------

R/S/I Modules LED Status
0/RSP0/*
host Critical-Alarm Off
host Major-Alarm Off
host Minor-Alarm Off
host ACO Off

Fan Information
-----------------------------------------------
```

```
Fan speed (rpm):
FAN0 FAN1 FAN2 FAN3 FAN4 FAN5

0/FT0/*
7080 7020 6990 7020 6960 6900
0/FT1/*
6900 6900 7110 6960 6900 7020
Power Supply Information
-----------------------------------------------

R/S/I Modules Sensor Watts Status

0/PM0/*
host PM 3000 Ok


Power Shelves Type: AC

Total Power Capacity: 3000W
Usable Power Capacity: 3000W
Supply Failure Protected Capacity: 0W
Worst Case Power Used: 1910W

Slot Max Watts
---- ---------
0/RSP0/CPU0 250
0/RSP1/CPU0 250 (default)
0/0/CPU0 375
0/1/CPU0 375
0/FT0/SP 330 (default)
0/FT1/SP 330 (default)

Worst Case Power Available: 1090W
Supply Protected Capacity Available: Not Protected
```

Troubleshooting the Power Distribution System

The power distribution system consists of:

- AC or DC power modules, which supply –54 VDC to the backplane.
- Chassis backplane, which carries voltage to chassis components.
- DC-to-DC converters, which convert –54 VDC from the backplane to the correct voltages required by the line cards.

Follow these steps to troubleshoot the power distribution system:

Procedure

Step 1 Check each power module to make sure that:

- Power module door is fully closed and properly secured by its latch.
- Green Input Power LED is on.
- Green Output Power LED is on.
- Red Fault LED is off.

If the power modules meet the above criteria, then the correct source power is present and within tolerance and output DC power is present. The power modules are functioning properly.

Step 2 Make sure the fan trays are operating:

- If the fan trays are functioning, then the –54 VDC from the chassis backplane and the cables from the backplane to the fan trays are functioning properly.
- If one or both fan trays are not functioning, there may be a problem with either the fan trays themselves, or the –54 VDC power supplied to the fan trays. Eject and reseat the fan trays.
- If a fan tray is still not operating, there could be a problem with the fan tray controller card or cable. Replace the fan tray.
- Contact your Cisco representative if replacing a fan tray or both fan trays does not fix the problem.

Troubleshooting the Route Processor Subsystem

The router processor subsystem consists of the route processor located on the RSP card. The RSP and the line cards each have the same onboard CPU serving as the main processor. The Controller Area Network (CAN) microcontroller processor monitors the environment and controls the onboard DC-to-DC converters.

Note A minimally configured router must have an RSP/RP installed in RSP slot 0 or RP slot 0 of the card cage to operate. If the router is equipped with a redundant RSP/RP, the redundant RSP/RP must be installed in RSP slot 1 or RP slot 1 of the card cage.

This section contains information to troubleshoot the route processor subsystem, including:

RSP and RP Front Panel Indicators

Refer to the RSP and RP Front Panel Indicators section in the *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide* for detailed information about the Route System Processor (RSP) or Route Processor (RP) cards front panel LED indicators and LED dot-matrix display.

Fabric Card Front Panel Indicator

The front panel of the fabric card (FC) has one tri-color LED indicator for system information.

Refer to the Fabric Controller Card section in the *Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide* for detailed information about the Fabric Card front panel LED indicators.

Troubleshooting Line Cards and Modular Port Adapters

See the *Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide* for information about troubleshooting line cards and modular port adapters (MPA).

Monitoring Critical, Major, and Minor Alarm Status

The alarms can warn of:

- Overtemperature condition on a component in the card cage
- Fan failure in a fan tray
- Overcurrent condition in a power supply
- Out-of-tolerance voltage on one of the cards
- Insertion count for an RSP card, RP, card, FC, or LC has reached a specified threshold. For more information on OIR insertion counts, see OIR Monitoring.

The alarm LEDs are controlled by the CAN microcontroller software, which sets the threshold levels for triggering the different stages of alarms.

The RSP/RP card continuously polls the system for temperature, voltage, current, and fan speed values. If a threshold value is exceeded, the RSP/RP sets the appropriate alarm severity level on the alarm card, which lights the corresponding LED, and energizes the appropriate alarm display relays to activate any external audible or visual alarms wired to the alarm display. The RSP/RP also logs a message about the threshold violation on the system console.

Note If one or more of the alarm LEDs is on, check the system console for messages describing the alarm.

Troubleshooting the Cooling Subsystem

You may need to troubleshoot the cooling subsystem if an overtemperature condition occurs. The cooling subsystem of the router consists of a fan tray in the chassis and a fan in each of the power supplies. The fan tray and the power supply fans circulate air to maintain acceptable operating temperatures within the router.

Caution When troubleshooting the fan trays, never unplug all the fan trays at the same time.

Chassis Cooling Requirements

The Cisco ASR 9000 Series supports version 1 and version 2 fan trays. Version 2 high-speed fans provide additional cooling for new generation line cards that draw more power and generate more heat. This table lists the chassis cooling requirements for these cards.

Table 15: Chassis Cooling Requirements for Next Generation Line Cards

Chassis Type and Fan Tray	4x100GE	8x100GE	Mod200 (1xNPU) Low density EP	20x10GE	Mod200 (1xNPU), 2x100GE EP
Cisco ASR 9922, V2 fan tray	-5 to 50°C 0 to 1800 m	-5 to 50 °C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m

Chassis Type and Fan Tray	4x100GE	8x100GE	Mod200 (1xNPU) Low density EP	20x10GE	Mod200 (1xNPU), 2x100GE EP
Cisco ASR 9912, V1 fan tray	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9010, V2 fan tray, low power optics (less than 1.5W)	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9010, V2 fan tray, high power optics (greater than 1.5W)	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 45°C (SFP+) 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9006 with baffle, V2 fan tray	-5 to 40°C 0 to 3000 m	-5 to 40°C 0 to 3000 m	-5 to 50°C 0 to 1800 m	-5 to 45°C (SFP+) 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9904 with baffle, V1 fan tray	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9906, V1 fan tray	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m
Cisco ASR 9910 Router with baffle, V2 fan tray	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m	-5 to 50°C 0 to 1800 m

Fan Tray Operation

The fan trays maintain acceptable operating temperatures for the internal components by drawing cooling air through a replaceable air filter into the switch fabric and alarm card cage and then through the line card and RSP card cage.

See the Chassis Air Flow Guidelines section for the cooling paths for the ASR 9000 Routers.

The fan tray contains 12 fans (Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9910 Router, Cisco ASR 9922 Router, and Cisco ASR 9912 Router), seven fans (Cisco ASR 9906 Router), or six fans (Cisco ASR 9006 Router), a controller card, and one front panel status LED indicator:

- Green—Fan tray is functioning properly.
- Red—There is a fault detected in the fan tray.

If the air temperature inside the chassis rises, blower speed increases to provide additional cooling air to the internal components. If the internal air temperature continues to rise beyond the specified threshold, the system environmental monitor shuts down all internal power to prevent equipment damage because of excessive heat.

If the system detects that one or more of the fans in the fan tray has failed, it displays a warning message on the system console. Except for the Cisco ASR 9922, the remaining fans go to full speed to compensate for the loss of the failed fan.

Note The Cisco ASR 9922 supports dynamic fan-speed algorithm (DFSA). DFSA sets the fan speed based on the temperature change. In case of a fan failure on the Cisco ASR 9922, the software increases the fan speed to the next level.

Caution Due to air leakage, the chassis should not be operated with any of the fan trays completely missing. Replace any missing fan tray within five minutes. Any fan tray replacement should be performed when the chassis is back to room temperature.

Power Module Fans

Each AC or DC power module is equipped with two fans that draw cooling air in through the front of the power module and force warm air out the back of the power tray:

- If the power source is within the required range, the power supply fan remains on.
- If a fan fails:
  - Power module detects an internal overtemperature condition.
  - Fault and Temp indicators light.
  - Power module sends an overtemperature warning to the system and then shuts down the system.

For additional power supply troubleshooting information, see Troubleshooting the Power Subsystem, on page 209.

Note For the RSP/RP to communicate properly to a power module in a power tray, input power to at least one of the three power modules in the power tray should be present.

Overtemperature Conditions

The following console error message indicates that the system has detected an overtemperature condition or out-of-tolerance power value inside the system:

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor initiated shutdown
```

The preceding message could also indicate a faulty component or temperature sensor. Enter the **show environment** command or the **show environment all** command at the user EXEC prompt to display information about the internal system environment. The information generated by these commands includes:

- Voltage measurements on each card from the DC-to-DC converter
- The +5 VDC for the I2C module
- Operating voltage for the fan trays

- Temperature measurements received by two sensors on each card (one for inlet air temperature and one for the card's hot-spot temperature) as well as temperature measurements from sensors located in each power module

If an environmental shutdown results from an overtemperature or out-of-tolerance condition, the Fault indicator on the power supply lights before the system shuts down.

Although an overtemperature condition is unlikely at initial system startup, make sure that:

- Heated exhaust air from other equipment in the immediate environment is not entering the chassis card cage vents.
- You allow sufficient air flow by maintaining a minimum of 6 inches (15.24 cm) of clearance at both the inlet and exhaust openings on the chassis and the power modules to allow cool air to enter freely and hot air to be expelled from the chassis.

Isolating Cooling Subsystem Problems

Follow these steps to isolate a problem with the chassis cooling system if you have an overtemperature condition:

Procedure

Step 1 Make sure the fan trays are operating properly when you power on the system. To determine if a fan tray is operating, check the LED indicator on each fan tray front panel:

- OK (green)—Fan tray is functioning properly and receiving –48 VDC power, indicating that the cables from the chassis backplane to the fan tray are good.
- Fail (red)—Fault is detected in the fan tray. Replace the fan tray.
- If neither indicator is on and the blower is not operating, there may be a problem with either the fan tray or the –48 VDC power supplied to the fan tray. Go to Step 2.

Caution
Never unplug all the fan trays at the same time.

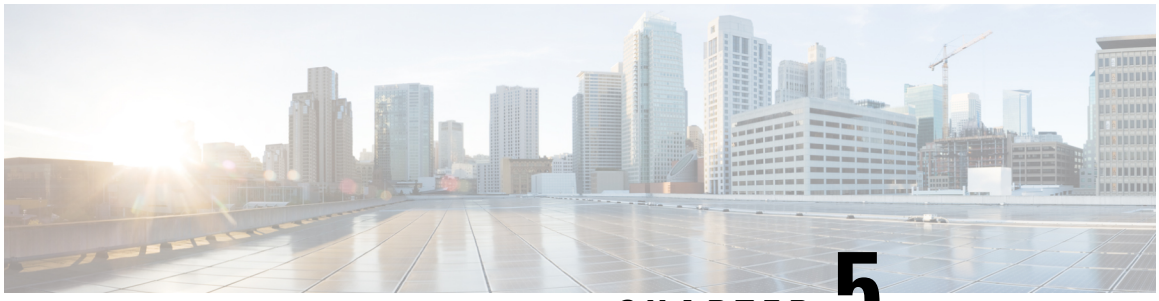
Step 2 Eject and reseat the fan tray making sure the captive screws are securely tightened to a torque of 10 +/–1 in-lb.

If the fan tray still does not function, go to Step 3.

Step 3 Check for –48 VDC power by looking at the LED indicators on each power module:

- If the Pwr OK indicator is on and the Fault indicator is off on each power module, it indicates that the fan trays are receiving –48 VDC:
  - If a fan tray is still not functioning, there could be a problem with the fan tray controller card or an undetected problem in the fan tray cable. Replace the fan tray.
  - If the new fan tray does not function, contact a Cisco customer service representative for assistance.
- If the Fault indicator is on, the power supply is faulty. Replace the power supply.
- If the Temp and Fault indicators are on, an overtemperature condition exists:
  - Verify that the power supply fan is operating properly.
  - If the fan is not operating, replace the power supply.

- Contact your Cisco representative if replacing the power supply does not fix the problem.



CHAPTER 5

Replacing Cisco ASR 9000 Series Router Components

The router is equipped as ordered and is ready for installation and startup when it is shipped. As network requirements change, you may need to upgrade the system by adding or changing components. This chapter describes how to maintain router components.

- Prerequisites and Preparation, on page 227
- Replacing the Chassis Air Filter, on page 230
- Removing and Replacing the Fan Trays, on page 237
- Removing and Replacing Power System Components, on page 239
- Removing and Replacing Cards from the Chassis, on page 254
- Repackaging the Line Card for Return Shipment, on page 257
- Migrating from RP1 to RP2 Card, on page 261
- Migrating from RP2 to RP3/RP3-X Card, on page 264
- Migrating from RP3 to RP3-X Card, on page 267
- Migrating from RSP440 to RSP880 or RSP880-LT Card , on page 270
- Migrating from A99-RSP to RSP880-LT Card (ASR 9906 Router), on page 273
- Migrating from A99-RSP/RSP880/RSP880-LT to RSP5/RSP5-X Card, on page 275
- Migrating from RSP5 to RSP5-X Card, on page 278
- Migrating from FC1 to FC2 Card, on page 281
- Migrating from A99-SFC2 to A99-SFC3 Card, on page 282
- Migrating from A99-SFC-S/A99-SFC-T to A99-SFC3-S/A99-SFC3-T Card, on page 283
- Removing a Chassis from the Equipment Rack, on page 284
- Packing a Chassis for Shipment, on page 284
- Installing a Replacement Chassis in the Equipment Rack, on page 285

Prerequisites and Preparation

Before you perform any of the procedures in this chapter, be sure that you:

- Review the Safety Guidelines, on page 1.
- Read the safety and ESD-prevention guidelines described in Compliance and Safety Information, on page 2.
- Ensure that you have all the necessary tools and equipment before beginning the procedure.

Have access to the *safety and compliance* document during the installation, see:

http://www.cisco.com/en/US/docs/routers/asr9000/hardware/rcsi/regulatory/compliance/asr9krcsi.html

Field Replaceable Units

In the Cisco ASR 9006 Router, Cisco ASR 9010 Router, and Cisco ASR 9904 Router, the following components are field replaceable units (FRU):

- All line cards
- RSP cards
- Power modules
- Fan trays
- Air filters
- Line card and RSP blank fillers
- Compact flash disk
- Transceiver modules
- Optional card cage doors (Cisco ASR 9010 Router only)

Note The backplane is not field-replaceable.

In the Cisco ASR 9906 Router, Cisco ASR 9910 Router, Cisco ASR 9912 Router, and Cisco ASR 9922 Router, the following components are FRUs:

- All line cards
- RP cards
- RSP cards (only for Cisco ASR 9906 Router and Cisco ASR 9910 Router)
- Fabric cards
- Power modules
- Fan trays and covers
- Air filters
- Foam media (only for Cisco ASR 9922 Router, Cisco ASR 9912 Router)
- Blank line card fillers
- Transceiver modules
- Optional card cage doors

Note The backplane, midplane (only for Cisco ASR 9906 Router and Cisco ASR 9910 Router), PEM, and BPID cards are not FRUs but are field serviceable.

Online Insertion and Removal

Most Cisco ASR 9000 Series Routers FRUs can be removed and replaced with the power on and the system operating. This is known as online insertion and removal (OIR). Power modules, fan trays, Route Switch Processor (RSP) cards, Route Processor (RP) cards, Fabric Controller (FC) cards, Line Cards (LCs), shared port adapter (SPA), and SPA interface processor (SIP) cards all support OIR. Unless otherwise noted, the maintenance tasks described in this chapter can be performed while the router remains powered on.

Caution Never unplug all the fan trays at the same time.

Note Although the power trays are not a true FRU because they do not support OIR, a procedure for replacing the power trays in Cisco ASR 9000 Series Routers is included in this chapter if a replacement becomes necessary.

The following table displays the supported line cards, ports, and OIR duration for QDD-400G-ZR-S and QDD-400G-ZRP-S optical modules:

Table 16: Supported Line Cards, Ports, and OIR Duration for QDD-400G-ZR-S and QDD-400G-ZRP-S Optical Modules

Line card	Supported front panel ports	Maximum supported OIR duration at mean sea level (MSL) with QDD-400G-ZR-S and QDD-400G-ZRP-S optical modules
A9K-20HG-FLEX-SE/A9K-20HG-FLEX-TR	0, 7, 8, 12, 19	1 minute at 30°C (or 86°F)
A9K-8HG-FLEX-SE/A9K-8HG-FLEX-TR	0, 7	3 minutes at 30°C (or 86°F)
A99-10X400GE-X-SE/A99-10X400GE-X-TR	3, 5, 6, 7, 9	1 minute at 30°C (or 86°F)
A9903-20HG-PEC	0, 4, 8, 12, 16	45 seconds at 30°C (or 86°F)

OIR Monitoring

The BPID board monitors OIR by counting the number of card insertions for each slot and saving that information in non-volatile memory. OIR monitoring is done for all fan trays, RSP cards, RP cards, FCs, and LCs. A card insertion is determined by the CAN Bus Controller (CBC) of the inserted card booting up and sending a CBC message which is intercepted by the BPID board. Note that a CBC reset or power cycle on a card will also be interpreted as a card insertion.

Note A card with an OIR count that exceeds 175 will generate a minor alarm against that slot. If the card OIR count exceeds 200, a major alarm is generated against that slot. Fan tray insertion counts are not checked against a threshold. See the Release Notes for Cisco ASR 9000 Series Aggregation Services Routers for Cisco IOS XR Software Release 3.9.1 for information about CLI commands for obtaining and resetting card insertion data.

Powering Off the Router

Caution Do not turn off the switch on the power tray to remove individual power modules. Power modules support OIR, so they can be removed and replaced with the power on and the system operating.

If it becomes necessary to turn all power off to the router, follow these steps:

Procedure

Step 1 Set the power switch on each power tray to the off (0) position.

Step 2 Power off all circuit breakers for the source power lines connected to the power trays.

Step 3 Verify that the Pwr OK indicator on each power module is off.

Step 4 Verify that the OK indicator on the fan tray is off.

Replacing the Chassis Air Filter

The Cisco ASR 9000 Series Routers are equipped with user-replaceable air filters that help prevent dust from being drawn into the router. One time per month (or more often in dusty environments), examine the air filters for damage and cleanliness.

Note

- In the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router, the chassis air filter is not serviceable. We recommend that you replace the filter at regular maintenance intervals. The interval may vary between 3 and 12 months depending on the environment.
- In the Cisco ASR 9922 Router and Cisco ASR 9912 Router, the three air filters (left, center, and right) contain foam media which filters the air going into the chassis. The three air filters can be removed from the chassis so that the foam media (Cisco PIDs 9922-CEN-FLTRMED= and 9922-LR-FLTRMED=) can be replaced on a regular maintenance interval. The interval may vary between 3 and 12 months depending on the environment.
- Air filters are consumable items and customers must order them separately. Customers may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

Caution Damage to the air filter can restrict the airflow, cause overheating in the router, and degrade electromagnetic interference (EMI) compliance. Be careful when cleaning and replacing the filter.

This table describes the air filter locations for the Cisco ASR 9000 Series Routers. For air filter PIDs, see the datasheet.

Table 17: Air Filter Locations for the Cisco ASR 9000 Series Routers

Router	Air Filter Location
Cisco ASR 9010 Router	Located underneath the fan trays.
Cisco ASR 9006 Router	Located along the right side of the chassis and is accessible from the rear.
Cisco ASR 9904 Router	Single air filter located along the right side of the chassis and is accessible from the rear.
Cisco ASR 9910 Router	Located underneath the card cage.
Cisco ASR 9906 Router	Located underneath the card cage.
Cisco ASR 9922 Router	Three air filters located on the front of the middle card cage (Figure 210: Cisco ASR 9922 Router Chassis Air Filters, on page 234).
Cisco ASR 9912 Router	Three air filters on the front of the RP and FC card cage (Figure 212: Cisco ASR 9912 Router Chassis Air Filter , on page 235).

Follow these steps to replace an air filter:

Procedure

Step 1 For the Cisco ASR 9006 Router, Cisco ASR 9010 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router, choose the procedure for your router:

- For the Cisco ASR 9010 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router, remove the air filter by simply sliding it out of the chassis.

  Note
  If the accessory grill has been installed on the front of the Cisco ASR 9010 Router, remove it from the front of the chassis by simply pulling on the grill until it comes loose. See the Installing Base Chassis

Accessories on the Cisco ASR 9010 Router, and Figure 140: Installing Base Chassis Accessories on the Cisco ASR 9010 Router, on page 132 for information about the accessory grill.

Figure 206: Replacing the Cisco ASR 9010 Router Chassis Air Filter

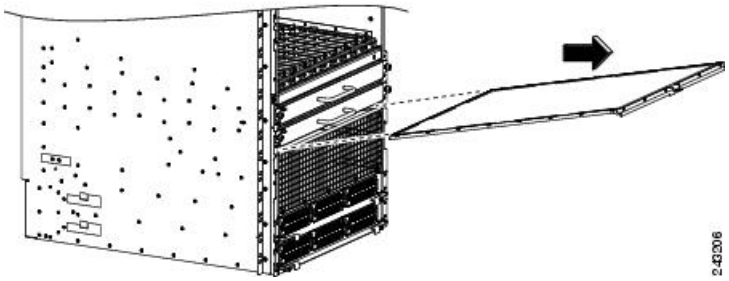
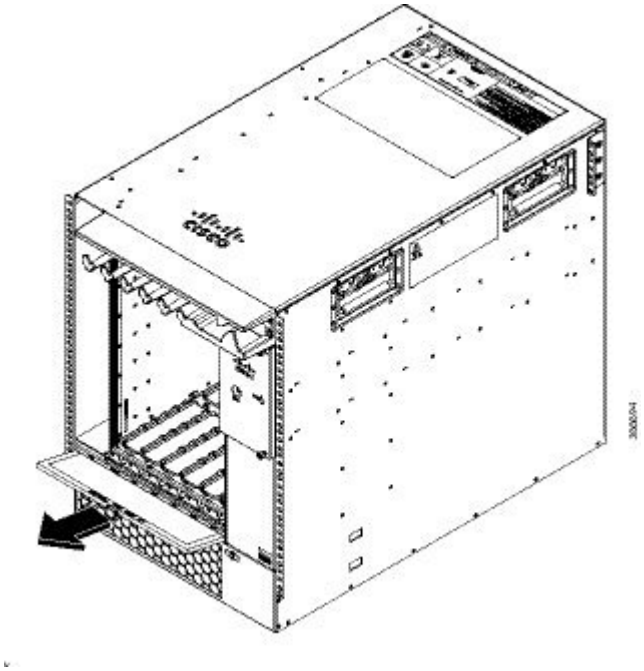
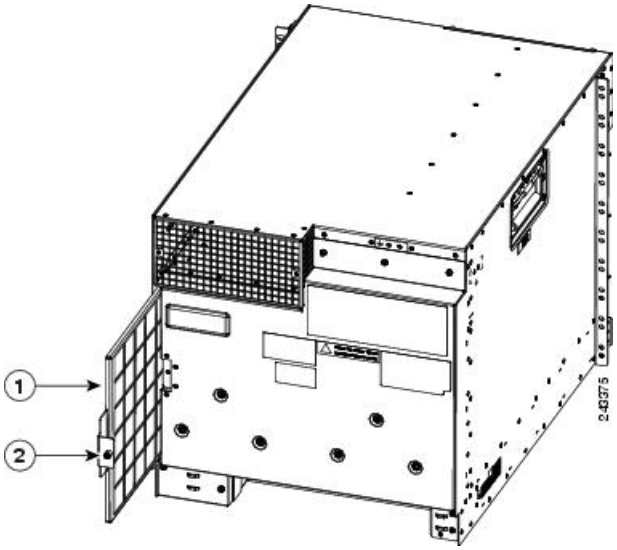


Figure 207: Replacing the Cisco ASR 9906 Router Chassis Air Filter



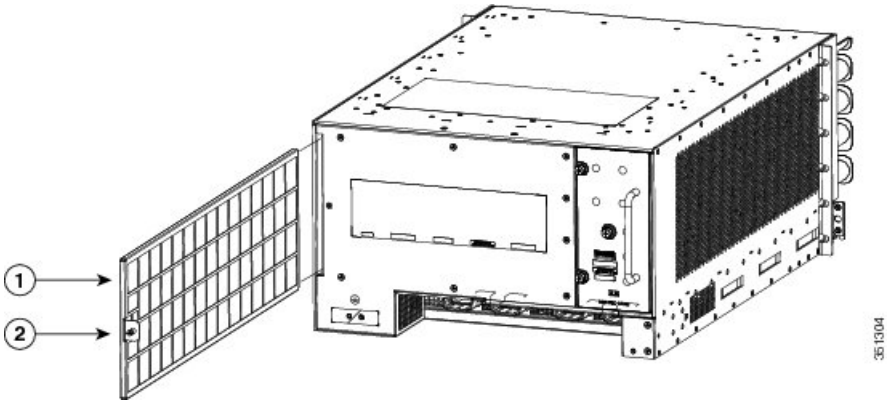
- For the Cisco ASR 9006 Router and Cisco ASR 9904 Router, loosen the thumb screw that secures the filter to the chassis, and then slide the air filter out of the chassis.

Figure 208: Replacing the Cisco ASR 9006 Router Chassis Air Filter



1	Air filter	2	Thumb screw

Figure 209: Replacing the Cisco ASR 9904 Router Chassis Air Filter



1	Air filter	2	Thumb screw

Step 2 For the Cisco ASR 9922 Router and Cisco ASR 9912 Router, remove the three air filters by pulling them off the front of the chassis (*Cisco ASR 9922 Router Chassis Air Filters*) and (*Cisco ASR 9912 Router Chassis Air Filter*). Then, for each filter, loosen the thumb screws, rotate the inner frame out, and replace the foam media (*Removing the Cisco ASR 9922 Router Chassis Center Air Filter—Version 1* and *Removing the Cisco ASR 9922 Router Chassis Side Air Filter —Versions 1 and 2*).

Note
In the Cisco ASR 9922 Router (version 2 air filter) the center air filter, shown in *Cisco ASR 9922 Router Chassis Center Air Filter—Version 2*, does not contain replaceable foam media. The left and right air filters are the same as version 1 and contain replaceable foam media.

Figure 210: Cisco ASR 9922 Router Chassis Air Filters

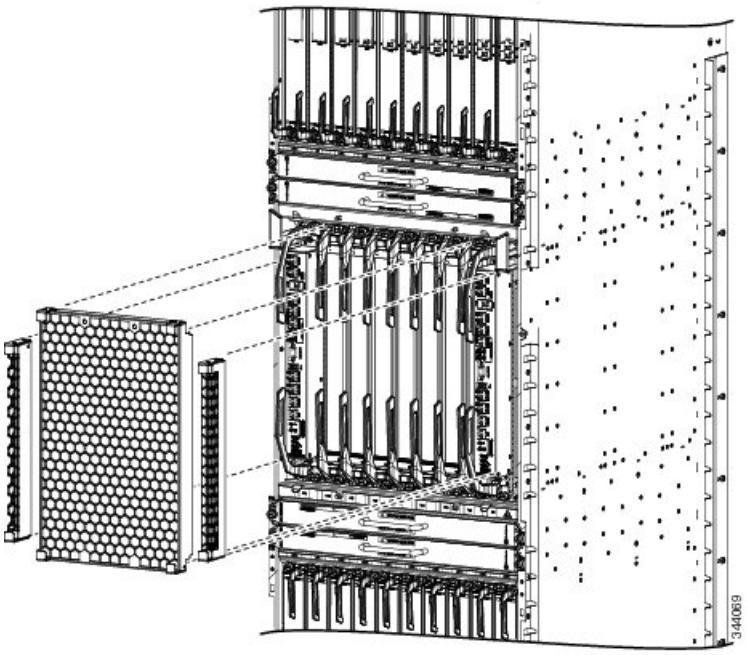


Figure 211: Cisco ASR 9922 Router Chassis Center Air Filter—Version 2

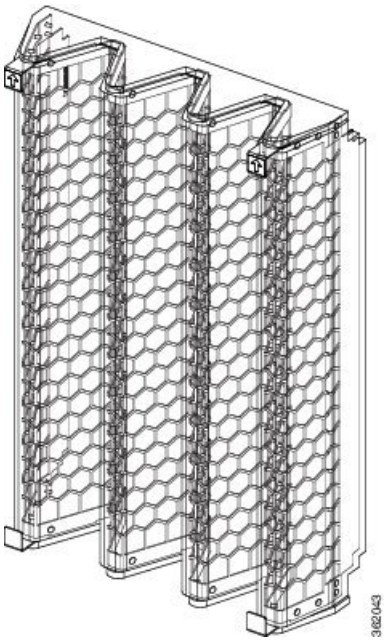


Figure 212: Cisco ASR 9912 Router Chassis Air Filter

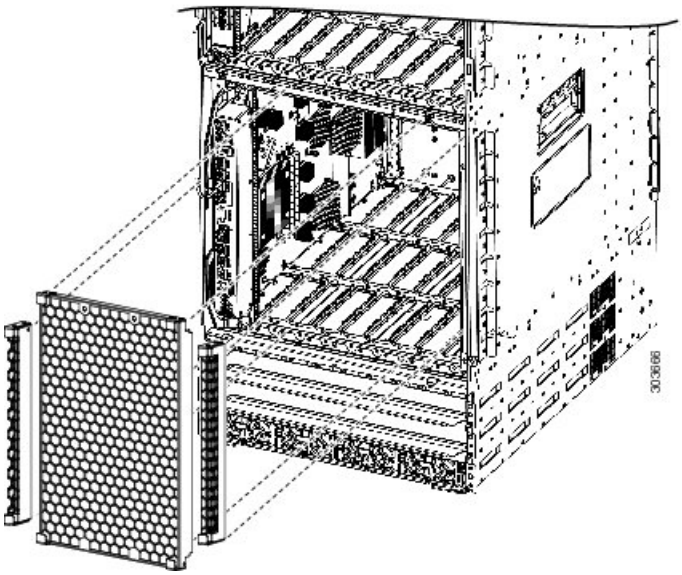
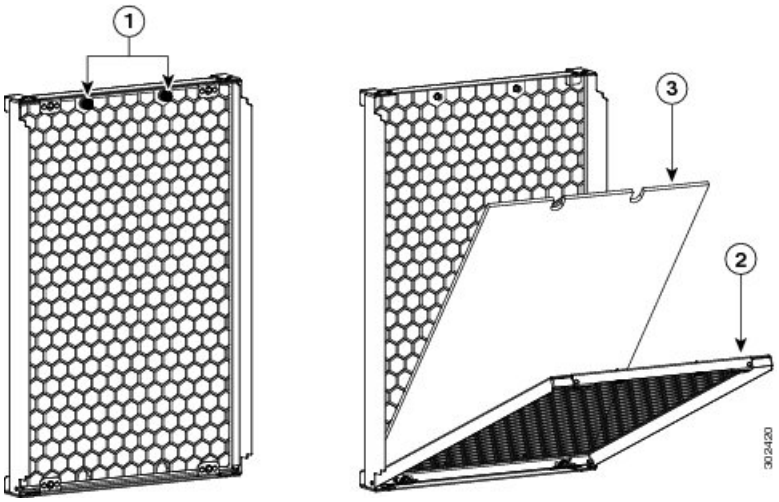
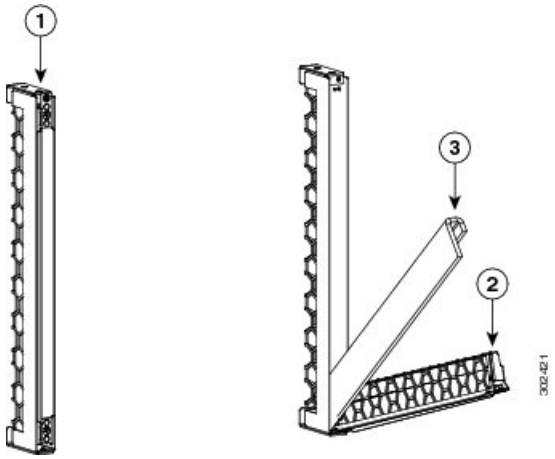


Figure 213: Removing the Cisco ASR 9922 Router Chassis Center Air Filter—Version 1



1	Loosen thumb screws	3	Remove foam filter media
2	Rotate and lower inner frame		

Figure 214: Removing the Cisco ASR 9922 Router Chassis Side Air Filter —Versions 1 and 2



1	Loosen thumb screws	3	Remove foam filter media
2	Rotate and lower inner frame		

Step 3 Visually check the condition of the air filter and/or its foam media to determine whether to install a new replacement filter or foam media.

Step 4 Install the new air filter.

- For the Cisco ASR 9010 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router, slide the new air filter into the air filter door (honeycomb side up).
- For the Cisco ASR 9006 Router and Cisco ASR 9904 Router, tighten the thumb screw to secure the filter to the chassis.
- For the Cisco ASR 9922 Router (version 1 air filter) and Cisco ASR 9912 Router, tighten the thumb screws that attach the inner frame to the air filter and re-attach the three air filters to the front of the chassis. For the Cisco ASR 9922 Router (version 2 air filter) tighten the thumb screws that attach the inner frame to the left and right air filters only. Attach the new center air filter, with arrows pointing upwards, and re-attach both side filters to the front of the chassis.

Note
For the version 2 air filter on the Cisco ASR 9922 Router, the center does not have thumb screws because it does not have replaceable foam media.

Caution
Align and seat the door carefully to avoid damaging the EMI-preventive gaskets on the door. The air filter door must be closed and secured at all times to maintain correct EMI performance.

Removing and Replacing the Fan Trays

Prerequisites

- For the Cisco ASR 9010 Router remove the accessory grill before removing and replacing the fan trays.
- For the Cisco ASR 9906 Router, Cisco ASR 9922 Router and Cisco ASR 9912 Router, remove the fan tray cover before removing the fan trays for replacement.

Required Tools and Equipment

- 6-inch long number 2 Phillips screwdriver (torque 10 in-lb)

Removing a Fan Tray

Follow these steps to remove and replace the fan trays:

Caution Never unplug all the fan trays at the same time.

Caution Be sure that the fans have stopped running before removing the fan tray. The fans can take from 3 to 5 seconds to completely stop running after disengaging the fan tray latch. Handling the fan tray before the fans have stopped running could cause fingertip injury.

Note Due to air leakage, the chassis should not be operated with any of the fan trays completely missing. Replace any missing fan tray within five minutes. Any fan tray replacement should be performed when the chassis is back to room temperature.

Note The Cisco ASR 9904 router is equipped with a single fan tray, which can be replaced while your system remains up and running. Complete the fan tray replacement within 45 seconds (at 30°C and 1,800 meters altitude) to prevent system shutdown due to overheating.

Note If the accessory grill has been installed on the front of the Cisco ASR 9010 Router, you must remove it before you can remove the lower fan tray. You can remove the accessory grill by simply pulling on the grill until it comes loose. See Installing Base Chassis Accessories on the Cisco ASR 9010 Router, and Figure 140: Installing Base Chassis Accessories on the Cisco ASR 9010 Router, on page 132 for information about the accessory grill.

Note If the fan tray cover has been installed on the front of the Cisco ASR 9922 Router or Cisco ASR 9912 Router, you must remove it before you can remove the fan tray. Remove the fan tray cover by simply pulling on the cover until it comes loose.

To remove a fan tray from the chassis (see Figure 81: Removing or Installing the Fan Tray on the Cisco ASR 9010 Router Chassis, on page 80, Figure 83: Removing or Installing the Fan Tray on the Cisco ASR 9922 Router Chassis, on page 82, Figure 84: Removing or Installing the Fan Tray on the Cisco ASR 9912 Router Chassis, on page 82, or Figure 85: Removing or Installing the Fan Tray on the Cisco ASR 9006 Router Chassis, on page 83):

Procedure

Step 1 Use the 6-inch long number 2 Phillips screwdriver to loosen the captive screw(s) that secure the fan tray.

Step 2 Use the handle on the fan tray front panel to pull the fan tray halfway out of the module bay.

Step 3 Slide out the fan tray completely from the chassis while supporting it with your other hand.

Caution
Use two hands when handling the fan tray. Each Cisco ASR 9010 Router version 1 fan tray weighs about 16 pounds (7.27 kg). Each Cisco ASR 9910 Router version 1 fan tray weighs about 26.55 pounds (12.04 kg). Each Cisco ASR 9906 Router fan tray weighs about 8.0 pounds (3.63 kg). Each Cisco ASR 9922 Router fan tray or Cisco ASR 9010 Router version 2 fan tray weighs about 18 pounds (8.18 kg).

Installing a Fan Tray

Note If you are upgrading a fan tray, follow these guidelines:

- Remove and install fan trays one at a time.
- Perform FPD upgrade on the fan tray. Refer to the "Upgrading Field-Programmable Devices" chapter in the *System Management Configuration Guide for Cisco ASR 9000 Series Routers*.

To install a fan tray into the chassis:

Procedure

Step 1 Lift the fan tray (with two hands) and slide it halfway into the module bay.

Step 2 Slowly push the fan tray into the chassis until it mates with the backplane connector at the back of the module bay.

Caution
To prevent damage to the connectors, do not use excessive force when inserting the fan tray into the chassis.

Step 3 Tighten the captive screw(s) on the fan tray using the 6-inch long number 2 Phillips screwdriver to a torque of 10 +/–1 in-lb to secure it to the chassis.

Step 4 Verify that the (green) OK status indicator on the front of the fan tray goes on. If the OK indicator does not light, see Troubleshooting the Cooling Subsystem.

Removing and Replacing Power System Components

The Cisco ASR 9000 Series Routers support OIR of power modules. If you are replacing a redundant power module, you can remove and install the power module while the system remains powered on without causing an electrical hazard or damage to the system. This feature enables you to replace a power module while the system maintains all routing information and ensures session preservation.

However, to maintain operational redundancy and proper cooling, and to meet EMI compliance standards, you must have at least one working power module installed (more than one for a fully configured system). When you remove a failed power module with the router in operation, perform the replacement as quickly as possible. Make sure you have the replacement power module ready before beginning the removal and installation procedure.

Note For the RSP/RP to communicate properly to a power module in a power tray, input power to at least one of the power modules in the power tray should be present.

This section contains procedures on how to remove and install AC and DC power modules used in the Cisco ASR 9000 Series Routers.

Caution Do not turn off the switch on the power tray to remove individual power modules. Power modules support OIR, so they can be removed and replaced with the power on and the system operating.

Note

- Before removing a power module (AC or DC) during an OIR procedure, run the **show environment power-supply location all** command to check for the capacity of a single power module and the worst case power availability. Proceed with the OIR procedure only if the worst case power availability is more than the capacity of a single power module in the router.
- We recommend you to replace one power module at a time.

Changing Between Version 1, Version 2, Version 3, AC, and DC Power Modules

Note The **pwrmod_change** command is not supported on the Cisco ASR 9912 Router and Cisco ASR 9922 Router.

Note Modern chassis (for example, ASR-9010-SYS and ASR-9006-SYS) supports automatic power migration without manual intervention.

Legacy chassis (for example, ASR-9010-AC-V2, ASR-9010-DC-V2, ASR-9006-AC-V2, and ASR-9006-DC-V2) requires manual intervention using the backplane cookie (bpcookies) mechanism.

The chassis type can be identified by checking the controller type or backplane code, for example:

- 0x2FA: ASR9010 10-Slot Modern Chassis backplane
- 0x2FE: ASR9010 10-Slot Legacy Chassis backplane
- 0x2FB: ASR9006 6-Slot Modern Chassis backplane
- 0x2FF: ASR9006 6-Slot Legacy Chassis backplane

You can verify and confirm the chassis type using the **show diag** command:

```
RP/0/RSP0/CPU0:#admin

sysadmin-vm:0_RSP0#show diag

Diag Information For : 0

Rack 0-IDPROM Info
Controller Family : 00ef
Controller Type : 02fe <<<<<<<<<<<<<<<<<<<<<<<<< Legacy Chassis backplane
PID : ASR-9010-AC
Version Identifier : v01
UDI Description : ASR-9010 AC
```

Follow these steps when changing between version 1, version 2, version 3, AC, and DC power modules:

Procedure

Step 1 Before making any physical changes, check the software configuration to ensure no ROMMON variable CHASSIS_TYPE (such as CHASSIS_TYPE=10_SLOT) is set to override the chassis type.

Step 2 At the Cisco IOS-XR command prompt on the RSP console, run the **pwrmod_change** command. This command displays the current power module and system information.

Example:

```
RP/0/RSP0/CPU0:RO9_P2RSP3# run
Wed Jul  4 20:18:58.034 UTC
 # pwrmod_change
 Current system:
 power supply type : AC power supply version 2
 chassis type : 10-slot
 chassis bpid: 0x2fa, PID: ASR-9010-AC
 UDI name: ASR-9010 AC, UDI desc: ASR-9010 AC
```

Step 3 Enter your new power module type.

Example:

```
Please enter the number that corresponds to the power supply type that is being migrated
to. Do not enter the current power system information, use the future power system type.
 1)      AC power supply version 1, fits 3 across in single power shelf
 2)      DC power supply version 1, fits 3 across in single power shelf
 3)      AC power supply version 2, fits 4 across in single power shelf
 4)      DC power supply version 2, fits 4 across in single power shelf
 5)      AC power supply version 3, fits 3 across in single power shelf
 6)      DC power supply version 3, fits 4 across in single power shelf
ATTENTION: You are about to commit a change in the power system type for the chassis.
Please confirm that the OLD and NEW power system information listed here is correct.
Once the system software change is committed, you must physically remove the OLD power
system and replace it with the NEW power system of the type specified below here. Any
mismatch between the programmed system value and the actual physical installation may
cause boot and power management issues in the system.
  OLD POWER SYSTEM:
  power supply type: AC power supply version 2
  chassis type: 10-slot
  chassis bpid: 0x2fa, PID: ASR-9010-AC
  UDI name: ASR-9010 AC, UDI desc: ASR-9010 AC
  NEW POWER SYSTEM:
  power supply type: DC power supply version 2
  chassis type: 10-slot
  chassis bpid: 0x2fa, PID: ASR-9010-DC
  UDI name: ASR-9010 DC, UDI desc: ASR-9010 DC
```

Step 4 Confirm your choice.

Example:

```
Please confirm that you wish to upgrade from AC power supply version 2 power system to
DC power supply version 2 power system by typing "yes" at the prompt below. Any other
response will cancel the power system change operation [yes/cancel]?
yes
```

Step 5 After the success message appears, power down the chassis.

Example:

```
  start update CBC eeprom, offset = 0x0,length=1000
  ..........................................................
  done update CBC eeprom
  start update I2C eeprom
  ..........................................................
  done update I2C eeprom
The power system programming change is complete. The system must now be completely powered

down, and the NEW power system hardware installed. When the system is rebooted the software

will recognize the new power system. Please power down the system at this point.
#
```

Step 6 Remove the old power module (see Removing a Version 1 AC or DC Power Module, on page 243 or Removing a Version 2 or Version 3 AC or DC Power Module).

Caution
Use two hands to remove the power module. The power supply weighs about 6.5 pounds (2.95 kg).

Step 7 Install the new power module (see Installing a Version 1 AC or DC Power Module, on page 245 or Installing a Version 2 or Version 3 AC or DC Power Module, on page 245).

Caution
To prevent damage to the power tray backplane connector, do not use excessive force when inserting the power module into the power tray.

Step 8 Power up the chassis.

Step 9 Verify that the (green) Power Input indicator on the front of the power module goes on. If the indicator does not light, see Troubleshooting the Power Subsystem .

Changing Between Version 1, Version 2, Version 3, AC, and DC Power Modules for ASR 9912 and ASR 9922

Note No configuration is needed for changing between Version 1, Version 2 or Version 3 Power Modules.

Note The **pwrmod_change** utility is not available in Cisco IOS XR 64 bits. To change the power module type the following two options are available:

- Boot the router in Cisco IOS XR 32 bits rommon and edit the bpcookie manually as described below
- Migrate the router to Cisco IOS XR 32 bits and access the pwrmod_change utility, then migrate back to Cisco IOS XR 64 bits.

Follow these steps when changing between AC and DC power modules:

Procedure

Step 1 Reload the router.

Example:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# hw-module location all reload
```

Step 2 Set the boot ROMMON variable to 1

Example:

a. Press CTRL+C to break into ROMMON

b. Boot to ROMMON

Selection [1/2/3/4]: 1

Selected Boot to ROMMON, Continue ? Y/N: Y

Step 3 Enter ROMMON priv mode

Example:

```
rommon > priv
```

Step 4 Set the ENABLE_IDPROM_WRITE ROMMON variable to 1

Example:

```
rommon > ENABLE_IDPROM_WRITE ROMMON = 1
```

Step 5 Save the ROMMON configuration

Example:

```
 rommon > sync
```

Step 6 Access bpcoookie

Example:

```
 rommon > bpcookie
```

Step 7 From bpcookie you need to enter the new PID, UDI Name, UDI Description

Step 8 Proceed to power off the router

Step 9 Switch the Power Supplies from AC to DC or from DC to AC

Step 10 Power on the router. After router boots up, verify that the power supplies are detected and showing the proper information based on the Part ID and type of power (AC or DC).

Removing a Version 1 AC or DC Power Module

Follow these steps to remove a version 1 AC or DC power module from the power tray (figure below).

Procedure

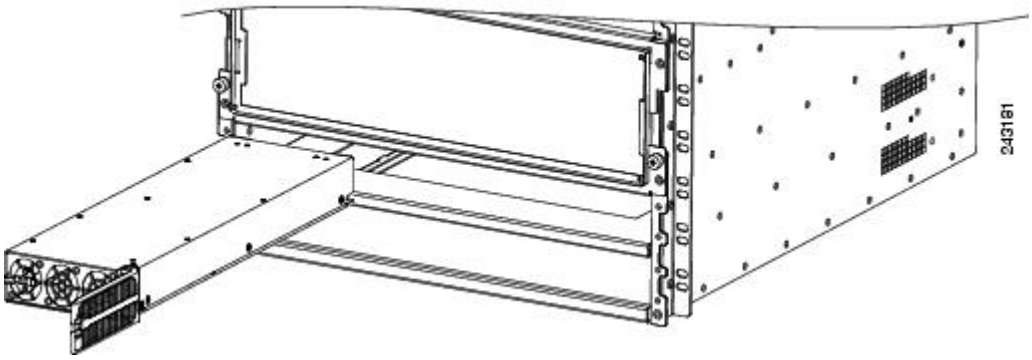
Step 1 Push the door latch to the left to release the door.

Step 2 Pivot the door to the right to eject the power module from its bay.

Step 3 Slide the power module out of its bay while supporting it with your other hand.

Caution
Use two hands to remove the power module. The power supply weighs about 6.5 pounds (2.95 kg).

Figure 215: Removing or Installing a Version 1 AC or DC Power Module



Removing a Version 2 or Version 3 AC or DC Power Module

Follow these steps to remove a version 2 or version 3 AC or DC power module from the chassis (see figure titled *Removing or Installing a Version 2 or Version 3 AC or DC Power Module*). The Cisco ASR 9904 Router chassis only has one power tray as shown in the figure titled *Removing or Installing a Version 2 AC or DC Power Module from the Cisco ASR 9904 Router* .

Procedure

Step 1 Pull the handle down.

Note
Unscrew the screw that secures the power module using a 7/16 hex socket and torque wrench with the torque set to 50 in-lb.

Step 2 Slide the power module out of its bay while supporting it with your other hand.

Figure 216: Removing or Installing a Version 2 or Version 3 AC or DC Power Module

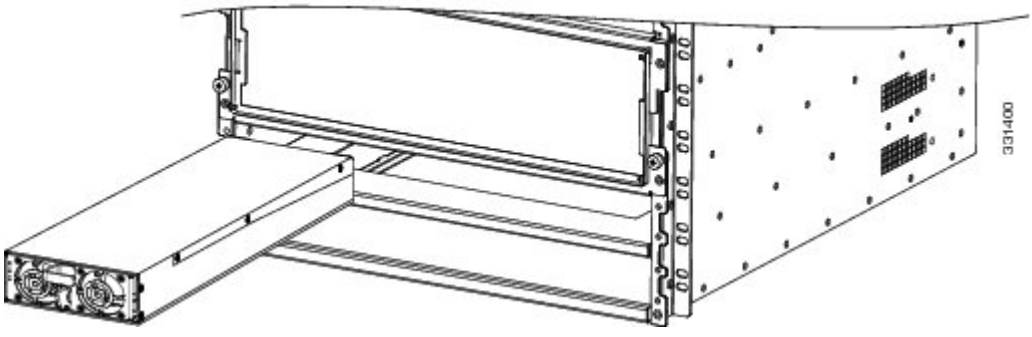
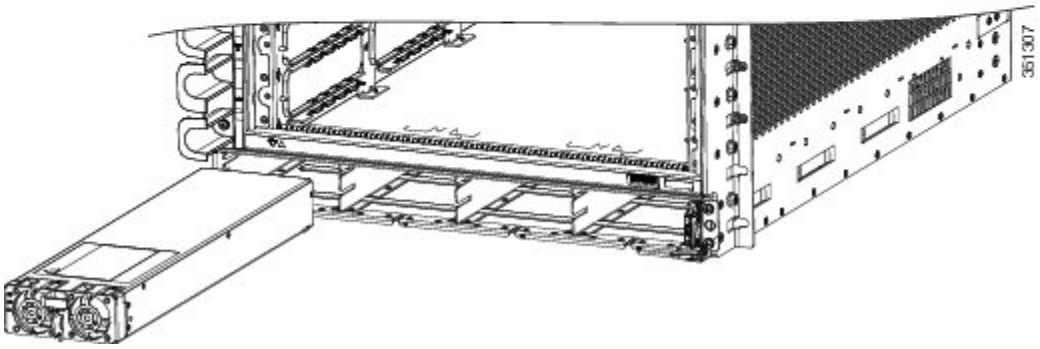


Figure 217: Removing or Installing a Version 2 AC or DC Power Module from the Cisco ASR 9904 Router



Installing a Version 1 AC or DC Power Module

Follow these steps to install a new version 1 AC or DC power module (Figure 215: Removing or Installing a Version 1 AC or DC Power Module, on page 244):

Procedure

Step 1 Slide the power module into the bay until it mates with its backplane connector.

Step 2 Pivot the door to the left until the door latch locks.

Caution
To prevent damage to the power tray backplane connector, do not use excessive force when inserting the power module into the power tray.

Step 3 Verify that the (green) Power Input indicator on the front of the power module goes on. If the indicator does not light, see Troubleshooting the Power Subsystem .

Installing a Version 2 or Version 3 AC or DC Power Module

Follow these steps to install a new version 2 or version 3 AC or DC power module (Figure 216: Removing or Installing a Version 2 or Version 3 AC or DC Power Module, on page 244):

Procedure

Step 1 Slide the power module into the bay until it mates with its backplane connector.

Step 2 Move the handle up.

Step 3 Tighten the screw that secures the power module using a 7/16 hex socket and torque wrench with the torque set to 50 in-lb.

Caution
To prevent damage to the power tray backplane connector, do not use excessive force when inserting the power module into the power tray.

Step 4 Verify that the (green) Power Input indicator on the front of the power module goes on. If the indicator does not light, see Troubleshooting the Power Subsystem.

Disconnecting AC Power

Follow these steps to disconnect an individual AC power cord:

Procedure

Step 1 Power OFF (0) the circuit breaker assigned to the AC power source you are disconnecting.

Step 2 Loosen the retainer bracket holding the AC power cord to the power tray receptacle.

Step 3 Unplug the AC power cord from the power tray receptacle.

Caution
Do not turn off the switch on the power tray to remove AC power cords. An individual AC power cord can be unplugged while the system is powered from other AC power sources.

Disconnecting AC Power

If it becomes necessary to disconnect all AC power from the router, follow these steps:

Procedure

Step 1 Set the power switch at the rear of the Version 1 AC power tray to the OFF (0) position. For Version 2 and Version 3 AC power trays, set the power switch at the front of the to the OFF (0) position.

Caution
Do not disconnect all power from the router to replace components, including power modules. See Removing and Replacing Power System Components, on page 239.

Step 2 Power OFF (0) the circuit breakers assigned to the AC power sources you are disconnecting.

Caution
To ensure that power remains off while you are performing this procedure, lock-out/tag-out the circuit breaker switch in the OFF (0) position until you are ready to turn it on.

Step 3 Loosen the retainer bracket holding the AC power cords to the power tray receptacle.

Step 4 Unplug the AC power cords from the power tray receptacles.

Reconnecting AC Power

Follow these steps to reconnect an individual AC power cord to a power tray:

Procedure

Step 1 Power OFF (0) the circuit breaker assigned to the AC power source you are reconnecting.

Step 2 Plug the AC power cord into the power tray receptacle.

Step 3 Close and tighten the retainer bracket holding the AC power cord to the power tray receptacle.

Step 4 Power on the AC power source circuit breaker.

Caution
Do not turn off the switch on the power tray to reconnect AC power cords. An individual AC power cord can be plugged in while the system is powered from other AC power sources.

Reconnecting AC Power

If power has been totally disconnected from the router, follow these steps to reconnect AC power to the AC power tray:

Procedure

Step 1 Verify that the power switch at the rear of the Version 1 AC power tray is set to the OFF (0) position. For Version 2 and Version 3 AC power trays, verify that the power switch at the front of the power tray set to the OFF (0) position.

Step 2 Check that the circuit breaker assigned to the AC power source you are connecting is set to OFF (0).

Caution
To ensure that power remains off while you are performing this procedure, lock-out/tag-out the circuit breaker switch in the OFF (0) position until you are ready to turn it on.

Step 3 Plug the AC power cords into the power tray receptacle (Figure 196: Typical AC Power Connections to an AC Power Tray—Version 1 Power System, on page 197).

Step 4 Close the retainer bracket to secure the AC power cord plug to the power tray receptacle.

Step 5 Power on the AC power source circuit breaker.

Step 6 Set the power switch at the rear of the AC power tray to the ON (1) position.

Caution
The following procedure is only to be used when reconnecting power to all power trays in a system that has been powered down completely.

Disconnecting DC Power

Follow these steps to disconnect an individual DC power source from a power tray (Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for version 1 DC power, Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 2 DC power, or Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 3 DC power):

Procedure

Step 1 Power off the circuit breaker assigned to the DC power source you are disconnecting.

Caution
To ensure that power remains off while you are performing this procedure, lock-out/tag-out the circuit breaker switch in the STANDBY (0) position until you are ready to turn it on.

Step 2 Remove the clear plastic safety covers that fit over the DC power connection terminal studs.

Caution
To prevent injury and damage to the equipment, always remove the source DC power cables and ground from the power tray terminals *in the following order* : (1) negative (–), (2) positive (+), (3) ground.

Step 3 Disconnect the DC power cables from their terminals in the following order and note the color of each cable (Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for version 1 DC power, Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 2 DC power, or Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 3 DC power):

a) Negative (PWR) cables first.
b) Positive (RTN) cables next.
c) Ground cable last.

Step 4 Repeat Step 1 through Step 3 for the other power tray, if installed.

Caution

It is not necessary to disconnect all power from the router to replace components, including power modules. See Removing and Replacing Power System Components, on page 239.

Disconnecting DC Power

If it becomes necessary to disconnect all DC power from the router, follow these steps (Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for version 1 DC power, Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 2 DC power, or Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 3 DC power):

Procedure

Step 1 Set the power tray switch to the STANDBY (0) position.

Step 2 Power OFF (0) the circuit breaker assigned to the DC power source you are disconnecting.

Caution
To ensure that power remains off while you are performing this procedure, lock-out/tag-out the circuit breaker switch in the OFF (0) position until you are ready to turn it on.

Step 3 Remove the clear plastic safety covers that fit over the DC power connection terminal studs.

Caution
To prevent injury and damage to the equipment, always remove the source DC power cables and ground from the power tray terminals *in the following order* : (1) negative (–), (2) positive (+), (3) ground.

Step 4 Disconnect the DC power cables from their terminals in the following order and note the color of each cable (Figure 199: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 2 Power System, on page 199 for version 1 DC power, Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 2 DC power, or Figure 200: Typical Power Connections to a Power Tray for a Single DC Power Module—Version 3 Power System, on page 200 for version 3 DC power):

a) Negative (PWR) cables first.
b) Positive (RTN) cables next.
c) Ground cable last.

Step 5 Repeat Step 1 through Step 4 for the other power tray, if installed.

Note
This procedure describes how to disconnect DC power from all power modules in a single DC power tray. The procedure is the same for each DC power tray, if more than one is installed.

Caution
If only one power tray is installed, performing the following procedure turns off all power to the router.

Reconnecting DC Power

Follow these steps to reconnect DC power to a DC power tray:

Procedure

Step 1 Set the power switch to the OFF (0) position.

Step 2 Check that the circuit breaker assigned to the DC power source you are reconnecting is powered OFF (0).

Step 3 Reconnect the DC power cables in the following order:

a) Ground cables first.
b) Positive (RTN) cables next.
c) Negative (PWR) cable last.
d) Repeat Step 1 through Step 3 for the other power tray (Cisco ASR 9010 Router only)

Caution
To prevent injury and damage to the equipment, always attach the ground and source DC power cable lugs to the power tray terminals in the following order: (1) ground to ground, (2) positive (+) to positive (+), (3) negative (–) to negative (–).

Caution
Do not overtighten the nuts that secure the DC power cables to the power tray terminals. The nuts should be tightened using the 7/16 hex socket and torque wrench to a torque of 45 to 50 in-lb.

Step 4 Replace the clear plastic safety covers over the DC power connection terminal studs and tighten the screws.

Step 5 Set the DC power source circuit breaker to ON (1).

Step 6 Set the power tray switch to ON (1).

Caution
Use this procedure only when reconnecting power to all power modules in a system that is powered down completely.

Removing an AC or DC Power Tray from a Cisco ASR 9000 Series Router

The power trays are not a true FRU because they do not support OIR. However, if replacement is necessary, follow these steps to remove and replace the power trays in a Cisco ASR 9000 Series Router.



Caution Power tray removal and replacement procedures are to be performed by qualified service persons only.



Caution All power to the node must be shut off at the branch circuit disconnect device before beginning power tray replacement procedures. Removal of a tray requires disconnection of power cabling on the back of the chassis that exposes service persons to exposed wiring from the unaffected tray.

Caution All terminal block covers should be replaced prior to energizing the power cabling to the system.

Follow these steps to remove an AC or DC power tray from the chassis:

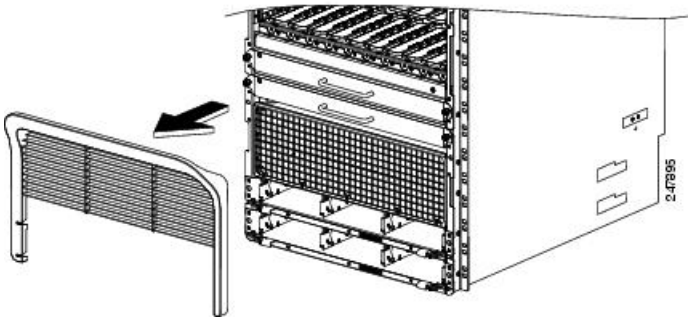
Procedure

Step 1 Disconnect AC or DC power from the power tray rear panel.

Step 2 Remove all power modules from the power tray.

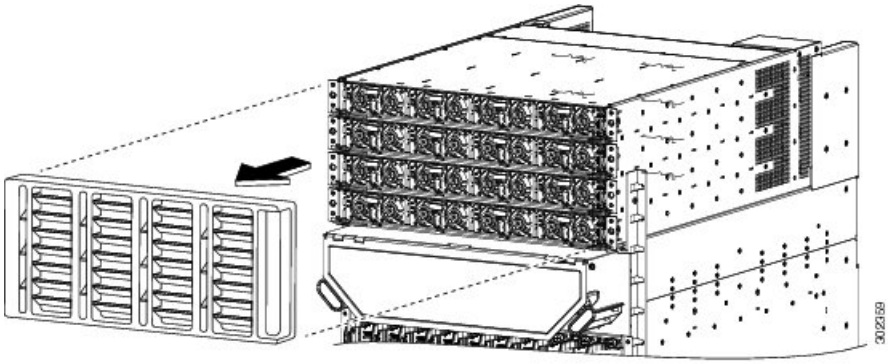
Step 3 For the Cisco ASR 9010 Router, remove the front grill by pulling it away from the chassis (see figure below).

Figure 218: Removing the Front Grill on the Cisco ASR 9010 Router



Step 4 For the Cisco ASR 9922 Router, the front power tray bezel is a standard item that comes with ball studs already installed. Simply install it by snapping it onto the chassis, or remove it by pulling it away from the chassis (see figure below).

Figure 219: Removing the Front Power Tray Bezel on the Cisco ASR 9922 Router



Step 5 For the Cisco ASR 9912 Router, the vented power tray bezel is a base chassis accessory that snaps onto the front of the power system. comes with ball studs already installed. Remove it by pulling it away from the chassis (Figure 169: Installing Base Accessories on the Cisco ASR 9912 Router, on page 160).

Step 6 Loosen and remove the four screws (two screws at each end) that attach the power tray to the chassis.

Step 7 Loosen the two captive screws (one per ejector lever) to release the ejector levers. The *Removing a Power Tray—Version 1 Power Tray* figure shows the process for the version 1 power trays, and the figure *Removing*

a Power Tray –Version 2 Power Tray shows the process for the version 2 power trays. The process for version 3 power trays is similar to the process for version 2 power trays, as shown in figure *Removing a Power Tray –Version 2 Power Tray* .

Figure 220: Removing a Power Tray—Version 1 Power Tray (Cisco ASR 9010 Router Shown)

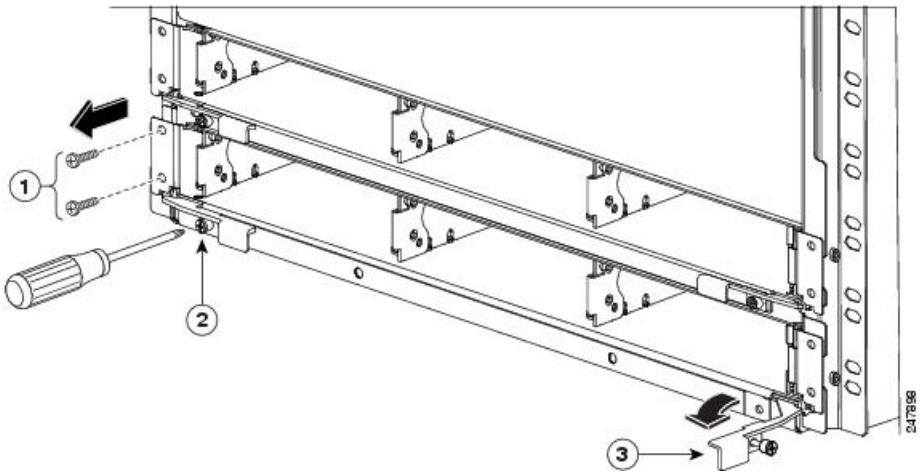
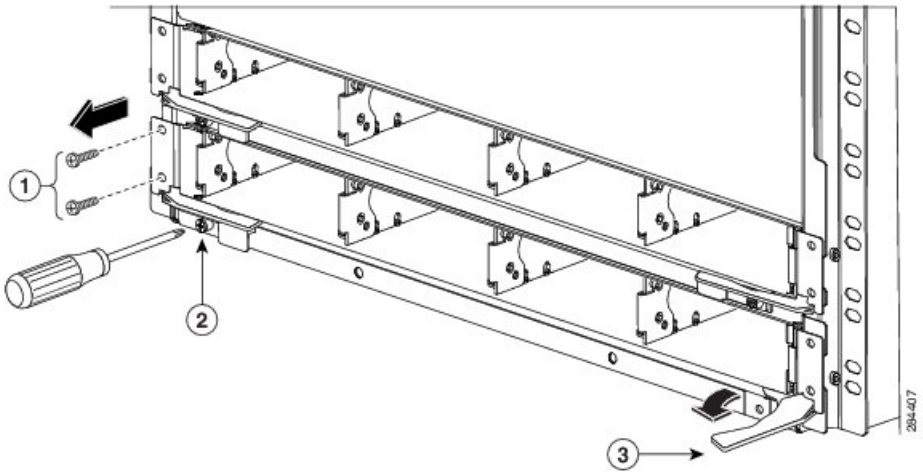


Figure 221: Removing a Power Tray –Version 2 Power Tray (Cisco ASR 9010 Router Shown)



1	Remove screws on each side that secure the power tray to the chassis	2	Loosen the captive screw in each ejector lever	3	Rotate the eje tray from its r

Step 8 Rotate the ejector levers away from the tray to unseat the tray from its mating connector. The figure *Removing a Power Tray—Version 1 Power Tray* shows the process for the version 1 power trays, and the figure *Removing a Power Tray –Version 2 Power Tray*shows the process for the version 2 and version 3 power trays.

Step 9 Slide the power tray out of the bay of the chassis.

Installing an AC or DC Power Tray into a Cisco ASR 9000 Series Router

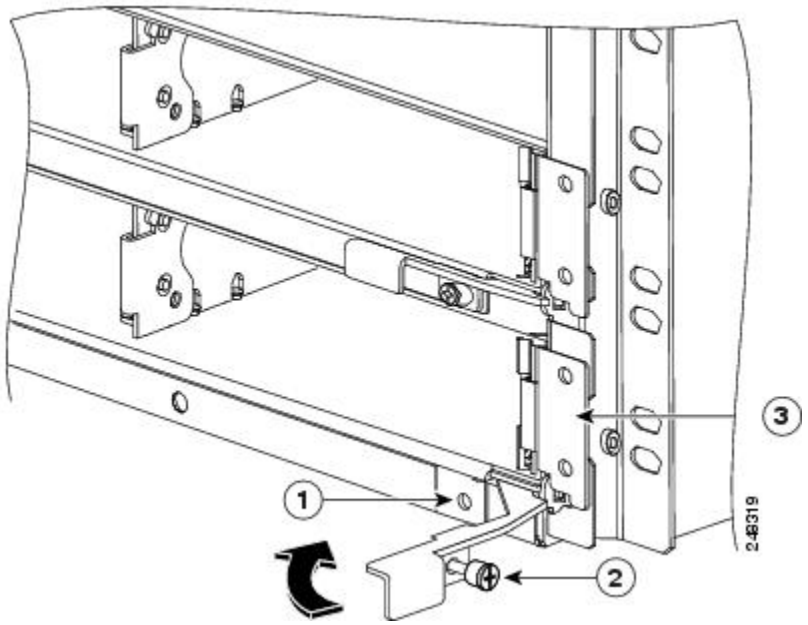
Follow these steps to install an AC or DC power tray into the chassis:

Procedure

Step 1 Slide the power tray into the bay until it engages its mating connector on the chassis. The ejector levers will partly rotate inward as you do this.

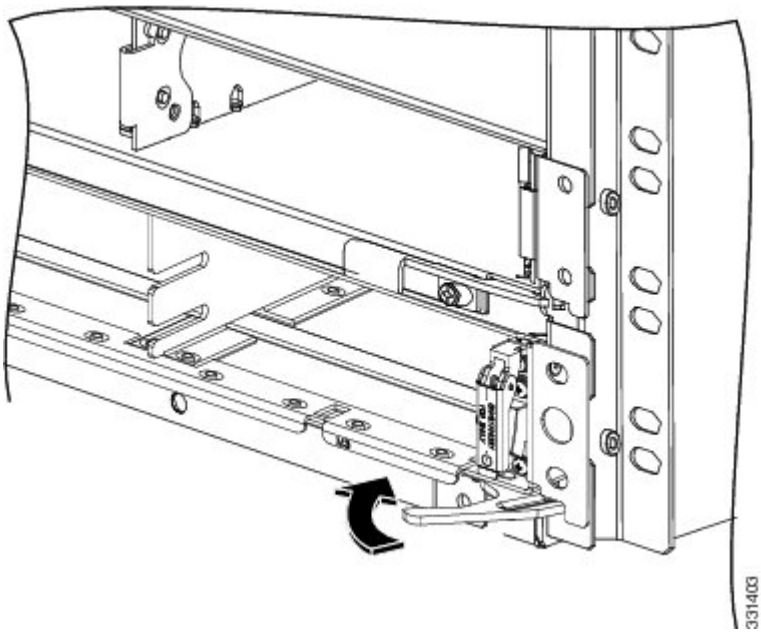
Step 2 Fully rotate the ejector levers inward to fully seat the power tray into its mating connector and seat the power tray mounting ears against the chassis mounting ears. The figure *Rotating the Ejector Levers Inward to Seat the Version 1 Power Tray* shows how to install the version 1 power trays and the figure *Rotating the Ejector Levers Inward to Seat the Version 2 Power Tray* shows how to install the version 2 power trays. The installation of version 3 power trays is similar to the installation of version 2 power trays, as shown in the figure *Rotating the Ejector Levers Inward to Seat the Version 2 Power Tray*. When the power tray is fully seated, the captive screw in each ejector aligns with the screw hole in the power tray frame.

Figure 222: Rotating the Ejector Levers Inward to Seat the Version 1 Power Tray



1	Screw hole in the power tray frame for ejector lever captive screw	2	Ejector lever captive screw	3	Power tray

Figure 223: Rotating the Ejector Levers Inward to Seat the Version 2 Power Tray



Step 3 Install the captive screw in each ejector lever into the screw hole in the power tray frame (figures *Rotating the Ejector Levers Inward to Seat the Version 1 Power Tray* or *Rotating the Ejector Levers Inward to Seat the Version 2 Power Tray*).

Step 4 Use the 6-inch long number 2 Phillips screwdriver to tighten the two ejector screws to a torque of 10 +/-1 in-lb to secure the ejectors and to secure the tray to its mating connector.

Step 5 Install and tighten two screws through the power tray mounting ears on each side into the screw holes in the chassis mounting ears to secure the tray to the chassis.

Removing and Replacing Cards from the Chassis

This section describes the procedures for removing and installing an RSP card, RP card, FC, or LC.

See the Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Hardware Installation Guide for information about removing and installing SIP and SPA cards.

- For a information about the router components and slot numbering for the Cisco ASR 9010 Router, Cisco ASR 9006 Router, and Cisco ASR 9904 Router, see Removing RSP Cards and Line Cards from the Cisco ASR 9010 Router, Cisco ASR 9006 Router, Cisco ASR 9904 Router, Cisco ASR 9906 Router, and Cisco ASR 9910 Router.
- For a information about the router components and slot numbering for the Cisco ASR 9922 Router and Cisco ASR 9912 Router, see Removing RP Cards, Fabric Cards, and Line Cards from the Cisco ASR 9922 Router and Cisco ASR 9912 Router.
- The Cisco ASR 9906 and Cisco ASR 9910 chassis are midplane chassis and the method of removal and replacing cards is different from other routers. The RSP (RSP0, RSP1) cards are located in the front of the chassis. The 4 line cards on the Cisco ASR 9906 (LC0 - LC3) and 8 line cards on the Cisco ASR

9910 (LC0 - LC7) slots are located in the front of the chassis. The 5 fabric cards (FC0 - FC4) can be inserted or removed from the rear side of the chassis.

Caution Handle all cards by the metal card carrier edges only; avoid touching the board or any connector pins. After removing a card, carefully place it in an antistatic bag or similar environment to protect it from ESD and dust in the optic ports (fiber-optic line cards).

Caution Be careful to avoid damaging the EMI gasket that runs along the full height of the card front panel edges. Damage to the EMI gasket can affect the ability of your system to meet EMI requirements.

Caution To avoid damaging card mechanical components, never carry an RSP card, RP card, FC, or LC by the captive installation screws or ejector levers. Doing so can damage these components and cause card insertion problems.

Note The BPID board monitors OIR by counting the number of card insertions for each slot and saving that information in non-volatile memory. OIR monitoring is done for all line cards, the RSP, the RP, and the fan trays. See OIR Monitoring, on page 229 for more information.

Removing Cards from the Chassis

Follow these steps to remove and replace RP, RSP, FC, or LC from the card cage:

Procedure

Step 1 Power down the card using either of the below options:

- Option '**a**' to power down the FC or LC
- Option '**b**' to power down RP or RSP in a router running Cisco ios XR 64-bit OS
- Option '**c**' to power down RP or RSP in a router running Cisco ios XR 32-bit OS

a) Use the CLI to power down the FC or LC.

```
Router# admin
Router(admin)# config
Router(admin-config)# hw-module power disable location location
Router(admin-config)# commit
Router(admin-config)# exit
```

The location is specified in rack/slot/cpu notation. For example, **hw-module power disable location 0/1/CPU0**.

b) Use this procedure to power down RP or RSP card on the router running Cisco IOS XR 64-bit OS:

```
Router# admin
Router(admin)# config
Router(admin-config)# hw-module location location shutdown
Router(admin-config)# commit
Router(admin-config)# exit
```

This gracefully shuts down route processor module (standby RP/RSP) to prevent any of the file systems from being corrupted.

Note
We recommend to shut down the RP or RSP module after switching it to the standby node.

Verify that the route processor LED for the slot that you specified turns off. Also, you can verify that the card is in powered off state running the **show platform** command to verify the status of the card to be POWERED_OFF.

c) Use this procedure to power down RP or RSP card on the router running Cisco IOS XR 32-bit OS

The router running Cisco IOS XR 32-bit OS doesn't support **hw-module location <loc> shutdown** command. Therefore, you must connect to the console port of RP or RSP and press CTRL+C to break into ROMMON. Later disconnect the cables and pull the RP or RSP card (standby RP or RSP) out of the slot.

Note
We recommend to shut down the RP or RSP module after switching it to the standby node.

d) Disengage the card from the back plane by performing Step 3a, 3b, and 3c. Leave the card inside the slot. Once the card is powered down wait 10 minutes for the line card to cool down below a temperature suitable to touch

Step 2 Disconnect any cables from the card.

a) Identify the type of line card and its slot number. Write this information down before you disconnect the cables. You'll need this information when you reinstall the line cards.
b) Identify the line card cable and its port connection. Label the cable with this information.
c) Starting with the port of the line card farthest from the cable management bracket, disconnect the interface cable connectors from each of the line card ports.
d) Carefully remove the cables from the cable-management bracket attached to the front panel of the line card.
e) (Optional) Use the 6-inch long number 2 Phillips screwdriver to a torque of 10 +/–1 in-lb to loosen the captive screw that secures the cable-management bracket to the line card and remove the cable-management bracket from the line card.
f) Carefully remove the cables from the horizontal cable management tray at the top of the chassis or side cable management brackets (Cisco ASR 9006 Router) and carefully place the cable bundle out of the way.

Step 3 Remove the card:

a) Use the 6-inch long number 2 Phillips screwdriver to loosen the captive screws at each end of the card front panel.
b) On the FC and LC push in both ejector lever release buttons.
c) Pivot the ejector levers to unseat the card from the backplane connector.
d) Slide the card out of the slot and place it directly into an antistatic bag or other ESD-preventive container.

Caution

A line card surface temperature may exceed 55 °C during normal operation. To avoid burn injuries, please take necessary precautions while removing the heated card from the chassis.

Replacing Cards in the Chassis

Follow these steps to replace a previously removed RSP card, RP card, FC, or LC from the card cage:

Procedure

Step 1 Install the card:

a) Slide the card into the slot, being sure to install the card in the same slot you recorded when you removed the card.

b) Use the 6-inch long number 2 Phillips screwdriver to a torque of 10 +/–1 in-lb to tighten the captive screws at each end of the card front panel.

c) Pivot the ejector levers to seat the card into the backplane connector.

Step 2 Reconnect cables to the card:

a) If you previously disconnected the card cable management bracket, reattach it to the card and use the 6-inch long number 2 Phillips screwdriver to a torque of 10 +/–1 in-lb to tighten the captive screw on the bracket to secure it to the card front panel.

b) Carefully reroute the cables through the horizontal cable management tray at the top of the chassis (the Cisco ASR 9922 Router has an additional tray at the bottom of the chassis) or side cable management brackets (Cisco ASR 9006 Router and Cisco ASR 9904 Router).

c) Carefully reroute cables through the card cable-management bracket.

d) Starting with the port of the card closest to the cable management bracket, reconnect the interface cable connectors to each of the card ports using the cable and port connection information you recorded when removing the cables.

Step 3 If the card was powered down using CLI before removal, then power up the card using the CLI:

```
Router# admin
Router(admin)# config
Router(admin-config)# no hw-module power disable location location
Router(admin-config)# commit
Router(admin-config)# exit
```

The location is specified in rack/slot/cpu notation. For example, **no hw-module power disable location 0/1/CPU0**.

The RSP or RP module can be power on with manual reload.

Repackaging the Line Card for Return Shipment

Follow these steps to repackage the line card for return shipment.

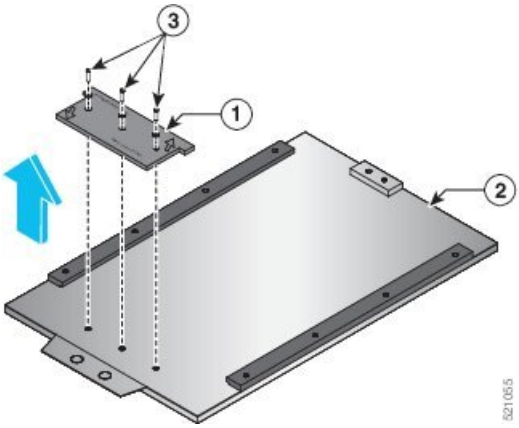
Before you begin

- Create an RMA. For details on the RMA process, see **Product Returns & Replacements (RMA).**
- Ensure that you have all the necessary tools and equipment before beginning the procedure:
  - Packaging material. Use the existing packaging material or order a new packaging material.
  - Screwdriver
  - 3M 373 3.00-inch wide pressure-sensitive carton sealing tape

Procedure

Step 1 Remove the three screws from the plastic blocker present on the wooden base board and remove the blocker.

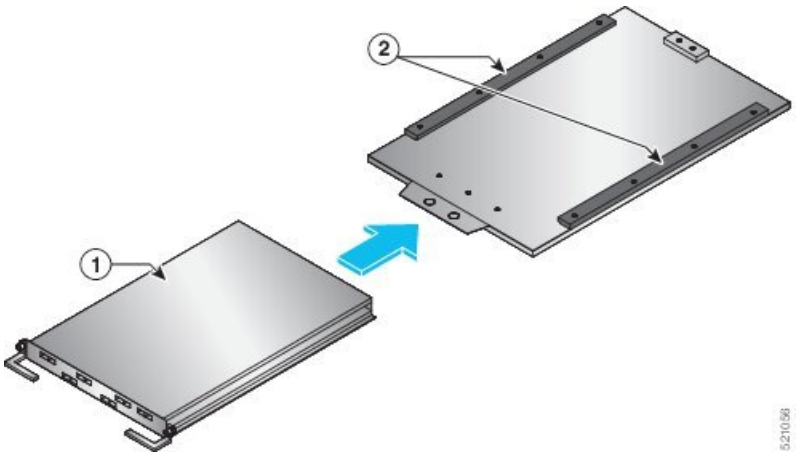
Figure 224: Removing the Plastic Blocker



1	Plastic Blocker	3	Screws
2	Wooden Base Board		

Step 2 Insert the line card into the slots in the plastic side rails of the wooden base board.

Figure 225: Inserting the Line Card in the Wooden Base Board

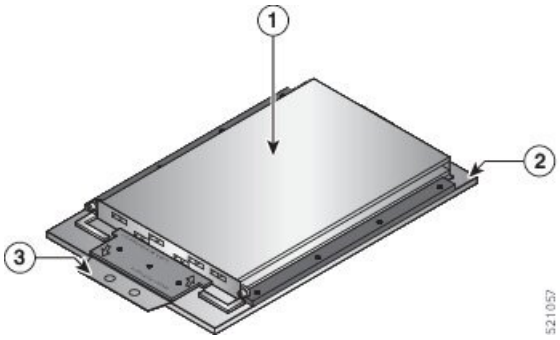


1	Line Card	2	Plastic Side Rails

Step 3 Refix the plastic blocker into the wooden base board. Tighten the three screws applying a minimum torque value of 40 in-lbs.

Note
Depending on the line card being packaged, orient the plastic blocker as per the instructions printed on the top face of the blocker.

Figure 226: Refixing the Plastic Blocker



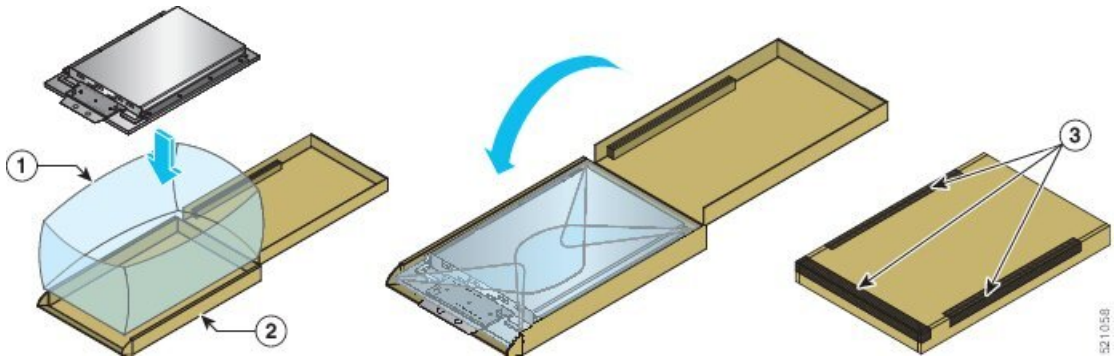
1	Line Card	3	Refixed Plastic Blocker
2	Wooden Base Board		

Step 4 Secure the line card inside the inner packaging box:

Note
For safety and ease of handling, two persons should carry the card.

a) Place the line card inside the ESD bag; with the base of the ESD bag positioned on the inner packaging box.
b) Fold and seal the ESD bag with invisible tape.
c) Close the inner packaging box and seal it with pressure-sensitive carton sealing tape.

Figure 227: Securing the Line Card inside the Inner Packaging Box

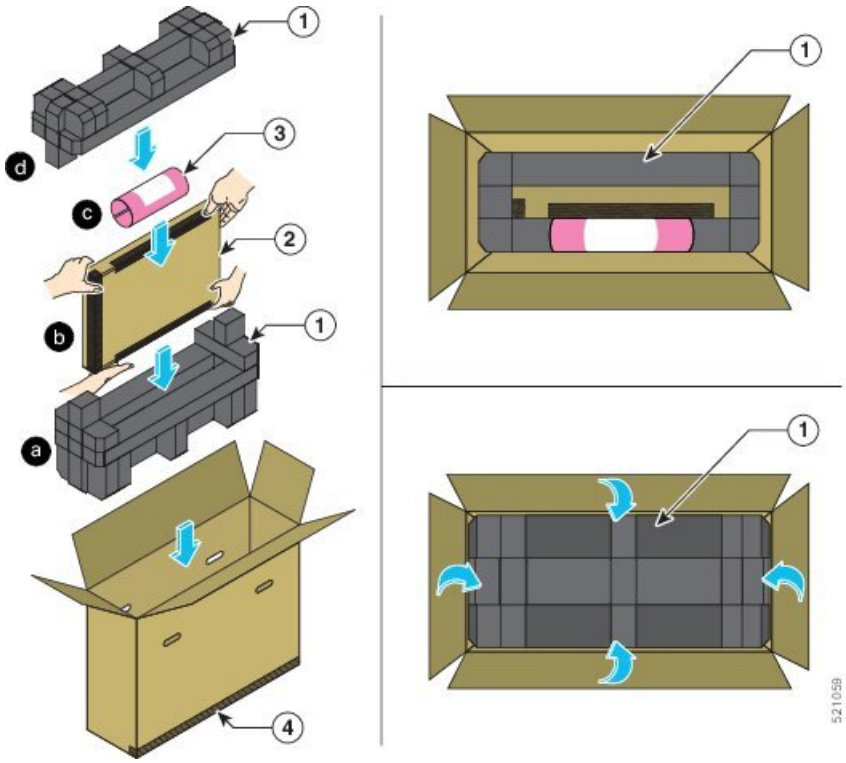


1	ESD Bag	2	Inner Packaging Box

Step 5 Pack the sealed line card package:

a) Place the foam cushion into the outer packaging box.
b) Place the sealed line card package sideways into the foam cushion.
c) Place the pink rolled foam inside the outer packaging box, between the sealed line card package and outer packaging box. This pink rolled foam is used to spread on a flat surface and place the line card on it, while unpacking.

Figure 228: Packing the Sealed Line Card Package



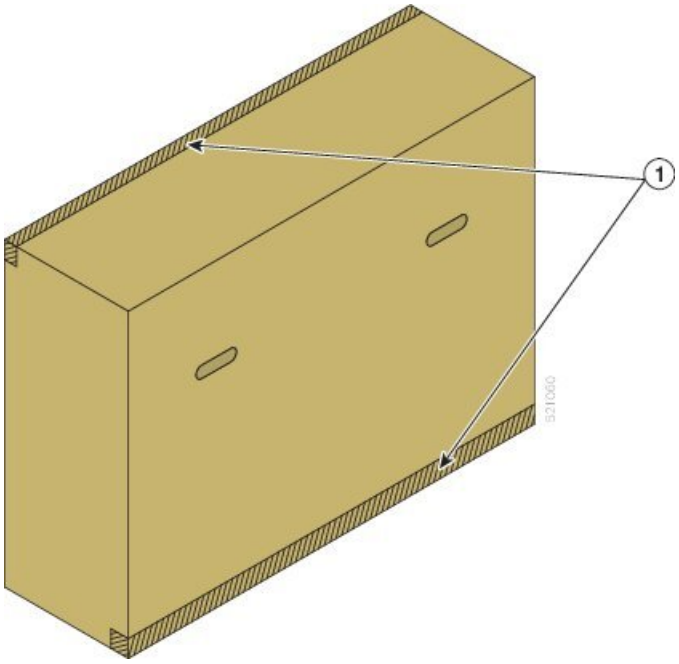
1	Foam Cushion	3	Pink Rolled Foam

2	Sealed Line Card Package Placed Sideways	4	Outer Packaging Box

d) Place the foam cushion on the sealed line card package.

Step 6 Close and seal the outer packaging box using 3M 373 3.00-inch wide pressure-sensitive carton sealing tape, and prepare the box for return shipment.

Figure 229: Closing and Sealing the Outer Packaging Box



1	Sealed Outer Packaging Box

Migrating from RP1 to RP2 Card

Before you begin:

- You must have console access to the router.
- The router must be running Cisco IOS XR software release 5.3.2 or later version.
- The router must have two RP1 cards (active and standby) up and running.
- Cisco ASR 9000 Ethernet Line Card (first generation) must be removed from the chassis as they are incompatible with RP2.
- Cisco ASR 9000 High Density 100GE Ethernet line cards must be power down or temporarily removed before starting the migration procedure. Use the **hw-module power disable location** *node-id* command in admin-config mode to power down the LC.

Procedure

Step 1 Use the **show redundancy summary** command to verify that the RP0 and RP1 are in Ready State.

Example:

```
Router# show redundancy summary
Wed Jun 17 11:18:51.391 PST
Active/Primary Standby/Backup
-------------- --------------
0/RP0/CPU0(A)  0/RP1/CPU0(S) (Node Ready, NSR: Ready)
0/RP0/CPU0(P)  0/RP1/CPU0(B) (Proc Group Ready, NSR: Ready)

Router# show redundancy

Wed Jun 17 11:20:19.086 PST
Redundancy information for node 0/RP1/CPU0:
==========================================
Node 0/RP1/CPU0 is in ACTIVE role
Node Redundancy Partner (0/RP0/CPU0) is in STANDBY role
Standby node in 0/RP0/CPU0 is ready
Standby node in 0/RP0/CPU0 is NSR-ready
Node 0/RP1/CPU0 is in process group PRIMARY role
Process Redundancy Partner (0/RP0/CPU0) is in BACKUP role
Backup node in 0/RP0/CPU0 is ready
Backup node in 0/RP0/CPU0 is NSR-ready

Group             Primary     Backup    Status
---------         ---------   --------- ---------
v6-routing        0/RP1/CPU0  0/RP0/CPU0  Ready
mcast-routing     0/RP1/CPU0  0/RP0/CPU0  Ready
netmgmt           0/RP1/CPU0  0/RP0/CPU0  Ready
v4-routing        0/RP1/CPU0  0/RP0/CPU0  Ready
central-services  0/RP1/CPU0  0/RP0/CPU0  Ready
dlrsc             0/RP1/CPU0  0/RP0/CPU0  Ready
dsc               0/RP1/CPU0  0/RP0/CPU0  Ready

Active node reload "Cause: Initiating switch-over."
Standby node reload "Cause: Initiating switch-over."
```

Step 2 Remove the standby RP1 card and insert RP2. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 3 Connect to RP2 console port and type CTRL+C to break into ROMMON.

Step 4 From the ROMMON prompt of RP2, set ROMMON variable to activate 1GE mode for peer RP communication:

Example:

```
rommon B1> RSP_LINK_1G=1
rommon B1> sync
```

Step 5 Verify that config register is set correctly in ROMMON:

Example:

```
rommon B1> confreg
```

Step 6 Reset RP2 card in ROMMON. Now the RP2 becomes the standby RP in slot 0 and synchronizes configuration from active RSP440 in slot 1.

Example:

```
rommon B1> reset -h
```

Note
The RP2 card reloads and user is disconnected from ROMMON automatically.

Step 7 Wait until standby node reach NSR-ready state and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Step 8 From active RP, verify the both RPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other:

Example:

```
#more disk0:snmp/ifindex-table loc 0/rp0/cpu0
#more disk0:snmp/ifindex-table loc 0/rp1/cpu0
#more disk0:snmp/snmp_persist loc 0/rp0/cpu0
#more disk0:snmp/snmp_persist loc 0/rp1/cpu0
```

Step 9 Manually copy Embedded Event Manager (EEM) scripts from RP1 to RP2 disks if applicable.

Note
The EEM scripts are files located on RP's hard disk. These files are not automatically synced between Active and Standby RPs.

Step 10 Perform redundancy switchover from active RP1 to standby RP2.

Example:

```
Router# redundancy switchover
```

Note
A physical OIR is not supported, hence you must perform CLI switchover.

Step 11 Verify that the active RP is RP2 and it has the running configuration from RP1.

Example:

```
Router# show redundancy summary
Router# show running config
```

Step 12 Remove RP1. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 13 Insert and boot RP2. After booting, the RP2 becomes standby RP. Do not set the ROMMON variable.

Step 14 Repeat Step 7, Step 8 and Step 9.

Step 15 (Optional) Perform FPD upgrade on the RP2. Use these commands:

Example:

```
Router#(admin) upgrade hw-module fpd all location 0/rsp0/cpu0
```

```
Router#(admin) upgrade hw-module fpd all location 0/rsp1/cpu0
```

Step 16 Clear ROMMON variable for active RP from XR prompt:

Example:

```
Router# run nvram_rommonvar RSP_LINK_1G 0
```

Migrating from RP2 to RP3/RP3-X Card

Before you begin:

- You must have console access to the router. Default console speed on RP3 and RP3-X is set as 115200.
- IOS XR software version requirement:
  - When migrating to RP3 card, the router must be running Cisco 64-bit IOS XR software release 6.5.15 or later version.
  - When migrating to RP3-X card, the router must be running Cisco 64-bit IOS XR software release 7.6.2 or later version.

If your router is running a 32-bit IOS XR release, you will need to migrate to 64-bit XR. Refer to Migration Guide for Cisco ASR 9000 Series Routers.

Note RP3 and RP3-X is only supported with 64-bit IOS XR software releases.

- The router must have two RP2 cards (active and standby) up and running.
- First and second generation Cisco ASR 9000 Ethernet Line Cards must be removed from the chassis as they are incompatible with RP3/RP3-X.

Procedure

Step 1 Use the **show redundancy summary** command to verify that the RP0 and RP1 are in Ready State.

Example:

```
Router# show redundancy summary

Active/Primary Standby/Backup
-------------- --------------
0/RP0/CPU0(A)  0/RP1/CPU0(S) (Node Ready, NSR: Ready)
0/RP0/CPU0(P)  0/RP1/CPU0(B) (Proc Group Ready, NSR: Ready)
```

Step 2 Shutdown the standby RP2 card (slot 1) using the **admin hw-module shutdown location 0/RP1** command.

Step 3 Remove the standby RP2 card. When RP2 is removed, an alarm is generated indicating that the redundancy is lost. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 4 Insert and boot RP3/RP3-X in slot 1.

Step 5 Verify both the RPs are in IOS XR RUN state using the **show platform** command.

Example:

```
Router#show platform

Node               Type                         State           Config state
--------------------------------------------------------------------------------
0/RP0/CPU0         A99-RP2-SE(Active)           IOS XR RUN        NSHUT
0/RP1/CPU0         A99-RP3-SE(Standby)          IOS XR RUN        NSHUT
0/FT0              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT1              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT2              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT3              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR               IOS XR RUN        NSHUT
0/FC0              A99-SFC2                     OPERATIONAL       NSHUT
0/FC1              A99-SFC2                     OPERATIONAL       NSHUT
0/FC2              A99-SFC2                     OPERATIONAL       NSHUT
0/FC3              A99-SFC2                     OPERATIONAL       NSHUT
0/FC4              A99-SFC2                     OPERATIONAL       NSHUT
0/FC5              A99-SFC2                     OPERATIONAL       NSHUT
0/FC6              A99-SFC2                     OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
0/PT2              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
0/PT3              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
```

Step 6 Verify RP2 in slot 0 and RP3/RP3-X in slot 1 reach full synchronization (NSR-ready state) and status of ALL the groups is in Ready state. Use **show redundancy** command to verify the same.

Step 7 Manually copy Embedded Event Manager (EEM) scripts from RP2 to RP3/RP3-X disks if applicable.

Note
The EEM scripts are files located on RP's hard disk. These files are not automatically synced between Active and Standby RPs.

Step 8 From active RP, verify that both RPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other. In Cisco IOS XR 64 bits, the SNMP files are located under config:/snmp directory.

Example:

```
dir config:/snmp

Directory of /misc/config/snmp
203 -rwxr-xr-x. 1 5145 May 12 13:54 ifindex-table
571 -rwxr-xr-x. 1   76 May  9 23:38 snmp_persist
264 -rwxr-xr-x. 1 5130 May 11 23:13 ifindex-table-v2

#more config:/snmp/ifindex-table location 0/RP0/cpu0
#more config:/snmp/ifindex-table location 0/RP1/cpu0
#more config:/snmp/snmp_persist location 0/RP0/cpu0
#more config:/snmp/snmp_persist location 0/RP1/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP0/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP1/cpu0
```

Step 9 Perform redundancy switchover from active RP2 to standby RP3/RP3-X. This results in RP3/RP3-X (slot 1) becoming active RP and RP2 (slot 0) becoming standby RP.

Example:

```
Router# redundancy switchover
```

Step 10 Verify that both the RPs are in IOS XR RUN state using the **show platform** command

Example:

```
Router# show platform
Thu Jul 12 20:50:28.317 UTC
Node               Type                       State             Config state
--------------------------------------------------------------------------------
0/RP0/CPU0         A99-RP2-SE(Standby)        IOS XR RUN        NSHUT
0/RP1/CPU0         A99-RP3-SE(Active)         IOS XR RUN        NSHUT
0/FT0              ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT1              ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT2              ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT3              ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR             IOS XR RUN        NSHUT
0/FC0              A99-SFC2                   OPERATIONAL       NSHUT
0/FC1              A99-SFC2                   OPERATIONAL       NSHUT
0/FC2              A99-SFC2                   OPERATIONAL       NSHUT
0/FC3              A99-SFC2                   OPERATIONAL       NSHUT
0/FC4              A99-SFC2                   OPERATIONAL       NSHUT
0/FC5              A99-SFC2                   OPERATIONAL       NSHUT
0/FC6              A99-SFC2                   OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V2              OPERATIONAL       NSHUT
0/PT2              A9K-AC-PEM-V2              OPERATIONAL       NSHUT
0/PT3              A9K-AC-PEM-V2              OPERATIONAL       NSHUT
```

Step 11 Verify RP3/RP3-X in slot 1 and RP2 in slot 0 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Example:

```
Router# show redundancy
Fri Jul 12 20:51:19.365 UTC
    Active Node    Standby Node
    -----------    ------------
     0/RP1/CPU0    0/RP0/CPU0(Node Ready, NSR:Ready)
```

Step 12 Remove standby RP2 (slot 0). Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 13 Insert and boot RP3/RP3-X (slot 0). After booting, RP3/RP3-X (slot 0) becomes standby RP. Verify using the **show platform** command.

Example:

```
Router# show platform
Thu Jul 12 20:50:28.317 UTC
Node               Type                       State             Config state
--------------------------------------------------------------------------------
0/RP0/CPU0         A99-RP3-SE(Standby)        IOS XR RUN        NSHUT
0/RP1/CPU0         A99-RP3-SE(Active)         IOS XR RUN        NSHUT
0/FT0              ASR-9922-FAN-V2            OPERATIONAL       NSHUT
```

```
0/FT1              ASR-9922-FAN-V2           OPERATIONAL       NSHUT
0/FT2              ASR-9922-FAN-V2           OPERATIONAL       NSHUT
0/FT3              ASR-9922-FAN-V2           OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR            IOS XR RUN        NSHUT
0/FC0              A99-SFC2                  OPERATIONAL       NSHUT
0/FC1              A99-SFC2                  OPERATIONAL       NSHUT
0/FC2              A99-SFC2                  OPERATIONAL       NSHUT
0/FC3              A99-SFC2                  OPERATIONAL       NSHUT
0/FC4              A99-SFC2                  OPERATIONAL       NSHUT
0/FC5              A99-SFC2                  OPERATIONAL       NSHUT
0/FC6              A99-SFC2                  OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V2             OPERATIONAL       NSHUT
0/PT2              A9K-AC-PEM-V2             OPERATIONAL       NSHUT
0/PT3              A9K-AC-PEM-V2             OPERATIONAL       NSHUT
```

Step 14 Repeat Step 6, Step 7 and Step 8.

Step 15 (Optional) Perform FPD upgrade on RP3/RP3-X. Use these commands:

Note
An FPD upgrade can be performed after the FCs and LCs are added to the system.

Example:

```
sysadmin-vm:0_RP1# upgrade hw-module location 0/RP0 fpd
sysadmin-vm:0_RP1# upgrade hw-module location 0/RP1 fpd
```

Step 16 (Optional) Reload the system once FPDs are upgraded using the **admin hw-module location all reload** command.

Migrating from RP3 to RP3-X Card

Before you begin:

- You must have console access to the router. Default console speed on RP3-X is set as 115200.
- The router must be running Cisco 64-bit IOS XR software release 7.6.2 or later version.

Note RP3 and RP3-X is only supported with 64-bit IOS XR software releases.

- The router must have two RP3 cards (active and standby) up and running.
- First and second generation Cisco ASR 9000 Ethernet Line Cards must be removed from the chassis as they are incompatible with RP3-X.

Procedure

Step 1 Use the **show redundancy summary** command to verify that the RP0 and RP1 are in Ready State.

Example:

```
Router# show redundancy summary

Active/Primary Standby/Backup
-------------- --------------
0/RP0/CPU0(A)  0/RP1/CPU0(S) (Node Ready, NSR: Ready)
0/RP0/CPU0(P)  0/RP1/CPU0(B) (Proc Group Ready, NSR: Ready)
```

Step 2 Shutdown the standby RP3 card (slot 1) using the **admin hw-module shutdown location 0/RP1** command.

Step 3 Remove the standby RP3 card. When RP3 is removed, an alarm is generated indicating that the redundancy is lost. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 4 Insert RP3-X in slot 1 and allow RP3-X to bootup.

Step 5 Verify both the RPs are in IOS XR RUN state using the **show platform** command.

Example:

```
Router#show platform

Node               Type                         State           Config state
--------------------------------------------------------------------------------
0/RP0/CPU0         A99-RP3-SE(Active)           IOS XR RUN        NSHUT
0/RP1/CPU0         A99-RP3-X-SE(Standby)        IOS XR RUN        NSHUT
0/FT0              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT1              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT2              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/FT3              ASR-9922-FAN-V2              OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR               IOS XR RUN        NSHUT
0/FC0              A99-SFC2                     OPERATIONAL       NSHUT
0/FC1              A99-SFC2                     OPERATIONAL       NSHUT
0/FC2              A99-SFC2                     OPERATIONAL       NSHUT
0/FC3              A99-SFC2                     OPERATIONAL       NSHUT
0/FC4              A99-SFC2                     OPERATIONAL       NSHUT
0/FC5              A99-SFC2                     OPERATIONAL       NSHUT
0/FC6              A99-SFC2                     OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
0/PT2              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
0/PT3              A9K-AC-PEM-V2                OPERATIONAL       NSHUT
```

Step 6 Verify RP3 in slot 0 and RP3-X in slot 1 reach full synchronization (NSR-ready state) and status of ALL the groups is in Ready state. Use **show redundancy** command to verify the same.

Step 7 Manually copy Embedded Event Manager (EEM) scripts from RP3 to RP3-X disks if applicable.

Note
The EEM scripts are files located on RP's hard disk. These files are not automatically synced between Active and Standby RPs.

Step 8 From active RP, verify that both RPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other. In Cisco IOS XR 64 bits, the SNMP files are located under config:/snmp directory.

Example:

```
dir config:/snmp

Directory of /misc/config/snmp
```

```
203 -rwxr-xr-x. 1 5145 May 12 13:54 ifindex-table
571 -rwxr-xr-x. 1   76 May  9 23:38 snmp_persist
264 -rwxr-xr-x. 1 5130 May 11 23:13 ifindex-table-v2

#more config:/snmp/ifindex-table location 0/RP0/cpu0
#more config:/snmp/ifindex-table location 0/RP1/cpu0
#more config:/snmp/snmp_persist location 0/RP0/cpu0
#more config:/snmp/snmp_persist location 0/RP1/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP0/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP1/cpu0
```

Step 9 Perform redundancy switchover from active RP3 to standby RP3-X. This results in RP3-X (slot 1) becoming active RP and RP3 (slot 0) becoming standby RP.

Example:

```
Router# redundancy switchover
```

Step 10 Verify that both the RPs are in IOS XR RUN state using the **show platform** command

Example:

```
Router# show platform
Thu Jul 12 20:50:28.317 UTC
Node               Type                           State             Config state
--------------------------------------------------------------------------------
0/RP0/CPU0         A99-RP3-SE(Standby)            IOS XR RUN        NSHUT
0/RP1/CPU0         A99-RP3-X-SE(Active)           IOS XR RUN        NSHUT
0/FT0              ASR-9922-FAN-V2                OPERATIONAL       NSHUT
0/FT1              ASR-9922-FAN-V2                OPERATIONAL       NSHUT
0/FT2              ASR-9922-FAN-V2                OPERATIONAL       NSHUT
0/FT3              ASR-9922-FAN-V2                OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR                 IOS XR RUN        NSHUT
0/FC0              A99-SFC2                       OPERATIONAL       NSHUT
0/FC1              A99-SFC2                       OPERATIONAL       NSHUT
0/FC2              A99-SFC2                       OPERATIONAL       NSHUT
0/FC3              A99-SFC2                       OPERATIONAL       NSHUT
0/FC4              A99-SFC2                       OPERATIONAL       NSHUT
0/FC5              A99-SFC2                       OPERATIONAL       NSHUT
0/FC6              A99-SFC2                       OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V2                  OPERATIONAL       NSHUT
0/PT2              A9K-AC-PEM-V2                  OPERATIONAL       NSHUT
0/PT3              A9K-AC-PEM-V2                  OPERATIONAL       NSHUT
```

Step 11 Verify RP3-X in slot 1 and RP3 in slot 0 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Example:

```
Router# show redundancy
Fri Jul 12 20:51:19.365 UTC
    Active Node    Standby Node
    -----------    ------------
     0/RP1/CPU0    0/RP0/CPU0(Node Ready, NSR:Ready)
```

Step 12 Remove standby RP3 (slot 0). Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 13 Insert and boot RP3-X (slot 0). After booting, RP3-X (slot 0) becomes standby RP. Verify using the **show platform** command.

Example:

```
Router# show platform
Thu Jul 12 20:50:28.317 UTC
Node              Type                       State             Config state
--------------------------------------------------------------------------------
0/RP0/CPU0        A99-RP3-X-SE(Standby)       IOS XR RUN        NSHUT
0/RP1/CPU0        A99-RP3-X-SE(Active)       IOS XR RUN        NSHUT
0/FT0             ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT1             ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT2             ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/FT3             ASR-9922-FAN-V2            OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR             IOS XR RUN        NSHUT
0/FC0             A99-SFC2                   OPERATIONAL       NSHUT
0/FC1             A99-SFC2                   OPERATIONAL       NSHUT
0/FC2             A99-SFC2                   OPERATIONAL       NSHUT
0/FC3             A99-SFC2                   OPERATIONAL       NSHUT
0/FC4             A99-SFC2                   OPERATIONAL       NSHUT
0/FC5             A99-SFC2                   OPERATIONAL       NSHUT
0/FC6             A99-SFC2                   OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V2              OPERATIONAL       NSHUT
0/PT2             A9K-AC-PEM-V2              OPERATIONAL       NSHUT
0/PT3             A9K-AC-PEM-V2              OPERATIONAL       NSHUT
```

Step 14 Repeat Step 6, Step 7 and Step 8.

Step 15 (Optional) Perform FPD upgrade on RP3-X. Use these commands:

Note
An FPD upgrade can be performed after the FCs and LCs are added to the system.

Example:

```
sysadmin-vm:0_RP1# upgrade hw-module location 0/RP0 fpd
sysadmin-vm:0_RP1# upgrade hw-module location 0/RP1 fpd
```

Step 16 (Optional) Reload the system once FPDs are upgraded using the **admin hw-module location all reload** command.

Migrating from RSP440 to RSP880 or RSP880-LT Card

Before you begin:

- You must have console access to the router.
- The router must be running Cisco IOS XR software release 5.3.2 or later version to support RSP880.
- The router must be running Cisco IOS XR software release 6.2.2 or later version to support RSP880-LT.
- The router must have two RSP440 cards (active and standby) up and running.

- Cisco ASR 9000 Ethernet Line Card (first generation) must be removed from the chassis as they are incompatible with RSP880.
- Cisco ASR 9000 High Density 100GE Ethernet line cards (third generation) must be power down or temporarily removed before starting the migration procedure. Use the **hw-module power disable location** *node-id* command in admin-config mode to power down the LC.

Procedure

Step 1 Use show redundancy summary command to identify the active and standby RSPs.

Example:

```
Router# show redundancy summary
Wed Jun 17 11:18:51.391 PST
Active/Primary Standby/Backup
-------------- --------------
0/RSP0/CPU0(A) 0/RSP1/CPU0(S) (Node Ready, NSR: Ready)
0/RSP0/CPU0(P) 0/RSP1/CPU0(B) (Proc Group Ready, NSR: Ready)
Make sure RSP1 is the active RSP card. If not, then use redundancy switchover command to
perform redundancy switchover from RSP0 to RSP1, and make RSP1 as active RSP.
```

Step 2 Remove the standby RSP440 (RSP0) and insert RSP880 in slot 0. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 3 Connect to RSP880 console port and type **CTRL+C** to break into ROMMON.

Step 4 From the ROMMON prompt, set ROMMON variable to activate 1GE mode for peer RSP communication.

Example:

ROMMON prompt on RSP880 (A)

```
rommon B1> RSP_LINK_1G=1
rommon B1> sync
```

Example:

ROMMON prompt on RSP880-LT

```
rommon B1> RSP_LINK_1G=1
rommon B1> ALDRIN_VERSION_DISABLE=1
rommon B1> RSP4L_ALDRIN_1G=1
rommon B1> sync
```

Step 5 Verify that config register is set correctly in ROMMON.

Example:

```
rommon B1> confreg
```

Step 6 Reset RSP880 card. Now the RSP880 becomes the standby RSP in slot 0 and synchronizes configuration from active RSP440 in slot 1.

Example:

```
rommon B1> reset –h
```

Note
The RSP880 reloads and the user is disconnected from ROMMON automatically.

Step 7 Wait until standby node reaches NSR-ready state and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Example:

```
Router# show redundancy
Tue Nov 18 07:51:47.098 EDT
Redundancy information for node 0/RSP0/CPU0:
==========================================
Node 0/RSP1/CPU0 is in ACTIVE role
Node Redundancy Partner (0/RSP0/CPU0) is in STANDBY role
Standby node in 0/RSP0/CPU0 is ready
Standby node in 0/RSP0/CPU0 is NSR- ready
Node 0/RSP1/CPU0 is in process group PRIMARY role
Process Redundancy Partner (0/RSP0/CPU0) is in BACKUP role
Backup node in 0/RSP0/CPU0 is ready
Backup node in 0/RSP0/CPU0 is NSR-ready

Group             Primary      Backup       Status
---------         ---------    ---------    ---------
dsc               0/RSP1/CPU0  0/RSP0/CPU0  Ready
dlrsc             0/RSP1/CPU0  0/RSP0/CPU0  Ready
central-services  0/RSP1/CPU0  0/RSP0/CPU0  Ready
v4- routing       0/RSP1/CPU0  0/RSP0/CPU0  Ready
netmgmt           0/RSP1/CPU0  0/RSP0/CPU0  Ready
mcast-routing     0/RSP1/CPU0  0/RSP0/CPU0  Ready
v6-routing        0/RSP1/CPU0  0/RSP0/CPU0
```

Step 8 From the active RSP, verify that both RSPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other:

Example:

```
#more disk0:snmp/ifindex-table loc 0/rsp0/cpu0
#more disk0:snmp/ifindex-table loc 0/rsp1/cpu0
#more disk0:snmp/snmp_persist loc 0/rsp0/cpu0
#more disk0:snmp/snmp_persist loc 0/rsp1/cpu0
```

Step 9 Manually copy Embedded Event Manager (EEM) scripts from RSP440 to RSP880 disks if applicable.

Note
The EEM scripts are files located on RSP's hard disk. These files are not automatically synced between Active and Standby RSPs.

Step 10 Perform redundancy switchover from active RSP440 (slot 1) to standby RSP880 in (slot 0)

Example:

```
Router# redundancy switchover
```

Step 11 Remove RSP440 from slot 1. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 12 Insert and boot RSP880. After booting, the RSP 880 becomes standby RSP. Do not set the ROMMON variable.

Step 13 Repeat Step 7, Step 8 and Step 9.

Step 14 (Optional) Perform FPD upgrade on the RSP880. Use these commands:

Example:

```
Router# (admin) upgrade hw-module fpd all location 0/rsp0/cpu0
Router# (admin) upgrade hw-module fpd all location 0/rsp1/cpu0
```

Step 15 Clear ROMMON variable for active RSP from XR prompt:

Example:

```
Router# run nvram_rommonvar RSP_LINK_1G 0
```

Migrating from A99-RSP to RSP880-LT Card (ASR 9906 Router)

Before you begin:

- You must have console access to the router.
- The router must be running Cisco IOS XR software release 6.3.2 or later version.
- The router must have two A99-RSP cards (active and standby) up and running.
- Set the MISMATCH_RP_ENABLED ROMMON variable to 1:
  1. Connect to the A99-RSP console port and press CTRL+C to break into ROMMON.
  2. From the ROMMON prompt on the A99-RSP, set the ROMMON variable to allow mismatched RSP:

     ```
     rommon B1> MISMATCH_RP_ENABLED=1
     ```

Procedure

Step 1 Enter the **show redundancy summary** command to identify the active and standby RSPs.

Example:

```
Router# show redundancy summary
Wed Jun 17 11:18:51.391 PST
Active/Primary Standby/Backup
-------------- --------------
0/RSP1/CPU0(A) 0/RSP0/CPU0(S) (Node Ready, NSR: Ready)
0/RSP1/CPU0(P) 0/RSP0/CPU0(B) (Proc Group Ready, NSR: Ready)
```

Step 2 Remove the standby A99-RSP from slot 0 and insert the RSP880-LT. Follow the procedure in Removing and Replacing Cards from the Chassis, on page 254.

Step 3 Wait until the standby node reaches NSR-ready state and the status of all groups is in Ready state. Enter the **show redundancy** command to verify.

Example:

```
Router# show redundancy
Wed Jun 17 11:18:53.098 PST
Redundancy information for node 0/RSP1/CPU0:
==========================================
Node 0/RSP1/CPU0 is in ACTIVE role
Node Redundancy Partner (0/RSP0/CPU0) is in STANDBY role
Standby node in 0/RSP0/CPU0 is ready
Standby node in 0/RSP0/CPU0 is NSR-ready
Node 0/RSP1/CPU0 is in process group PRIMARY role
Process Redundancy Partner (0/RSP0/CPU0) is in BACKUP role
Backup node in 0/RSP0/CPU0 is ready
Backup node in 0/RSP0/CPU0 is NSR-ready

Group            Primary         Backup          Status
---------        ---------       ---------       ---------
v6-routing       0/RSP1/CPU0     0/RSP0/CPU0     Ready
mcast-routing    0/RSP1/CPU0     0/RSP0/CPU0     Ready
netmgmt          0/RSP1/CPU0     0/RSP0/CPU0     Ready
v4-routing       0/RSP1/CPU0     0/RSP0/CPU0     Ready
central-services 0/RSP1/CPU0     0/RSP0/CPU0     Ready
dsc              0/RSP1/CPU0     0/RSP0/CPU0     Ready
dlrsc            0/RSP1/CPU0     0/RSP0/CPU0     Ready
```

Step 4 Perform redundancy switchover from active A99-RSP (slot 1) to standby RSP880-LT (slot 0).

Example:

```
Router# redundancy switchover
Proceed with switchover 0/RSP1/CPU0 -> 0/RSP0/CPU0? [confirm] y
Initiating switch-over.
RP/0/RSP0/CPU0:Jun 17 11:18:55.098 PST: rmf_svr[418]: %HA-REDCON-4-FAILOVER_REQUESTED :
failover has been requested by operator, waiting to initiate
RP/0/RSP1/CPU0:Jun 17 11:18:55.098 PST: nvram[74]: %MEDIA-NVRAM-6-UNMOUNT : nvram unmount
requested due to process restart or card reload
Connection closed by foreign host.

. . .

RP/0/RSP0/CPU0:Jun 17 11:26:55.098 PST: rmf_svr[418]: %HA-REDCON-1-BACKUP_READY : backup
process groups between 0/RSP0/CPU0 and 0/RSP1/CPU0 are ready
RP/0/RSP1/CPU0:Jun 17 11:26:55.098 PST: rmf_svr[420]: %HA-REDCON-6-STBY_BACKUP_READY : This
 card is standby and its backup process groups are ready

. . .
```

The RSP880-LT in slot 0 becomes the active RSP.

Step 5 Remove the RSPS-4 from slot 1 and insert the RSP880-LT. Follow the procedure in Removing and Replacing Cards from the Chassis, on page 254.
After booting, the RSP880-LT is slot 1 becomes the standby RSP.

Step 6 Enter the **show redundancy** and **show platform** commands to confirm the RSPs have synchronized and are in the correct state.

Example:

```
Router# show redundancy
Redundancy information for node 0/RSP0/CPU0:
==========================================
Node 0/RSP0/CPU0 is in ACTIVE role
Node Redundancy Partner (0/RSP1/CPU0) is in STANDBY role
Standby node in 0/RSP1/CPU0 is ready
Standby node in 0/RSP1/CPU0 is NSR-not-configured
Node 0/RSP0/CPU0 is in process group PRIMARY role
Process Redundancy Partner (0/RSP1/CPU0) is in BACKUP role
Backup node in 0/RSP1/CPU0 is ready
Backup node in 0/RSP1/CPU0 is NSR-ready

Group            Primary         Backup          Status
---------        ---------       ---------       ---------
dsc              0/RSP0/CPU0     0/RSP1/CPU0     Ready
dlrsc            0/RSP0/CPU0     0/RSP1/CPU0     Ready
central-services 0/RSP0/CPU0     0/RSP1/CPU0     Ready
v4-routing       0/RSP0/CPU0     0/RSP1/CPU0     Ready
netmgmt          0/RSP0/CPU0     0/RSP1/CPU0     Ready
mcast-routing    0/RSP0/CPU0     0/RSP1/CPU0     Ready
v6-routing       0/RSP0/CPU0     0/RSP1/CPU0     Ready

Router# show platform
Node            Type                        State            Config State
-------------------------------------------------------------------------------
0/RSP0/CPU0     A9K-RSP880-LT-TR(Active)  IOS XR RUN       PWR,NSHUT,MON
0/RSP1/CPU0     A9K-RSP880-LT-TR(Standby) IOS XR RUN       PWR,NSHUT,MON
0/0/CPU0        A99-8X100GE-TR            IOS XR RUN       PWR,NSHUT,MON
0/2/CPU0        A99-12X100GE              IOS XR RUN       PWR,NSHUT,MON
0/3/CPU0        A99-8X100GE-TR            IOS XR RUN       PWR,NSHUT,MON
```

Migrating from A99-RSP/RSP880/RSP880-LT to RSP5/RSP5-X Card

Before you begin:

- You must have console access to the router. Default console speed on RSP5 and RSP5-X is set as 115200.
- IOS XR software version requirement:
  - When migrating to RSP5 card, the router must be running Cisco 64-bit IOS XR software release 6.5.15 or later version.
  - When migrating to RSP5-X card, the router must be running Cisco 64-bit IOS XR software release 7.6.2 or later version.

If your router is running a 32-bit IOS XR release, you will need to migrate to 64-bit XR. Refer to Migration Guide for Cisco ASR 9000 Series Routers.

Note RSP5 and RSP5-X are only supported with 64-bit IOS XR software releases.

- The router must have two A99-RSP/RSP880/RSP880-LT cards (active and standby) up and running. In this section, RSP refers to A99-RSP/RSP880/RSP880-LT in the system.
- First and second generation Cisco ASR 9000 Ethernet Line Cards must be removed from the chassis as they are incompatible with RSP5/RSP5-X.

Procedure

Step 1 Use the **show redundancy summary** command to verify that the RSP0 and RSP1 are in Ready State.

Example:

```
Router# show redundancy summary

Active/Primary Standby/Backup
-------------- --------------
0/RSP0/CPU0(A)  0/RSP1/CPU0(S) (Node Ready, NSR: Ready)
0/RSP1/CPU0(P)  0/RSP1/CPU0(B) (Proc Group Ready, NSR: Ready)
```

Step 2 Shutdown the standby RSP card (slot 1) using the **admin hw-module shutdown location 0/RSP1** command.

Step 3 Remove the standby RSP card (slot 1). When RSP is removed, an alarm is generated indicating that the redundancy is lost. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 4 Insert and boot RSP5/RSP5-X in slot 1.

Step 5 Verify both the RSPs are in IOS XR RUN state using the **show platform** command.

Example:

```
Router#show platform
Node              Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0       A9K-RSP880-LT-TR(Active)    IOS XR RUN        NSHUT
0/RSP1/CPU0       A9K-RSP5-TR(Standby)        IOS XR RUN        NSHUT
0/FT0             ASR-9910-FAN                OPERATIONAL       NSHUT
0/FT1             ASR-9910-FAN                OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR             IOS XR RUN        NSHUT
0/FC0             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC1             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC2             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC3             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC4             A99-SFC-S                  OPERATIONAL       NSHUT
0/PT0             A9K-AC-PEM-V3               OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V3               OPERATIONAL       NSHUT
```

Step 6 Verify RSP in slot 0 and RSP5/RSP5-X in slot 1 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use **show redundancy** command to verify the same.

Step 7 Manually copy Embedded Event Manager (EEM) scripts from RSP to RSP5/RSP5-X disks if applicable.

Note
The EEM scripts are files located on RSP's hard disk. These files are not automatically synced between Active and Standby RSPs.

Step 8 From active RP, verify that both RPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other. In Cisco IOS XR 64 bits, the SNMP files are located under config:/snmp directory.

Example:

```
dir config:/snmp

Directory of /misc/config/snmp
203 -rwxr-xr-x. 1 5145 May 12 13:54 ifindex-table
571 -rwxr-xr-x. 1   76 May  9 23:38 snmp_persist
264 -rwxr-xr-x. 1 5130 May 11 23:13 ifindex-table-v2

#more config:/snmp/ifindex-table location 0/RP0/cpu0
#more config:/snmp/ifindex-table location 0/RP1/cpu0
#more config:/snmp/snmp_persist location 0/RP0/cpu0
#more config:/snmp/snmp_persist location 0/RP1/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP0/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP1/cpu0
```

Step 9 Perform redundancy switchover from active RSP to standby RSP5/RSP5-X. This results in RSP5/RSP5-X (slot 1) becoming active RSP and RSP (slot 0) becoming standby RP.

Example:

```
Router# redundancy switchover
```

Step 10 Verify that both the RSPs are in IOS XR RUN state using the **show platform** command

Example:

```
Router# show platform
Node              Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0       A9K-RSP880-LT-TR(Standby)  IOS XR RUN        NSHUT
0/RSP1/CPU0       A9K-RSP5-TR(Active)        IOS XR RUN        NSHUT
0/FT0             ASR-9910-FAN               OPERATIONAL       NSHUT
0/FT1             ASR-9910-FAN               OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR             IOS XR RUN        NSHUT
0/FC0             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC1             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC2             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC3             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC4             A99-SFC-S                 OPERATIONAL       NSHUT
0/PT0             A9K-AC-PEM-V3              OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V3              OPERATIONAL       NSHUT
```

Step 11 Verify RSP5/RSP5-X in slot 1 and RSP in slot 0 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Example:

```
Router# show redundancy
Fri Jul 12 20:51:19.365 UTC
    Active Node    Standby Node
    -----------    ------------
     0/RSP1/CPU0    0/RSP0/CPU0(Node Ready, NSR:Ready)
```

Step 12 Remove standby RSP (slot 0). Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 13 Insert and boot RSP5/RSP5-X (slot 0). After booting, the RSP5/RSP5-X becomes standby RSP.

Example:

```
Router# show platform
Node              Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0       A9K-RSP5-TR(Standby)      IOS XR RUN        NSHUT
0/RSP1/CPU0       A9K-RSP5-TR(Active)       IOS XR RUN        NSHUT
0/FT0             ASR-9910-FAN              OPERATIONAL       NSHUT
0/FT1             ASR-9910-FAN              OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR            IOS XR RUN        NSHUT
0/FC0             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC1             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC2             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC3             A99-SFC-S                 OPERATIONAL       NSHUT
0/FC4             A99-SFC-S                 OPERATIONAL       NSHUT
0/PT0             A9K-AC-PEM-V3             OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V3             OPERATIONAL       NSHUT
```

Step 14 Repeat Step 6, Step 7 and Step 8.

Step 15 (Optional) Perform FPD upgrade on the RSP5/RSP5-X. Use these commands:

Note
An FPD upgrade can be performed after all the FCs/LCs are added to the system.

Example:

```
sysadmin-vm:0_RSP1# upgrade hw-module location 0/RSP0 fpd
sysadmin-vm:0_RSP1# upgrade hw-module location 0/RSP1 fpd
```

Step 16 (Optional) Reload the system once FPDs are upgraded using the **admin hw-module location all reload** command.

Migrating from RSP5 to RSP5-X Card

Before you begin:

- You must have console access to the router. Default console speed on RSP5-X is set as 115200.
- The router must be running Cisco 64-bit IOS XR software release 7.6.2 or later version.

Note RSP5 and RSP5-X is only supported with 64-bit IOS XR software releases.

- The router must have two RSP5 cards (active and standby) up and running. In this section, RSP refers to RSP5 in the system.

- First and second generation Cisco ASR 9000 Ethernet Line Cards must be removed from the chassis as they are incompatible with RSP5-X.

Procedure

Step 1 Use the **show redundancy summary** command to verify that the RSP0 and RSP1 are in Ready State.

Example:

```
Router# show redundancy summary

Active/Primary Standby/Backup
-------------- --------------
0/RSP0/CPU0(A)  0/RSP1/CPU0(S) (Node Ready, NSR: Ready)
0/RSP1/CPU0(P)  0/RSP1/CPU0(B) (Proc Group Ready, NSR: Ready)
```

Step 2 Shutdown the standby RSP card (slot 1) using the **admin hw-module shutdown location 0/RSP1** command.

Step 3 Remove the standby RSP card (slot 1). When RSP is removed, an alarm is generated indicating that the redundancy is lost. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 4 Insert RSP5-X in slot 1 and allow RSP5-X to bootup.

Step 5 Verify both the RSPs are in IOS XR RUN state using the **show platform** command.

Example:

```
Router#show platform
Node               Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0        A9K-RSP5-TR(Active)          IOS XR RUN        NSHUT
0/RSP1/CPU0        A9K-RSP5-X-TR(Standby)       IOS XR RUN        NSHUT
0/FT0              ASR-9910-FAN                 OPERATIONAL       NSHUT
0/FT1              ASR-9910-FAN                 OPERATIONAL       NSHUT
0/1/CPU0           A9K-8X100GE-TR               IOS XR RUN        NSHUT
0/FC0              A99-SFC-S                    OPERATIONAL       NSHUT
0/FC1              A99-SFC-S                    OPERATIONAL       NSHUT
0/FC2              A99-SFC-S                    OPERATIONAL       NSHUT
0/FC3              A99-SFC-S                    OPERATIONAL       NSHUT
0/FC4              A99-SFC-S                    OPERATIONAL       NSHUT
0/PT0              A9K-AC-PEM-V3                OPERATIONAL       NSHUT
0/PT1              A9K-AC-PEM-V3                OPERATIONAL       NSHUT
```

Step 6 Verify RSP in slot 0 and RSP5-X in slot 1 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use **show redundancy** command to verify the same.

Step 7 Manually copy Embedded Event Manager (EEM) scripts from RSP5 to RSP5-X disks if applicable.

Note
The EEM scripts are files located on RSP's hard disk. These files are not automatically synced between Active and Standby RSPs.

Step 8 From active RP, verify that both RPs have synchronized the SNMP engine ID and SNMP ifindex-table between each other. In Cisco IOS XR 64 bits, the SNMP files are located under config:/snmp directory.

Example:

```
dir config:/snmp

Directory of /misc/config/snmp
203 -rwxr-xr-x. 1 5145 May 12 13:54 ifindex-table
571 -rwxr-xr-x. 1   76 May  9 23:38 snmp_persist
264 -rwxr-xr-x. 1 5130 May 11 23:13 ifindex-table-v2

#more config:/snmp/ifindex-table location 0/RP0/cpu0
#more config:/snmp/ifindex-table location 0/RP1/cpu0
#more config:/snmp/snmp_persist location 0/RP0/cpu0
#more config:/snmp/snmp_persist location 0/RP1/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP0/cpu0
#more config:/snmp/ifindex-table-v2 location 0/RP1/cpu0
```

Step 9 Perform redundancy switchover from active RSP5 to standby RSP5-X. This results in RSP5-X (slot 1) becoming active RSP and RSP5 (slot 0) becoming standby RSP.

Example:

```
Router# redundancy switchover
```

Step 10 Verify that both the RSPs are in IOS XR RUN state using the **show platform** command

Example:

```
Router# show platform
Node              Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0       A9K-RSP5-TR(Standby)         IOS XR RUN        NSHUT
0/RSP1/CPU0       A9K-RSP5-X-TR(Active)        IOS XR RUN        NSHUT
0/FT0             ASR-9910-FAN                 OPERATIONAL       NSHUT
0/FT1             ASR-9910-FAN                 OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR               IOS XR RUN        NSHUT
0/FC0             A99-SFC-S                   OPERATIONAL       NSHUT
0/FC1             A99-SFC-S                   OPERATIONAL       NSHUT
0/FC2             A99-SFC-S                   OPERATIONAL       NSHUT
0/FC3             A99-SFC-S                   OPERATIONAL       NSHUT
0/FC4             A99-SFC-S                   OPERATIONAL       NSHUT
0/PT0             A9K-AC-PEM-V3                OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V3                OPERATIONAL       NSHUT
```

Step 11 Verify RSP5-X in slot 1 and RSP5 in slot 0 reach full synchronization (NSR-ready state) and status of ALL the groups is Ready state. Use show redundancy command to verify the same.

Example:

```
Router# show redundancy
Fri Jul 12 20:51:19.365 UTC
    Active Node    Standby Node
    -----------    ------------
     0/RSP1/CPU0    0/RSP0/CPU0(Node Ready, NSR:Ready)
```

Step 12 Remove standby RSP5 (slot 0). Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 13 Insert and boot RSP5-X (slot 0). After booting, the RSP5-X becomes standby RSP.

Example:

```
Router# show platform
Node              Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0       A9K-RSP5-X-TR(Standby)     IOS XR RUN        NSHUT
0/RSP1/CPU0       A9K-RSP5-X-TR(Active)      IOS XR RUN        NSHUT
0/FT0             ASR-9910-FAN               OPERATIONAL       NSHUT
0/FT1             ASR-9910-FAN               OPERATIONAL       NSHUT
0/1/CPU0          A9K-8X100GE-TR             IOS XR RUN        NSHUT
0/FC0             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC1             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC2             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC3             A99-SFC-S                  OPERATIONAL       NSHUT
0/FC4             A99-SFC-S                  OPERATIONAL       NSHUT
0/PT0             A9K-AC-PEM-V3              OPERATIONAL       NSHUT
0/PT1             A9K-AC-PEM-V3              OPERATIONAL       NSHUT
```

Step 14 Repeat Step 6, Step 7 and Step 8.

Step 15 (Optional) Perform FPD upgrade on the RSP5-X. Use these commands:

Note
An FPD upgrade can be performed after all the FCs/LCs are added to the system.

Example:

```
sysadmin-vm:0_RSP1# upgrade hw-module location 0/RSP0 fpd
sysadmin-vm:0_RSP1# upgrade hw-module location 0/RSP1 fpd
```

Step 16 (Optional) Reload the system once FPDs are upgraded using the **admin hw-module location all reload** command.

Migrating from FC1 to FC2 Card

Procedure

Step 1 Remove the FC1 card from slot FC0. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Step 2 Insert FC2 card in slot FC0. Follow the procedure explained in the topic Replacing Cards in the Chassis, on page 257

Step 3 Wait for FC2 to come online. Verify the card state using the **show controller fabric plane all** command. In the output, Admin State and Oper State value should be 01 (that means the card state is up), Links Down should be zero, and the values of In pkt count and Out pkt count should be incrementing.

Example:

```
Router# show controllers fabric plane all
Wed Apr 13 08:32:02.464 PDT
Flags: Admin State: 1-Up 2-Down 12-UnPowered 16-Shutdown
```

```
Oper State: 1-Up 2-Down 3-Admin Down

Summary for All Fabric Planes:

Plane Id   Admin State   Oper State   Links Up   Links Down  In Pkt Count    Out Pkt count

=============================================================================================

0          01            01           42         00          5942644519      5942644481
1          01            01           42         00          5906049163      5906047719
2          01            01           42         00          5939106251      5939105048
3          01            01           42         00          5933726816      5933725418
4          01            01           42         00          5931138987      5931137649
5          01            01           22         00          5920246359      5920245399
6          01            01           22         00          5920165028      5920163883
```

Step 4 Repeat Step1 through Step 3 for migrating remaining FCs from slot FC1 to slot FC6.

Migrating from A99-SFC2 to A99-SFC3 Card

Cisco ASR 9912 and Cisco ASR 9922 chassis supports the A99-SFC3 fabric card.

Procedure

Step 1 Remove the A99-SFC2 card from slot FC0. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Alarms are raised when fabric cards are removed and when the system has a combination of old and new generation fabric cards. These alarms clear when all the fabric cards are replaced.

Step 2 Insert A99-SFC3 card in slot FC0. Follow the procedure explained in the topic Replacing Cards in the Chassis, on page 257

Step 3 Wait for A99-SFC3 card to come online. Verify the card state is OPERATIONAL using the **show platform** command.

Step 4 Repeat Step1 through Step 3 for migrating remaining FCs from slot FC1 to slot FC6.

Example:

```
Router# show platform

Node               Type                         State             Config state
-------------------------------------------------------------------------------
0/RSP0/CPU0        A9K-RSP5-TR(Standby)          IOS XR RUN         NSHUT
0/RSP1/CPU0        A9K-RSP5-TR(Active)         IOS XR RUN         NSHUT
0/FT0              ASR-9910-FAN                 OPERATIONAL        NSHUT
0/FT1              ASR-9910-FAN                 OPERATIONAL        NSHUT
0/1/CPU0           A9K-8X100GE-TR               IOS XR RUN         NSHUT
0/FC0              A99-SFC3                     OPERATIONAL        NSHUT
0/FC1              A99-SFC3                     OPERATIONAL        NSHUT
0/FC2              A99-SFC3                     OPERATIONAL        NSHUT
0/FC3              A99-SFC3                     OPERATIONAL        NSHUT
0/FC4              A99-SFC3                     OPERATIONAL        NSHUT
0/PT0              A9K-AC-PEM-V3                OPERATIONAL        NSHUT
```

```
0/PT1             A9K-AC-PEM-V3              OPERATIONAL       NSHUT
```

Use the **admin show alarm** and **show pfm location all**commands to verify no additonal alarms are raised after replacing all the FCs.

Migrating from A99-SFC-S/A99-SFC-T to A99-SFC3-S/A99-SFC3-T Card

Cisco ASR 9906 chassis supports the A99-SFC3-T fabric card and Cisco ASR 9910 chassis supports the A99-SFC3-S fabric card. In this section, SFC refers to A99-SFC-S/A99-SFC-T.

Procedure

Step 1 Remove the SFC card from slot FC0. Follow the procedure explained in the topic Removing and Replacing Cards from the Chassis, on page 254.

Alarms are raised when fabric cards are removed and when the system has a combination of old and new generation fabric cards. These alarms clear when all the fabric cards are replaced.

Step 2 Insert A99-SFC3-T/A99-SFC3-S card in slot FC0. Follow the procedure explained in the topic Replacing Cards in the Chassis, on page 257

Step 3 Wait for A99-SFC3-T/A99-SFC3-S card to come online. Verify the card state is OPERATIONAL using the **show platform** command.

Step 4 Repeat Step1 through Step 3 for migrating remaining FCs from slot FC1 to slot FC4.

Example:

```
 Router# show platform
Node               Type                         State             Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0        A9K-RSP5-TR(Standby)          IOS XR RUN         NSHUT
0/RSP1/CPU0        A9K-RSP5-TR(Active)         IOS XR RUN         NSHUT
0/FT0              ASR-9910-FAN                 OPERATIONAL        NSHUT
0/FT1              ASR-9910-FAN                 OPERATIONAL        NSHUT
0/1/CPU0           A9K-8X100GE-TR               IOS XR RUN         NSHUT
0/FC0              A99-SFC3-S                   OPERATIONAL        NSHUT
0/FC1              A99-SFC3-S                   OPERATIONAL        NSHUT
0/FC2              A99-SFC3-S                   OPERATIONAL        NSHUT
0/FC3              A99-SFC3-S                   OPERATIONAL        NSHUT
0/FC4              A99-SFC3-S                   OPERATIONAL        NSHUT
0/PT0              A9K-AC-PEM-V3                OPERATIONAL        NSHUT
0/PT1              A9K-AC-PEM-V3                OPERATIONAL        NSHUT
```

Use the **admin show alarm** and **show pfm location all** commands to verify no additonal alarms are raised after replacing all the FCs.

Removing a Chassis from the Equipment Rack

Follow these steps to remove the chassis and its components from the equipment rack:

Procedure

Step 1 Power off the router (see Powering Off the Router, on page 230).

Caution
You must use two people to remove the chassis from the equipment rack safely. An empty chassis can weigh up to approximately 300 pounds (136 kg).

Step 2 Power off the circuit breakers to the power supplies.

Step 3 Disconnect the power from the power modules on the rear of the chassis.

Step 4 Disconnect the supplemental bonding and grounding connection from the chassis (see Supplemental Bonding and Grounding Connections).

Step 5 Remove the fan tray (see Removing and Replacing the Fan Trays, on page 237).

Step 6 Disconnect RSP/RP cables connected to the console port, auxiliary port, or either of the management Ethernet ports. Be sure to label each of the RSP/RP cables before you disconnect the cables.

Step 7 Disconnect any cables connected to the external alarm port on the alarm display.

Label each of the alarm display cables before you disconnect the cables.

Step 8 Disconnect the line card interface cables.

Step 9 Remove the RSP cards, RP cards, FCs, and LCs from the chassis (see Removing and Replacing Cards from the Chassis, on page 254).

Step 10 Remove the chassis air filter (see Replacing the Chassis Air Filter, on page 230).

Step 11 Remove the chassis from the rack.

a) Using the side handles to support the weight of the chassis, remove the screws that attach the chassis rack mount flanges and the side rack mount brackets to the rack posts.
b) Carefully lift the chassis out of the rack and set it aside.
c) Use the rear handle on the Cisco ASR 9922 Router to push the chassis out of the rack and onto an adjacent pallet jack for transport.

Packing a Chassis for Shipment

Use the packaging that came with the replacement chassis to repack and ship the chassis being replaced.

Before shipping the chassis being replaced, pack the chassis back into the shipping rack (see Unpacking the Router).

Installing a Replacement Chassis in the Equipment Rack

Follow these steps to install the replacement chassis and components in the equipment rack:

Procedure

Step 1 Install the new chassis in the rack (see Rack-Mounting the Router Chassis).

Step 2 Install the power modules (see Removing and Replacing Power System Components, on page 239).

Step 3 Install the fan tray (see Removing and Replacing the Fan Trays, on page 237).

Step 4 Install the RSP cards, RP cards, FCs, and LCs. (see Removing and Replacing Cards from the Chassis, on page 254).

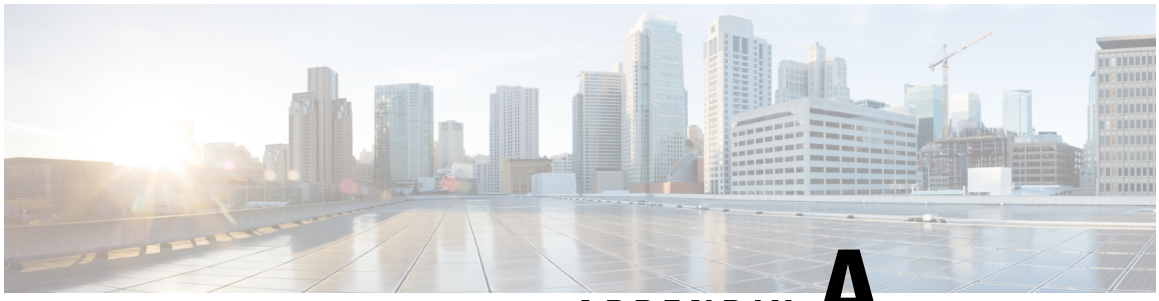
Step 5 Install the chassis air filter (see Replacing the Chassis Air Filter, on page 230).

Step 6 Connect all line card and interface cables (see Connecting Line Card Network Interface Cables).

Step 7 Connect the supplemental bonding and grounding connection (if there is one) to the chassis (see Supplemental Bonding and Grounding Connections).

Step 8 Connect power to the power trays on the rear of the chassis.

Step 9 To turn on power to the router, see Powering On the Router .



APPENDIX A

Technical Specifications

- Technical Specifications, on page 287

Technical Specifications

For more information on Cisco ASR 9000 Series Aggregation Services Routers, see Technical Specifications in the Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide.

Technical Specifications



APPENDIX **B**

Site Log

The site log provides a historical record of all actions relevant to the operation and maintenance of the router. Keep your site log in a convenient place near the router where anyone who performs the maintenance has access to it.

Site log entries might include the following:

- Installation progress—Make entries in the site log to record installation progress. Note any difficulties and remedies during the installation process.
- Upgrades or removal and replacement procedures—Use the site log as a record of router maintenance and expansion history.

Each time a procedure is performed on the router, update the site log to show the following:

-
    - Any field replaceable unit (FRU) that is installed, removed, or replaced
    - Any router configuration changes
    - Software upgrades
    - Corrective or preventive maintenance procedures performed
    - Intermittent problems
    - Related comments

The following page shows a sample site log format. You can make copies of the sample or design your own site log page to meet the needs of your site and equipment.

Date	Description of Action Performed or Symptoms Observed	Initials

- Site Log, on page 290

Site Log

The site log provides a historical record of all actions relevant to the operation and maintenance of the router. Keep your site log in a convenient place near the router where anyone who performs the maintenance has access to it.

Site log entries might include the following:

- Installation progress—Make entries in the site log to record installation progress. Note any difficulties and remedies during the installation process.
- Upgrades or removal and replacement procedures—Use the site log as a record of router maintenance and expansion history.

Each time a procedure is performed on the router, update the site log to show the following:

- - Any field replaceable unit (FRU) that is installed, removed, or replaced
  - Any router configuration changes
  - Software upgrades
  - Corrective or preventive maintenance procedures performed
  - Intermittent problems
  - Related comments

The following page shows a sample site log format. You can make copies of the sample or design your own site log page to meet the needs of your site and equipment.

Date	Description of Action Performed or Symptoms Observed	Initials