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Cisco ASR 9000 Series Aggregation Services Router Satellite Systems Installation Guide

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CHAPTER 4

Preface

This guide describes how to install a Cisco ASR 9000 Series Aggregation Services Satellite System.

Audience

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

This publication assumes that the user has a substantial background in installing and configuring router- and switch-based hardware. The reader should also be familiar with electronic circuitry and wiring practices and have experience as an electronic or electromechanical technician.

Documentation Conventions

Note   *Means reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Tip   *Means the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

Caution   *Means reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

![warning symbol]

Warning IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

![warning symbol]

Warning Statements using this symbol are provided for additional information and to comply with regulatory and customer requirements.

Convention	Description
bold font	Commands and keywords and user-entered text appear in **bold** font.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
[ ]	Elements in square brackets are optional.
{x | y | z}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
courier font	Terminal sessions and information the system displays appear in courier font.
	Indicates a variable for which you supply values, in context where italics cannot be used.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Related Documentation

For more information on the Cisco ASR 9000 Series Aggregation Services Router, see additional documents found at http://www.cisco.com/en/US/products/ps9853/prod_installation_guides_list.html.

Changes to This Document

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

Table 1: Changes to This Document

Date	Summary
October 2014	Added support for new optics added in IOS XR Release 5.2.2 and new PIDs for cost optimized satellite.
June 2014	Added support for new optics added in IOS XR Release 5.2.0.
January 2014	Added information about Cisco ASR 9000v satellite shelf with 24 V DC power module for ANSI standard. Added procedure for installing optional air baffle accessory kit on ASR 9000v and ASR 903.
September 2013	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.
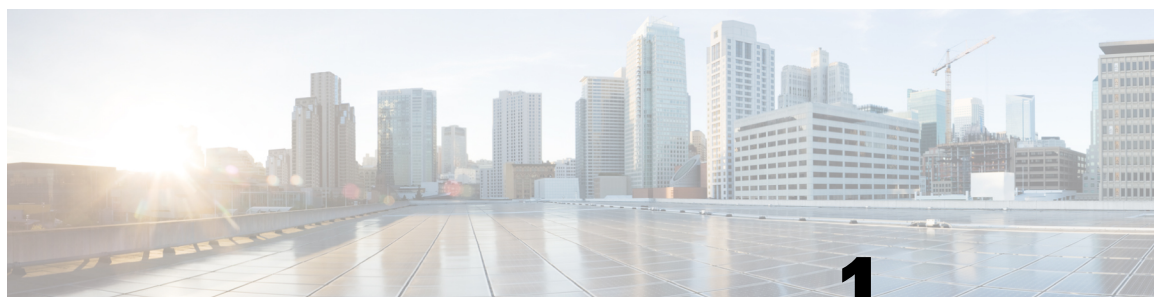
CHAPTER 1

Overview

The Cisco ASR 9000v, Cisco ASR 901 Mobile Wireless Router, and Cisco ASR 903 Router are supported as satellite systems with the Cisco ASR 9000 Series, as described in this table.

Table 2: Routers Supported as Satellite Systems with the Cisco ASR 9000 Series

Cisco IOS XR Release	Description
5.2.2	Introduced support for the Cisco ASR 9000v version 2 satellite shelf with the Cisco ASR 9000 Series.
4.3.2	Introduced support for the Cisco ASR 9000v satellite shelf with the Cisco CRS Line Card Chassis in the following systems: • Cisco CRS 8-slot Line Card Chassis in a back-to-back system • Cisco CRS 16-slot Line Card Chassis in a back-to-back system • Cisco CRS 16-slot Line Card Chassis in a multishelf system
4.3.1	Introduced support for the Cisco ASR 9000v satellite shelf with the Cisco CRS Line Card Chassis (in the 8-slot or 16-slot variation).
4.3.0	Introduced support for the Cisco ASR 901 Mobile Wireless Router and the Cisco ASR 903 Router as satellite systems with the Cisco ASR 9000 Series.
4.2.1	Introduced the Cisco ASR 9000v as a satellite system with the Cisco ASR 9000 Series.

Note   Throughout this document, the generic term Cisco ASR 9000v satellite shelf refers to the Cisco ASR 9000v satellite shelf (ASR-9000V-AC, ASR-9000V-DC-A, ASR-9000v-24-A, and ASR-9000V-DC-E) and the Cisco ASR 9000v version 2 satellite shelf (A9KV-V2-DC-A and A9KV-V2-DC-E), unless otherwise specified.

For more information on the Cisco ASR 9000 Series, see the Cisco ASR 9000 Series Aggregation Services Router Hardware Installation Guide and the Cisco ASR 9000 Series Aggregation Services Router Overview and Reference Guide.

For more information on the Cisco CRS Line Card Chassis, see the http://www.cisco.com/c/en/us/support/routers/carrier-routing-system/products-installation-guides-list.html Cisco CRS Carrier Routing System Installation Guides.

For Cisco IOS XR software Ethernet port configuration and command information, see the Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Command Reference and the *Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Configuration Guide* .

For information specific to Cisco IOS XR software, see the Release Notes for Cisco ASR 9000 Series Aggregation Services Routers for Cisco IOS XR Software .

Power Supply Safety Precautions

Observe the following general safety precautions and recommendations in planning the source power requirements for the Cisco ASR 9000v, Cisco ASR 901, and Cisco ASR 903 routers:

- Check the power at your site before router installation (and periodically after installation) to ensure that clean power (free of spikes and noise) is being received.
- Always disconnect the power source and unplug the power cable before working on the router.
- Install proper grounding for the site to avoid damage from lightning and power surges.

Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021

Warning There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015

Warning This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Cisco ASR 9000v Satellite Shelf Hardware Description

The Cisco ASR 9000v satellite shelf is designed to comply with Telcordia GR-1089-CORE, Issue 4. The Cisco ASR 9000v satellite shelf provides only Type 2 and Type 4 interfaces. A single Cisco ASR 9000v satellite shelf supports both ANSI and ETSI standards.

The Cisco ASR 9000v satellite shelf has 44 Gigabit Ethernet (GE) SFP ports and 4 10-GE SFP+ ports, which can be connected to the following line cards that support 10-GE interfaces:

- The 24-port 10-GE SE or 24-port 10-GE TR line card
- The 36-Port 10-GE SE or 36-Port 10-GE TR line card
- The 80-GB modular line card when populated with 4-port 10-GE Modular Port Adapters (MPAs) or 2-port 10-GE MPAs
- The 160-GB modular line card when populated with 8-port 10-GE MPAs, 4-port 10-GE MPAs, or 2-port 10-GE MPAs
- The line cards that support 10-GE interfaces on the Cisco ASR 9922 Aggregation Services Router
- The line cards that support 10-GE interfaces on the Cisco ASR 9001 Aggregation Services Router
- The line cards that support 10-GE interfaces on the Cisco CRS Carrier Routing System 16-Slot Line Card Chassis and the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis

    - CRS MSC-140G or FP-140G
    - 14-port 10-GE XFP PLIM
    - 20-port 10-GE XFP PLIM

For more information on the 10-GE line cards supported on the Cisco ASR 9000 Series Aggregation Services Router family, including the Cisco ASR 9922 Aggregation Services Router, see the Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide .

For more information on the 10-GE line cards supported on the Cisco ASR 9001 Aggregation Services Router, see the Cisco ASR 9001 Aggregation Services Router Hardware Installation Guide .

For more information on the 10-GE line cards supported on the Cisco CRS Carrier Routing System 16-Slot Line Card Chassis and the Cisco CRS Carrier Routing System 8-Slot Line Card Chassis, see the Cisco CRS Carrier Routing System Ethernet Physical Layer Interface Module Installation Note .

The Cisco ASR 9000v satellite shelf is one rack unit high. The Cisco ASR 9000v satellite shelf is typically connected to a fuse panel to provide distributed power for the Cisco ASR 9000v satellite shelf. The fuse panel is third-party equipment and is not described in this documentation. If you are unsure about the requirements or specifications for a fuse, consult the user documentation for the related equipment.

The Cisco ASR 9000v satellite shelf cannot operate independently. After connecting the Cisco ASR 9000v satellite shelf to the Cisco ASR 9000 Router or the Cisco CRS Line Card Chassis, the Cisco ASR 9000v satellite shelf is automatically discovered and registered.

The Cisco ASR 9000v satellite shelf supports Gigabit Ethernet and Fast Ethernet for ports numbered 0 to 43. Ports numbered 0 to 3 support 10 Gigabit Ethernet. By default, the four 10-GE ports numbered 0 to 3 are in IC mode and cannot be changed. The Cisco ASR 9000v satellite shelf also supports copper ports via copper SFPs and Active Cable copper SFP+ pluggables.

The Cisco ASR 9000v satellite shelf has redundant DC feeds. The Cisco ASR 9000v satellite shelf DC power supply can handle 48 V and 24 V. The 48-V power supply has both ANSI and ETSI versions. The 24-V power supply has ANSI version only.

The Cisco ASR 9000v satellite shelf has a removable fan tray and a local console port for onsite access and debugging.

Cisco ASR 9000v Satellite Shelf Faceplates

There are seven variations of the Cisco ASR 9000v satellite shelf faceplate:

- Cisco ASR 9000v satellite shelf with AC power. See Figure 1: Cisco ASR 9000v Satellite Shelf with AC Power Faceplate, on page 4.
- Cisco ASR 9000v satellite shelf with DC ETSI 48 V. See Figure 2: Cisco ASR 9000v Satellite Shelf with DC ETSI 48-V Faceplate, on page 4.
- Cisco ASR 9000v satellite shelf with DC ANSI 24V. See Figure 3: Cisco ASR 9000v Satellite Shelf with DC ANSI 24-V Faceplate, on page 4.
- Cisco ASR 9000v satellite shelf with DC ANSI 48 V. See Figure 4: Cisco ASR 9000v Satellite Shelf with DC ANSI 48-V Faceplate, on page 4.
- Cisco ASR 9000v version 2 satellite shelf with AC power. Cisco ASR 9000v satellite shelf with AC power and Cisco ASR 9000v version 2 satellite shelf with AC power are similar. See Figure 1: Cisco ASR 9000v Satellite Shelf with AC Power Faceplate, on page 4.
- Cisco ASR 9000v version 2 satellite shelf with DC ETSI 48 V. Cisco ASR 9000v satellite shelf with DC ETSI 48 V and Cisco ASR 9000v version 2 satellite shelf with DC ETSI 48 V are similar. See Figure 2: Cisco ASR 9000v Satellite Shelf with DC ETSI 48-V Faceplate, on page 4.
- Cisco ASR 9000v version 2 satellite shelf with DC ANSI 48 V. Cisco ASR 9000v satellite shelf with DC ANSI 48 V and Cisco ASR 9000v version 2 satellite shelf with DC ANSI 48 V are similar. See Figure 4: Cisco ASR 9000v Satellite Shelf with DC ANSI 48-V Faceplate, on page 4.

Figure 1: Cisco ASR 9000v Satellite Shelf with AC Power Faceplate
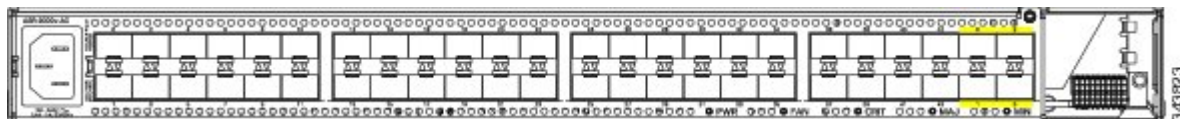
Figure 2: Cisco ASR 9000v Satellite Shelf with DC ETSI 48-V Faceplate
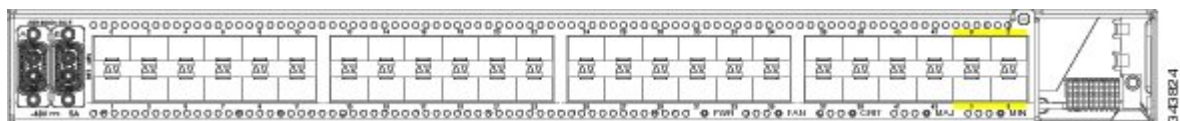
Figure 3: Cisco ASR 9000v Satellite Shelf with DC ANSI 24-V Faceplate
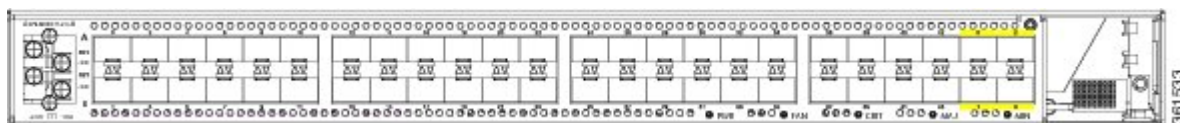
Figure 4: Cisco ASR 9000v Satellite Shelf with DC ANSI 48-V Faceplate
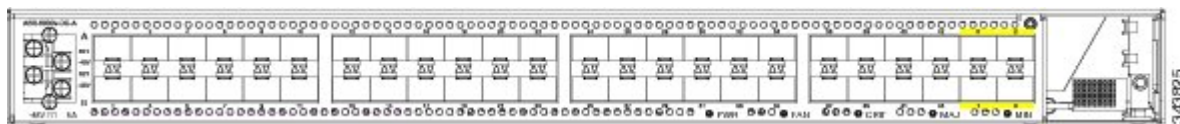
Cisco ASR 9000v Satellite Shelf Card–Level Indicators

This table describes the LEDs on the Cisco ASR 9000v satellite shelf cards.

Table 3: Cisco ASR 9000v Satellite Shelf Card–Level Indicators

Card-Level LED	Description
PWR	Indicates the status of the power to the card. If there is a power failure, this LED turns red.
FAN	Indicates the status of the fan to the card. If there is a fan failure, this LED turns red.
CRIT	Indicates the critical alarms in the network at the local terminal.
MAJ	Indicates the major alarms in the network at the local terminal.
MIN	Indicates the minor alarms in the network at the local terminal.

SFP Interface LEDs

This table gives information about the LEDs on the SFP interface.

Table 4: SFP LEDs

LED	Color/State	Description
SFP Link/Active (labeled LINK ACT)	Orange	Link and active indicator
	Off	Link not enabled

Power Module

The Cisco ASR 9000v satellite shelf is available in four variations based on the power module:

- Cisco ASR 9000v satellite shelf with an AC power module for ANSI and ETSI standards
- Cisco ASR 9000v satellite shelf with a DC power module (24 V) for ANSI standard
- Cisco ASR 9000v satellite shelf with a DC power module (48 V) for ANSI standard
- Cisco ASR 9000v satellite shelf with a DC power module (48 V) for ETSI standard

The Cisco ASR 9000v version 2 satellite shelf is available in three variations based on the power module:

- Cisco ASR 9000v version 2 satellite shelf with an AC power module for ANSI and ETSI standards
- Cisco ASR 9000v version 2 satellite shelf with a DC power module (48 V) for ANSI standard
- Cisco ASR 9000v version 2 satellite shelf with a DC power module (48 V) for ETSI standard

Note Do not remove the top cover of the Cisco ASR 9000v satellite shelf.

Cisco ASR 9000v Satellite Shelf with an AC Power Module

The AC power module converts the AC input current to DC output current. The AC power module has one AC single phase with 3- pole (line L, Neutral N, and Protective Earth PE) input connector.

Cisco ASR 9000v Satellite Shelf with a DC Power Module

The Cisco ASR 9000v satellite shelf with a DC power module can be powered by redundant DC power lines, however a single power line can power the entire Cisco ASR 9000v satellite shelf.

The Cisco ASR 9000v satellite shelf with DC power module (24 V) for ANSI standard has single terminal block with four poles: –24V, RET for power terminals A and B.

The Cisco ASR 9000v satellite shelf with DC power module (48 V) for ANSI standard has single terminal block with four poles: –48V, RET for power terminals A and B.

The Cisco ASR 9000v satellite shelf with DC power module (48 V) for ETSI standard has two input battery connectors (two poles): –48V, RET for power terminals A and B.

Cisco ASR 901 Router Hardware Description

Contained in a standard shelf-rack enclosure, the Cisco ASR 901 Router weighs approximately 10 pounds (4 kg). It measures 1.7 inches high x 17.4 inches wide x 8.25 inches deep (4.32 cm [or 1RU] x 44.2 cm x 21.0 cm). These dimensions do not include the rack-mount brackets.

You can mount the router in a standard (ETSI) 19-inch (48.3 cm) equipment rack, a 600-mm ETSI rack, or a 23-inch ETSI rack.

The Cisco ASR 901 Router as a satellite shelf includes the following hardware features:

- Four ports of 100/1000 copper Ethernet including auto-MDIX (RJ-45 connector)
- Four ports of SFP only
- Four combo ports (SFP/copper)
- Dual feed supply with redundant DC inputs plus built-in redundant power supply (RPS)
- Two fans placed in the chassis (fans are redundant)
- Chassis: 1RU, 8.25-inch depth
- Operating temperature range is –40 to +149°F (–40°C to +65°C).
- Side-to-side airflow
- Four solid-state alarm inputs
- A single built-in 1-GB flash memory
- Two management ports: an RS-232 serial console port and a 10/100 BASE-T Ethernet port
- One BITS clock port (RJ-45) and 1 ToD port (RJ-45)
- Two miniature coaxial connectors for 10-Mhz and 1-PPS timing (input or output). You can use these interfaces with an external GPS device to send or receive clocking from the router.
- Two LEDs for each Ethernet port

  - L—Indicates activity, lack of activity, or no link
  - S—Indicates speed (100 or 1000) or off

- One System LED:

  - Solid green—System healthy (normal operation)
  - Solid red—System faulty

Cisco ASR 901 Router Ethernet Version Front View

The figure below shows the front view of the Cisco ASR 901 Router, Ethernet version, with each interface module.

The front panel of the Cisco ASR 901 Router, Ethernet version, has the following components:

- Eight RJ-45 jacks for copper Ethernet ports, labeled "100/1000" Ethernet
- Eight SFP connectors for optical GE ports
- Two miniature coaxial connectors for 10-MHz and 1-PPS timing
- A single RJ-45 connector for console, labeled "CONSOLE"
- A single RJ-45 jack for the BITS interface, labeled "BITS"
- A single RJ-45 jack for the ToD interface, labeled "ToD"
- A single alarm
- Two management ports
- The following LEDs:

    - Ethernet ports
    - SFP ports
    - Chassis: Single LED for multiple conditions
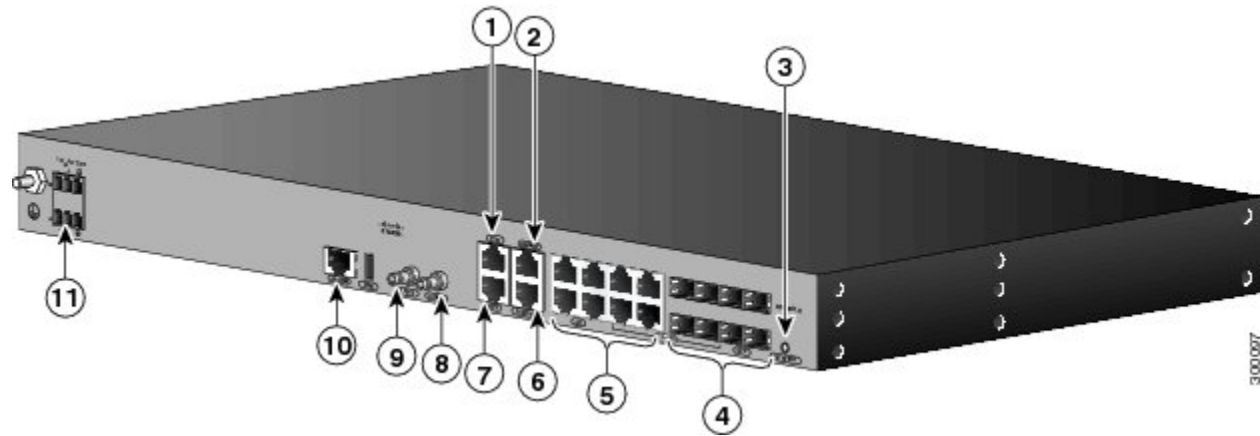
1	ToD Port	7	BITS Port
2	Management Port	8	MINI-Coax Connector (1 PPS)
3	Power LED	9	MINI-Coax Connector (10 MHz)
4	8 SFP Ports	10	Alarm
5	8 GE Ports	11	Power Connector
6	Console Port		

The Cisco ASR 901 Router as a satellite shelf has 16 Gigabit Ethernet (8 RJ-45, 8 SFP) ports and one 10 Gigabit Ethernet SFP+ port. When running Cisco IOS XR software release 4.3 or 4.3.1, the Cisco ASR 901 Router as a satellite shelf can be connected to the following line cards that support Gigabit Ethernet interfaces:

- 40-port GE line card

• 40-port GE extended line card
• 40-port GE low queue line card
• Line cards that support Gigabit Ethernet interfaces on the Cisco ASR 9922 Aggregation Services Router
• Line cards that support Gigabit Ethernet interfaces on the Cisco ASR 9001 Aggregation Services Router

Note   Only the last two SFP Gigabit Ethernet ports on the Cisco ASR 901 Router as a satellite shelf can support ICL (Inter-Chassis Link) mode.

Cisco ASR 901 Router Rear View

This figure below shows the rear view of the Cisco ASR 901 Router including the orientation of the following components:

• Two blowing fans
• Mounting point for the 2-hole lug

Figure 5: Cisco ASR 901 Router—Rear View
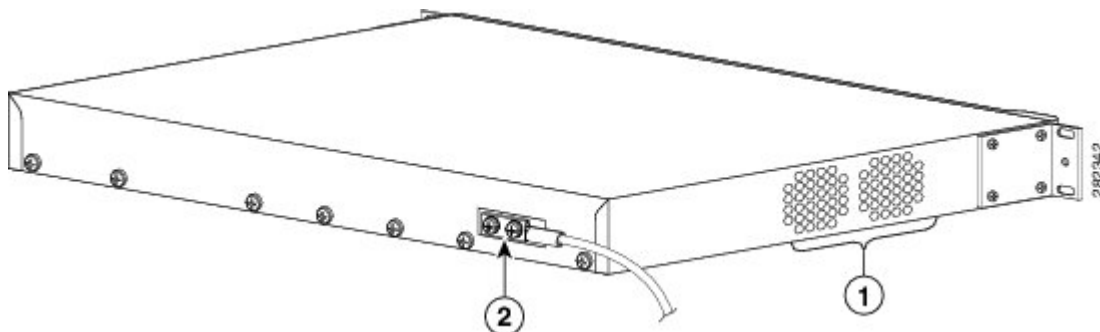
| 1 | Fan |
| 2 | Grounding point lug |

LEDs

The Cisco ASR 901 chassis and interface modules contain LEDs to assist in troubleshooting.

Chassis LEDs

This table summarizes the LEDs on the chassis of the Cisco ASR 901 router. These LEDs are common to the Cisco ASR 901 router used as a satellite shelf.

Table 5: LED Summary

LED	Color/State	Port Type	Description
Copper GE ports (from GE/FE Quad PHY) contain two LEDS each.			

LED	Color/State	Port Type	Description
RJ-45 Link L	Solid green	PHY	Link with no activity
	Flashing green		Link with activity
	Off		No link
RJ-45 Speed S	Green	PHY	Speed 1000
	Off		Off
Copper GE (from Quad combo PHY) ports contain two LEDS each.			
RJ-45 Link L	Solid green	PHY	Link with no activity
	Flashing green		Link with activity
	Off		No link
RJ-45 Speed S	Green	PHY	Speed 1000
	Off		Off
System LED			
System	Off	HP	No power or unit not booted
	Alternating green/off		POST in progress
	Solid green		System healthy (normal operation
	Solid red		System faulty
SFP LED			
SFP Link-Active L-A	Orange	HP	Link and active indicator
	Off		Not enabled

SFP Ethernet Interface LEDs

This table gives information about the LEDs on the SFP interface.

Table 6: SFP LEDs

LED	Color/State	Description
SFP Link/Active (labeled LINK ACT)	Orange	Link and active indicator
	Off	Link not enabled

RJ-45 Ethernet Interface LEDs

This table summarizes the LEDs on the RJ-45 Ethernet interface.

Table 7: 100/1000 Ethernet Port LEDs

LED	Color/State	Description (Two LEDs for Each 100/1000 Ethernet Port)
100/1000 RJ-45 link (labeled L, left LED)	Solid Green	Link with no activity
	Flashing Green	Link with activity
	Off	No link detected
100/1000 RJ-45 speed (labeled S, right LED)	Green	Speed 1000
	Yellow	Speed 100
	Off	Off

Regulatory Compliance

For regulatory compliance and safety information, see Cisco Regulatory Compliance and Safety Information for Cisco ASR 901 Series Aggregation Services Router.

Where to Go Next

For more information on installing the Cisco ASR 901 Series Aggregation Services Router as a satellite shelf, see Chapter 3, "Installing the Cisco ASR 901 Mobile Wireless Router as a Satellite Shelf."

Cisco ASR 903 Router Hardware Description

The Cisco ASR 903 Router has the following hardware features:

- 3-RU modular chassis designed for installation in a 300-mm European Telecommunications Standards Institute (ETSI) cabinet
- Dedicated slots in the chassis that support the following:
    - Up to six interface modules
    - Up to two Route Switch Processors (RSPs)

Note When configured as an ASR 903v satellite shelf, the Cisco ASR 903 Router supports only one Route Switch Processor (RSP).

- • Up to two AC power supply units

or

- • Up to two DC power supply units

> **Note**   You cannot mix AC and DC power supply units in the Cisco ASR 903 Router.

- • One fan tray
- Network frequency, phase, and time inputs and outputs for network interfaces (SyncE and TDM), BITS, 1 PPS or 10 MHz, and Timing over Packet (IEEE 1588-2008)

> **Note**   When configured as a satellite shelf, the Cisco ASR 903 Router does not support SyncE and timing features.

- Adjustable front and rear rail mounting locations
- Front panel access to power supplies, fan tray, RSPs, and interface modules
- Online insertion and removal (OIR) of power supplies and fan tray
- Discrete status LEDs on power supply, interface module, RSP, and fan tray units
- Four alarm dry contact inputs (either normally open or normally closed)
- Environmental monitoring and reporting functions
- LED indicators for critical, major, and minor alarms
- Side-to-side forced air cooling
- Temperature range of –40 to +149 °F (–40 to 65°C) with DC power supply
- Temperature range of –32 to +104 °F (0 to 40°C) with AC power supply

Cisco ASR 903 Router Front View

This figure illustrates the Cisco ASR 903 Router chassis design.

Figure 6: Cisco ASR 903 Chassis Design
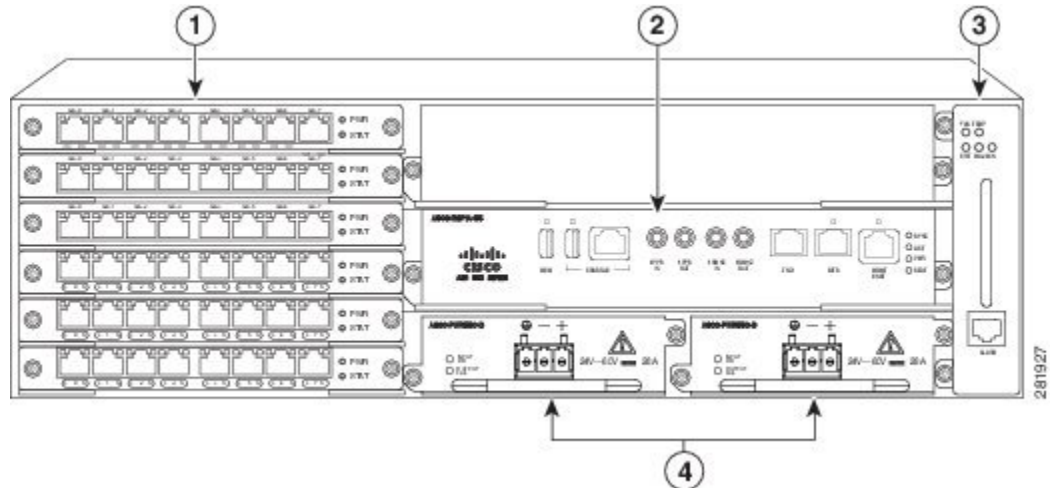
1	Interface modules	3	Fan tray
2	RSP unit	4	Redundant power units (two DC power units shown)

The Cisco ASR 903 Router as a satellite shelf supports the following Ethernet interface modules:

- 8-Port Gigabit Ethernet SFP Interface Module
- 8-Port Gigabit Ethernet RJ-45 Interface Module
- 1-Port 10 Gigabit Ethernet XFP Interface Module

The Cisco ASR 903 Router as a satellite shelf can support up to two 10 Gigabit Ethernet XFP ports (restricted to slots 0 and 1) and up to 31 Gigabit Ethernet (either RJ-45 or SFP) ports (8-port interface modules in slots 2 through 5). In slot 5, only seven ports can be activated. Port 0 on slot 5 cannot be used as a satellite port because it is used for the internal FPGA. The two 10 Gigabit Ethernet XFP ports can be used as ICL ports when they are connected to the following line cards that support 10 Gigabit Ethernet interfaces:

- 24-port 10-GE SE or 24-port 10-GE TR line card
- 36-Port 10-GE SE or 36-Port 10-GE TR line card
- 80-GB modular line card when populated with 4-port 10-GE Modular Port Adapters (MPAs) or 2-port 10-GE MPAs
- 160-GB modular line card when populated with 4-port 10-GE MPAs or 2-port 10-GE MPAs
- Line cards that support 10 Gigabit Ethernet interfaces on the Cisco ASR 9922 Aggregation Services Router
- Line cards that support 10 Gigabit Ethernet interfaces on the Cisco ASR 9001 Aggregation Services Router

LEDs

The following sections describe the meanings of the LEDs on the Cisco ASR 903 Router satellite shelf.

RSP LEDs

This table summarizes the RSP LEDs.

Note A major alarm condition indicates the failure of a single fan in the fan tray; a critical alarm indicates the failure of multiple fans. If a single fan fails, the Cisco ASR 903 Router satellite shelf software adjusts the fan speed to prevent excessive heat within the chassis.

Table 8: RSP LEDs

LED	Color/State	Description (Two LEDs for Each T1/E1 Port)
Power (PWR)	Off	Disabled/no power to RSP
	Green	Power rails on RSP in range
Status (STAT)	Off	Disabled/power down
	Red	Failure to boot (lit at reset)
	Yellow	Rommon booted
	Green	Cisco IOS software booted and running

LED	Color/State	Description (Two LEDs for Each T1/E1 Port)
Active (ACTV)	Off	Not available
	Yellow	Standby (indicates standby RSP)
	Green	Active (indicates active RSP)
Management port (MGMT)	Off	No connection
	Green	Connected with no activity
	Flashing green	Connected with activity
Sync status (SYNC)	Off	Not enabled
	Yellow	Free run
	Flashing yellow	Holdover
	Green	Locked to source
USB flash (MEM)	Flashing green	USB activity
BITS	Off	Out of service/not configured
	Amber	Fault or loop condition
	Green	In frame/working properly

Interface Module LEDs

This table below summarizes the interface module LEDs. This LED summary applies to the following interface modules:

- SFP Gigabit Ethernet Interface Module

- RJ-45 Gigabit Ethernet Interface Module

- XFP 10 Gigabit Ethernet XFP Interface Module

Table 9: Interface Module LEDs

LED	Color/State	Description
Power (PWR)	Off	Disabled/no power to IM
	Green	Enabled and power rails on IM in range

LED	Color/State	Description
Status (STAT)	Off	Disabled/power-down
	Red	Failure (on at reset)
	Amber	Booting (if local CPU)
	Green	Operational
Link status (L)	Off	Inactive or no connection
	Amber	Fault/loop condition
	Green	Ok with no activity
	Flashing green	OK with activity
Speed (S)	Off	100/10 Mbps/Slow
	Green	1 Gbps/Full

Power Supply LEDs

These tables below summarize the power supply LEDs for the AC and DC power supplies.

Table 10: AC Power Supply LEDs

LED	Color/State	Description
Input OK	Off	No input voltage
	Amber	Input voltage out of range
	Green	Input voltage within acceptable operating range
Output Fail	Off	Disabled/Forced shut down/No input power
	Red	Power supply fault (internal failure such as overtemperature)
	Green	Operational

Table 11: DC Power Supply LEDs

LED	Color/State	Description
Input Power (PWR)	Off	No input voltage
	Amber	Input voltage out of range
	Green	Input voltage within acceptable operating range

LED	Color/State	Description
Status (STAT)	Off	Disabled/power down/no power
	Red	Power supply fault (internal failure)
	Green	Operational

Fan Tray LEDs

This table summarizes the fan tray LEDs.

Table 12: Fan Tray LEDs

LED	Color/State	Description
Status (TEMP)	Off	Disabled/power down
	Amber	Overtemperature
	Green	OK
Fan (FAN)	Green	Fan rotation in range
	Amber	Fan fault
	Red	Two or more fan faults
Minor (MIN)	Off	No minor alarm
	Amber	Minor alarm
Major (MAJ)	Off	No major alarm
	Red	Major alarm

Where to Go Next

For more information on installing the Cisco ASR 903 Series Aggregation Services Router as a satellite shelf, see Chapter 4, "Installing the Cisco ASR 903 Router as a Satellite Shelf."

CHAPTER 2

Installing and Maintaining the Cisco ASR 9000v Satellite Shelf

This chapter describes how to install the Cisco ASR 9000v satellite shelf. It contains the following sections:

Electrostatic Discharge

This section explains best practices to be followed to prevent electrostatic discharge (ESD) damage, which can occur when the equipment is improperly handled.

Before locating and grounding any chassis, you must complete the following prerequisites:

Preparing Your Location

This section illustrates how the building that houses the chassis must be properly grounded to the earth ground.

Warning	This product requires short-circuit (overcurrent) protection to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045.

Warning	A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022.

Figure 7: Building with Rack Room Connected to Earth Ground
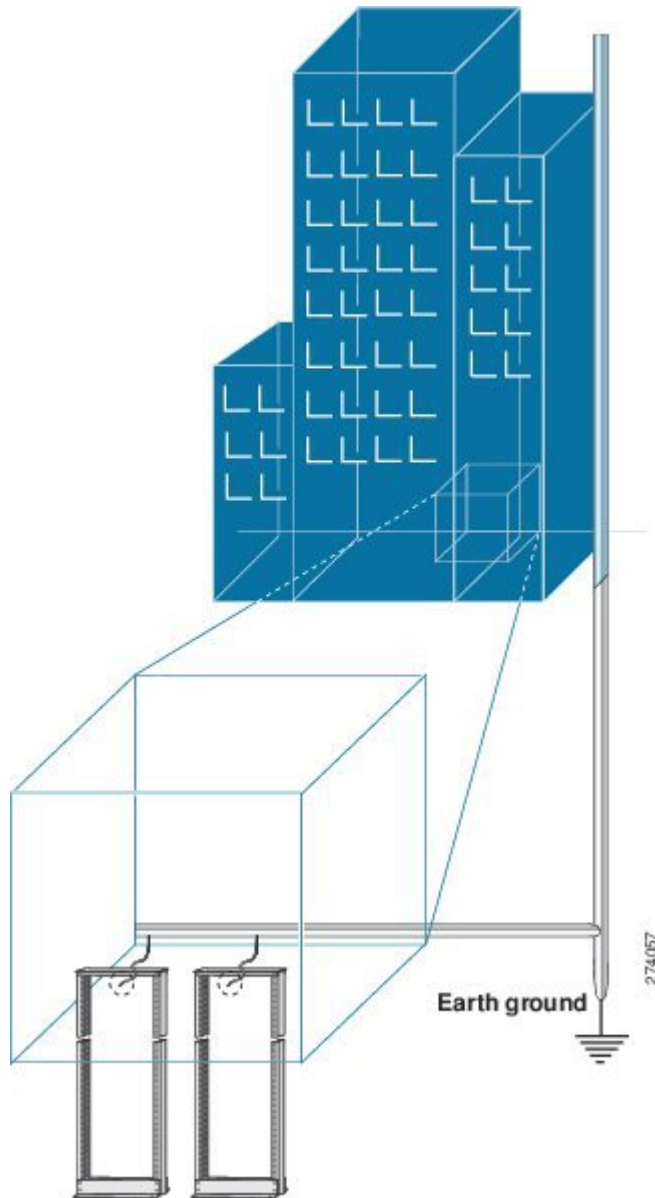
Preparing the Rack Room

This section explains how the rack enclosures must be properly connected to the building earth ground. It also illustrates how to keep the chassis in a sealed antistatic bag until you are ready to install it. (See figure below.)

⚠️

Danger   Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003.

Figure 8: Rack Room Connected to Earth Ground

Earth ground

Chassis protected
in antistatic bag
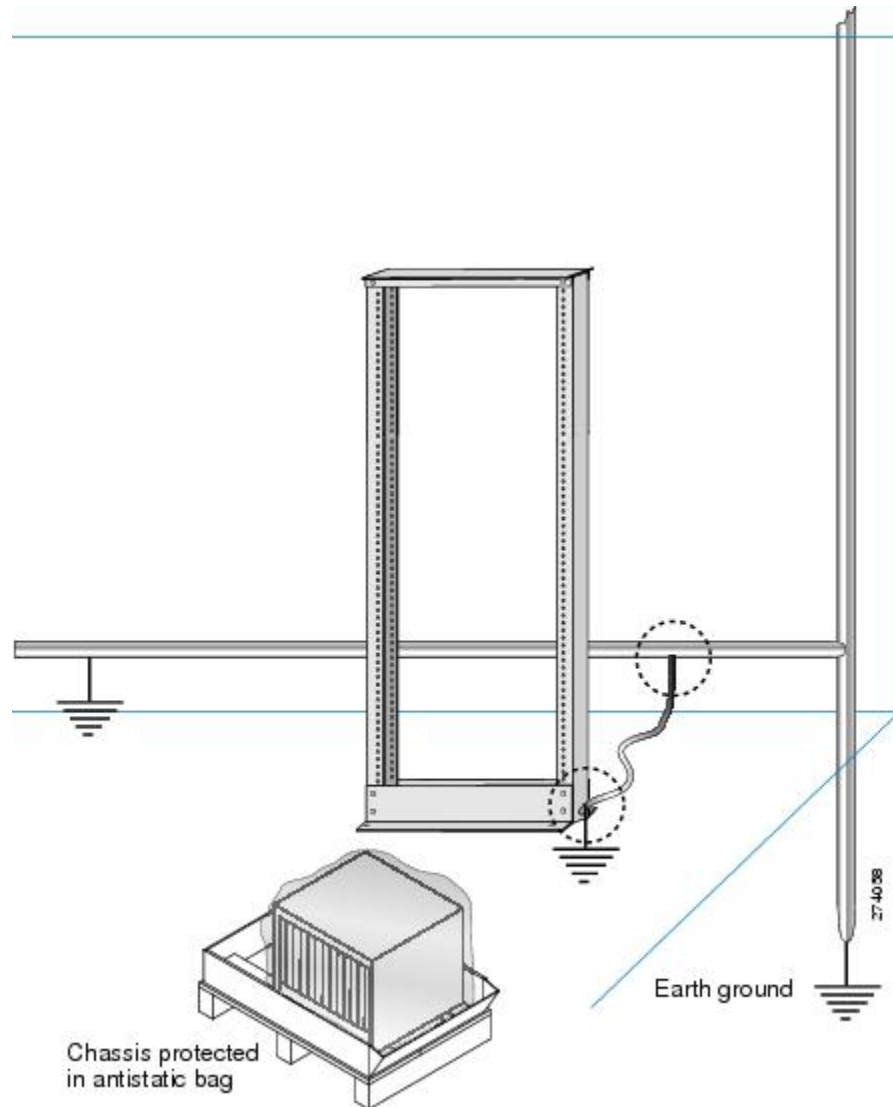
Preparing Yourself

This section illustrates how to prepare yourself before removing the chassis from the sealed antistatic bag. This figure illustrates how to cuff the ESD strap around the wrist and the ground cord that connects the cuff to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

Figure 9: Wearing the ESD Strap

Earth ground
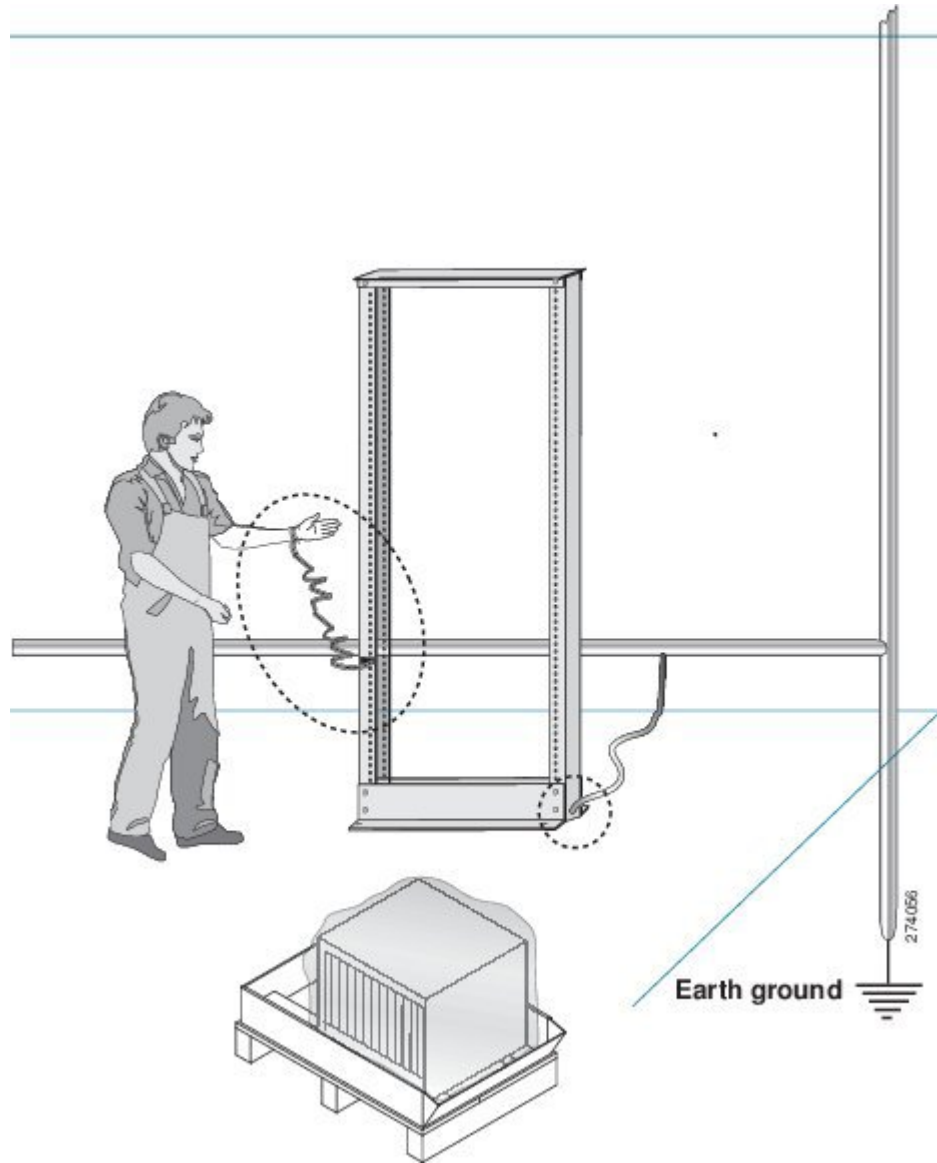
This figure illustrates how you must be properly grounded before handling the chassis.

Figure 10: Handling the Chassis

Earth ground
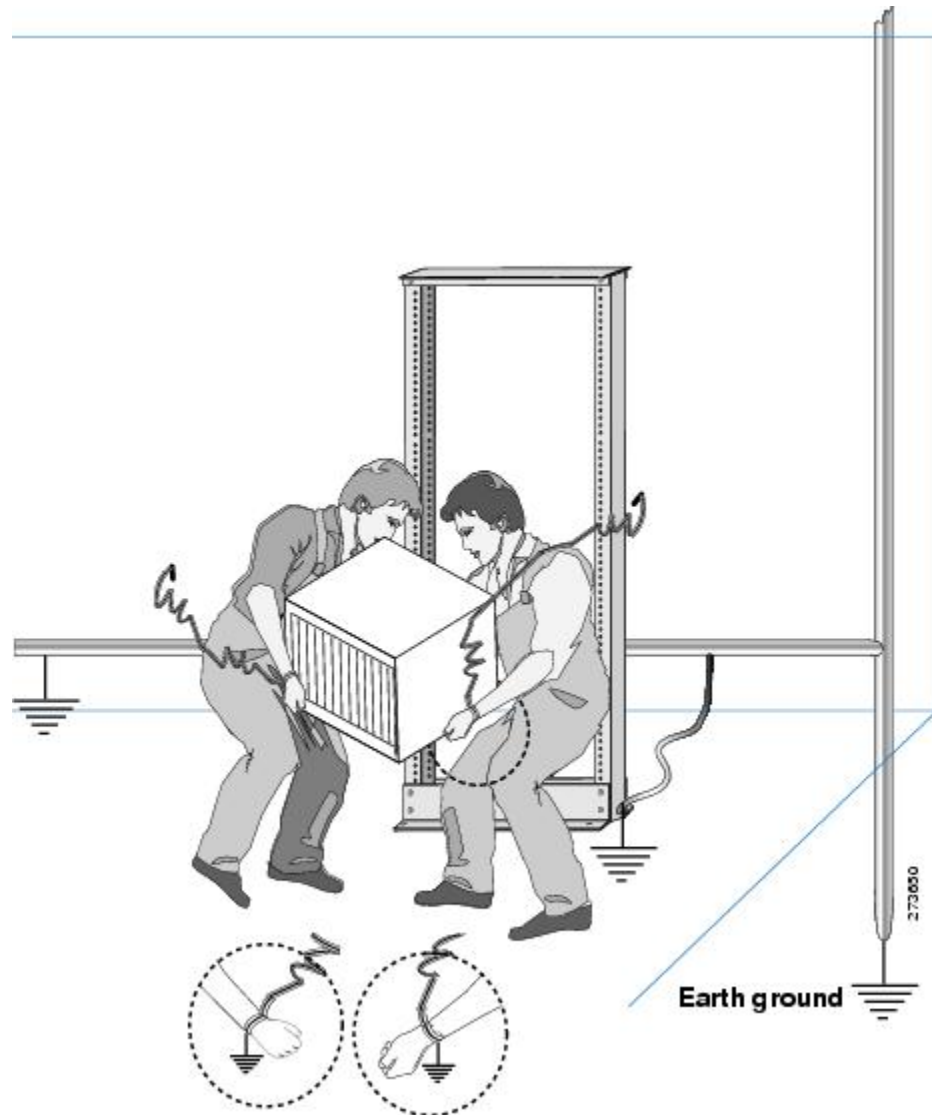
Installing the Cisco ASR 9000v Satellite Shelf

This section explains how to unpack and install the Cisco ASR 9000v satellite shelf.

Important Safety Recommendations

Warning   IMPORTANT SAFETY INSTRUCTIONS: This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

Warning   Installation of the equipment must comply with local and national electrical codes. Statement 1074

Warning   This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Warning   Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Warning   A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022

Note   In this appendix, the term "shelf" refers to the steel enclosure that holds cards and connects power, and the term "node" refers to the entire hardware and software system.

Note   Unless otherwise specified, the term "Cisco ASR 9000v satellite shelf" refers to both ANSI and ETSI environments.

Note   The Cisco ASR 9000v satellite shelf is suitable for installation in network telecommunication facilities where the National Electric Code (NEC) applies.

Required Tools and Equipment

The following sections describe the tools and equipment that you need to install and test the Cisco ASR 9000v satellite shelf.

Cisco Supplied Materials

The following materials are required and are shipped with the Cisco ASR 9000v satellite shelf (wrapped in plastic). The number in parentheses gives the quantity of the item included in the package.

- (Only ANSI) Pair of 19-inch mounting brackets (2)
- (Only ANSI) Pair of 23-inch mounting brackets (2)
- (Only ETSI) Pair of 21-inch mounting brackets (2)
- Cable guides (2)
- Rubber bumpers (4)
- M4 screws to fix brackets (8)
- M4 screws to fix ground lug (2)
- Ground lug (1)
- Power cable (1) (A DC power cable is present in the kit if you have ordered a DC power shelf)

Note   If you have ordered an ASR-9000v-24-A=, ASR-9000v-DC-A, or ASR-9000v-DC-E= shelf, a DC power cable is present in the accessory kit. If you have ordered an ASR-9000v-AC= shelf, an AC power cable is present in the accessory kit.

Caution   Use only the power cables that are designed to be used with the Cisco ASR 9000v satellite shelf. These are sold separately.

Caution   Always use M4 screw to install the ground lug on an ASR 9000v shelf. The part number of this screw is Cisco PN 48-0468-01 and the maximum recommended length is 6 millimeters (mm). If you use any other screw longer than 6 mm, it can lead to a short circuit in the ASR 9000v shelf.

User Supplied Materials

The following materials, tools, and equipment are required but are not supplied with the Cisco ASR 9000v satellite shelf.

- Equipment rack
- M4 Phillips screw driver
- Fuse panel
- Wire cutters
- Wire wrapper
- Voltmeter
- Ground cable #8 AWG stranded, specified for up to 90° Celsius (194° Fahrenheit)
- M3 Phillips screw driver only for the ASR-9000v-24-A=, the ASR-9000v-DC-A=, and the ASR-9000v-DC-E= shelves to secure the DC power cable to the shelf.

Caution   Use only the power cables that are designed to be used with the Cisco ASR 9000v satellite shelf. These are sold separately.

Unpacking and Inspecting the Cisco ASR 9000v Satellite Shelf

Complete the following steps to remove the Cisco ASR 9000v satellite shelf from the package and verify that all parts of the Cisco ASR 9000v satellite shelf assembly are in good condition.

SUMMARY STEPS

1. When you receive the Cisco ASR 9000v satellite shelf equipment at the installation site, open the top of the box. The Cisco Systems logo indicates the top of the box.
2. Remove the foam inserts from the box. The box contains the Cisco ASR 9000v satellite shelf (wrapped in plastic) and other items needed for installation.
3. To remove the Cisco ASR 9000v satellite shelf, grasp both rings of the shelf removal strap and slowly lift the shelf out of the box.
4. Verify that you have all items listed in the Required Tools and Equipment, on page 22 section.
5. Verify the following:
6. Remove the foam inserts from the box. The box contains the Cisco ASR 9000v satellite shelf (wrapped in plastic) and other items needed for installation.
7. If there is any damage, call your Cisco sales engineer for a replacement.

DETAILED STEPS

Step 1   When you receive the Cisco ASR 9000v satellite shelf equipment at the installation site, open the top of the box. The Cisco Systems logo indicates the top of the box.

Step 2   Remove the foam inserts from the box. The box contains the Cisco ASR 9000v satellite shelf (wrapped in plastic) and other items needed for installation.

Step 3   To remove the Cisco ASR 9000v satellite shelf, grasp both rings of the shelf removal strap and slowly lift the shelf out of the box.

Step 4   Verify that you have all items listed in the Required Tools and Equipment, on page 22 section.

Step 5   Verify the following:

- The Cisco ASR 9000v satellite shelf is not damaged.
- The cable connectors, EOBC, timing connectors, and power connectors on the front panel of the Cisco ASR 9000v satellite shelf are not damaged.
- The SFP cages on the front panel of the Cisco ASR 9000v satellite shelf are not damaged.

Step 6   Remove the foam inserts from the box. The box contains the Cisco ASR 9000v satellite shelf (wrapped in plastic) and other items needed for installation.

Step 7   If there is any damage, call your Cisco sales engineer for a replacement.

ANSI Rack Installation

The Cisco ASR 9000v satellite shelf is mounted on a 19-inch (482.6-mm) or 23-inch (584.2-mm) equipment rack. If the shelf is mounted in the front position, then it projects 0.9 inches (22.86 mm) from the front of the rack. If the shelf assembly is mounted in the middle position, it projects 4.3 inches (109.22 mm) from the front of the rack. The shelf mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard

racks. The shelf assembly is a total of 17.4 inches (442.4 mm) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The Cisco ASR 9000v satellite shelf measures 1.7 inches (43.1 mm) high, 19 or 23 inches (482.6 or 584.2 mm) wide (depending on which way the mounting ears are attached), and 9.1 inches (231.1 mm) deep.

This figure shows the dimensions of the Cisco ASR 9000v satellite shelf in a 19-inch ANSI rack configuration with brackets mounted in the front position.

Figure 11: Cisco ASR 9000v Satellite Shelf Dimensions for a 19-Inch ANSI Rack Configuration
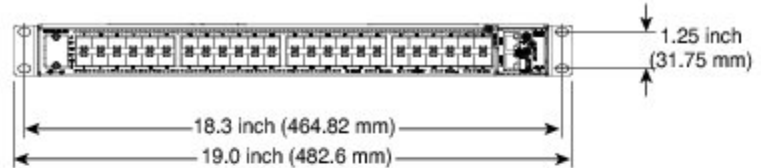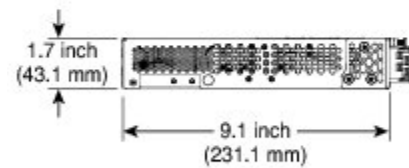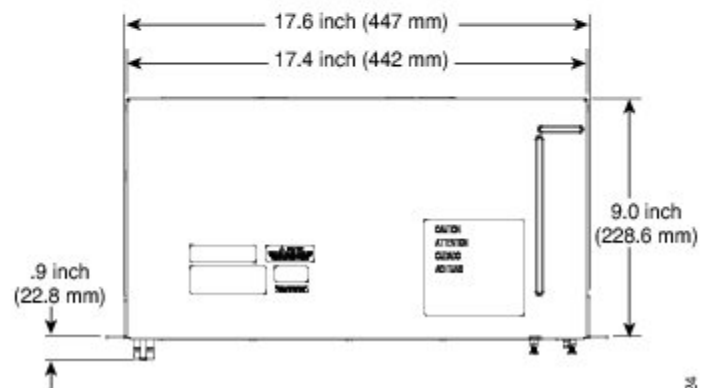
Mounting Brackets

⚠ **Caution**   Use only the fastening hardware provided with the Cisco ASR 9000v satellite shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

⚠ **Caution**   When mounting the Cisco ASR 9000v satellite shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the Cisco ASR 9000v satellite shelf shipping kit or remove the coating from the threads to ensure electrical continuity.

The mounting brackets (19-inch or 23-inch) are used to mount the Cisco ASR 9000v satellite shelf on a 19-inch (482.6 mm) rack or a 23-inch (584.2 mm) rack.

Mounting a Single Node

Mounting the Cisco ASR 9000v satellite shelf on a rack requires a minimum of 1.75 inches (44.44 mm) of vertical rack space. To ensure the mounting is secure, use two #12-24 mounting screws for each side of the shelf assembly. For an ANSI rack, the brackets can be mounted in the front or middle position.

ETSI Rack Installation

The Cisco ASR 9000v satellite shelf is mounted on a 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) ETSI standard equipment rack. The shelf assembly is a total of 442 mm (17.4 inches) wide with no mounting ears attached. Cisco does not provide ring runs, which might hinder side-by-side installation of shelves where space is limited.

The Cisco ASR 9000v satellite shelf measures 43.1 mm (1.7 inches) high, 533.4 mm (21 inches) wide, and 231.1 mm (9.1 inches) deep.

Figure 1 provides the dimensions of the Cisco ASR 9000v satellite shelf installed on a 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack. In this figure, the cable guides are attached to the mounting brackets.

⚠️

Caution   When mounting a Cisco ASR 9000v satellite shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Figure 12: Cisco ASR 9000v Satellite Shelf Dimensions for an ETSI Rack Configuration
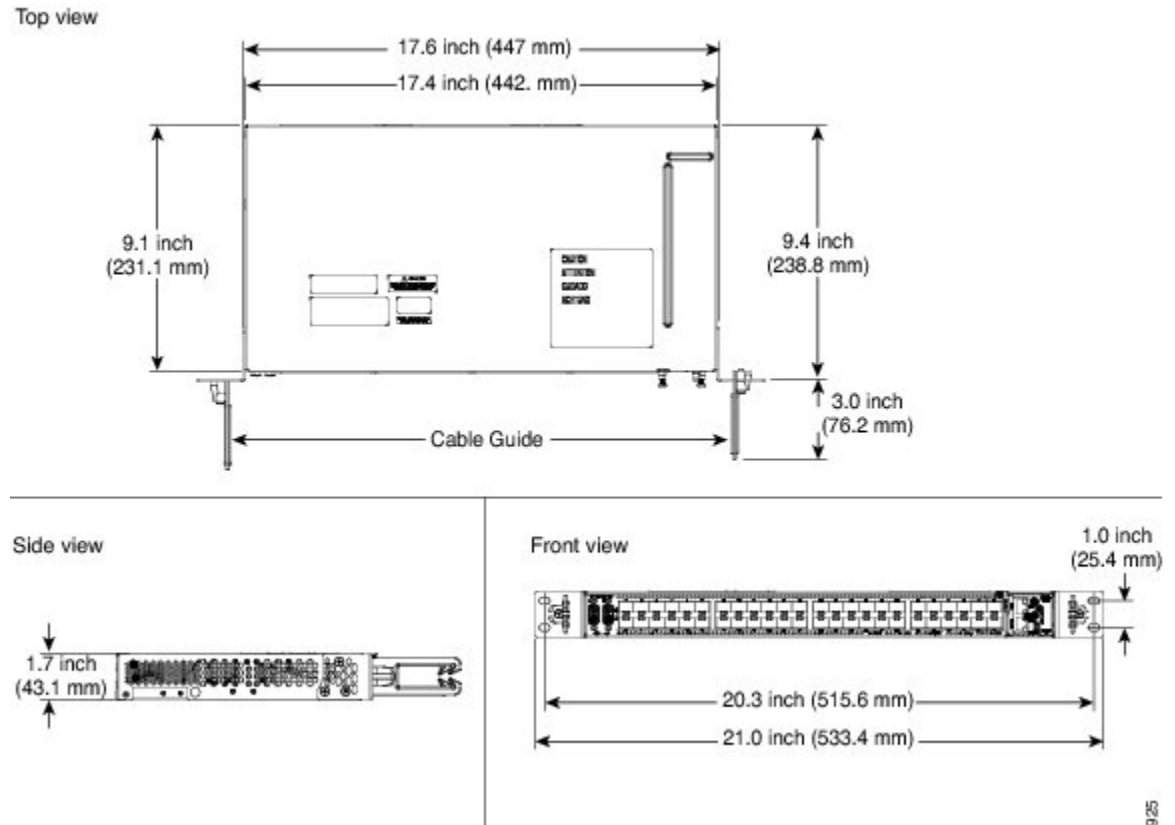
Mounting a Single Node

The Cisco ASR 9000v satellite shelf requires 1.75 inches (44.44 mm) minimum of vertical rack space. To ensure the mounting is secure, use two M6 mounting screws for each side of the shelf assembly. In an ETSI rack, the brackets can be mounted only in the front position.

Wall Mounting and Desktop Mounting the Cisco ASR 9000v Satellite Shelf

This section provides information about mounting the Cisco ASR 9000v satellite shelf on the wall and the desktop.

- Wall Mounting
- Desktop Mounting

Wall Mounting

The Cisco ASR 9000v satellite shelf can be mounted on the wall using the wall mount brackets. The type of screws used to mount the brackets on the wall depends on the wall-type; wall mount brackets are not provided by Cisco.

After the Cisco ASR 9000v satellite shelf is mounted on the wall, a fire protective tray is installed on the wall mount bracket to support the shelf assembly.

Desktop Mounting

The Cisco ASR 9000v satellite shelf can be mounted on the desktop for easy access.

Laser Warning

The laser warning label is placed on top of the chassis. The following figure shows the label placed on the Cisco ASR 9000v satellite shelf.

Figure 13: Cisco ASR 9000v Satellite Shelf Label
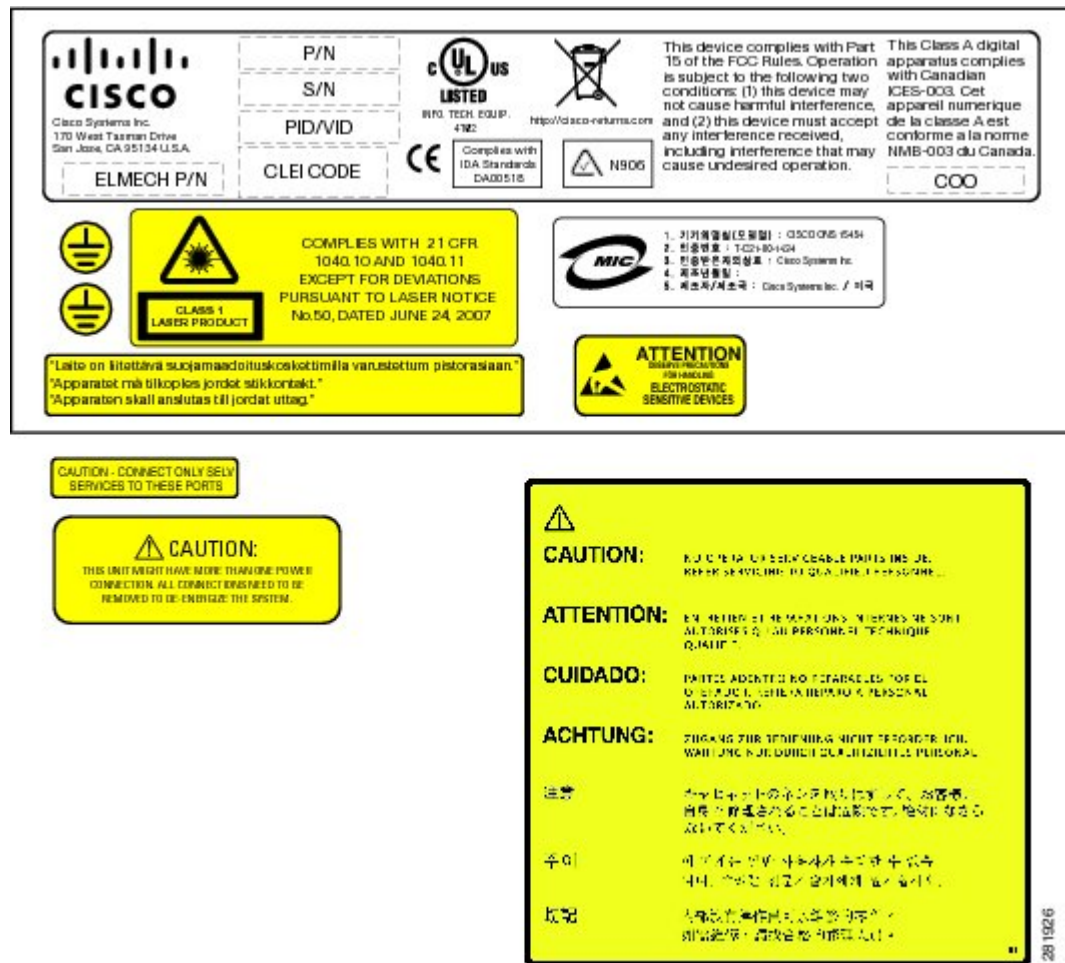
Installing the Cisco ASR 9000v Satellite Shelf

Note In a CO (Central Office) or CPE (Customer Premises Equipment) installation, if the Cisco ASR 9000 routers or Cisco CRS Line Card Chassis and Cisco ASR 9000v satellite shelf units are connected through copper SFP+, place the units less than 6 meters apart in the same lineup.

Warning   The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7005

Warning   Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over. Statement 1048

Warning   This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A for Cisco ASR 9000v satellite shelf with 48 VDC power supply; 15A for Cisco ASR 9000v satellite shelf with 24 VDC power supply. Statement 1005

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-15A, 100-240 VAC~. Statement 1005

Warning   To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C) for Cisco ASR 9000v satellite shelf with AC power module and 149°F (65°C) for Cisco ASR 9000v satellite shelf with DC power module. Statement 1047

Warning   Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018

Warning   To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:This unit should be mounted at the bottom of the rack if it is the only unit in the rack.When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006

Warning   To ensure adequate airflow through the equipment rack, we recommend that you maintain a clearance of at least 6 inches (15.24 cm) on each side of the rack at all times.

Note   The Cisco ASR 9000v satellite shelf installations are suitable for Network Telecommunication facilities and locations where NEC applies.

SUMMARY STEPS

1. Complete the necessary task as applicable:
2. Complete the necessary mounting task as applicable:
3. Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge, on page 17 section.

DETAILED STEPS

Step 1   Complete the necessary task as applicable:

- Mounting the 19-Inch Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration, on page 30

- Mounting the 23-Inch Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration, on page 32

- Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ETSI Rack Configuration, on page 33

Step 2   Complete the necessary mounting task as applicable:

- Mounting the Cisco ASR 9000v Satellite Shelf on a Rack (One Person), on page 35

- Mounting the Cisco ASR 9000v Satellite Shelf on the Wall, on page 37

- Mounting the Cisco ASR 9000v Satellite Shelf on the Desktop, on page 39

Step 3   Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge, on page 17 section.

Mounting the 19-Inch Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration

Caution   Use only the fastening hardware provided with the Cisco ASR 9000v satellite shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

⚠

Caution   When mounting the Cisco ASR 9000v satellite shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel), either use the thread-forming screws provided with the Cisco ASR 9000v satellite shelf ship kit or remove the coating from the threads to ensure electrical continuity.

✎

Note   The mounting brackets can be installed in the front or the middle position of the chassis.

SUMMARY STEPS

   1. Place the wider side of the 19-inch mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in Figure 1. The narrow side of the mounting bracket should be towards the front of the shelf.
   2. Align the mounting bracket screw holes against the shelf assembly screw holes.
   3. Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
   4. Repeat Step 1 to Step 3 to mount the bracket on the opposite side.

DETAILED STEPS

Step 1   Place the wider side of the 19-inch mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in Figure 1. The narrow side of the mounting bracket should be towards the front of the shelf.

Step 2   Align the mounting bracket screw holes against the shelf assembly screw holes.

Step 3   Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4   Repeat Step 1 to Step 3 to mount the bracket on the opposite side.

Figure 14: Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration

Mounting the 23-Inch Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration

⚠

Caution   Use only the fastening hardware provided with the Cisco ASR 9000v satellite shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

⚠

Caution   When mounting the Cisco ASR 9000v satellite shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel), either use the thread-forming screws provided with the Cisco ASR 9000v satellite shelf ship kit or remove the coating from the threads to ensure electrical continuity.

✎

Note   The mounting brackets can be installed in the front or the middle position of the chassis.

SUMMARY STEPS

1. Place the wider side of the 23-inch mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in the figure *Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for a 23-Inch (584.2-mm) ANSI Rack Configuration*. The narrow side of the mounting bracket should be towards the front of the shelf.
2. Align the mounting bracket screw holes against the shelf assembly screw holes.
3. Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
4. Repeat Step 1 to Step 3 to mount the bracket on the opposite side.
5. Align the cable guide screw hole against the mount bracket screw hole, as shown in this figure.
6. Insert the M4 screw and tighten it to a torque value of 6.5 in-lb (0.75 N-m).
7. Repeat Step 5 and Step 6 to install the cable guide on the opposite side.

DETAILED STEPS

Step 1   Place the wider side of the 23-inch mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in the figure *Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for a 23-Inch (584.2-mm) ANSI Rack Configuration*. The narrow side of the mounting bracket should be towards the front of the shelf.

Step 2   Align the mounting bracket screw holes against the shelf assembly screw holes.

Step 3   Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4   Repeat Step 1 to Step 3 to mount the bracket on the opposite side.

Figure 15: Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for a 23-Inch (584.2-mm) ANSI Rack Configuration
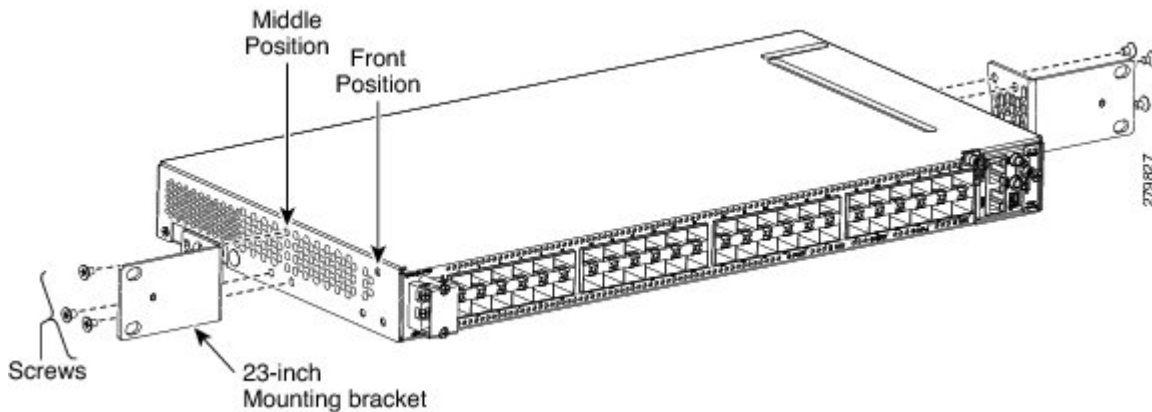
Step 5   Align the cable guide screw hole against the mount bracket screw hole, as shown in this figure.

Figure 16: Mounting the Cable Guide on the Cisco ASR 9000v Satellite Shelf 23-Inch (584.2-mm) Mounting Bracket

Step 6   Insert the M4 screw and tighten it to a torque value of 6.5 in-lb (0.75 N-m).

> **Note**   The cable guide is made of plastic. Therefore a lower torque value should be applied to tighten the cable guide screws to avoid breakage.

Step 7   Repeat Step 5 and Step 6 to install the cable guide on the opposite side.

Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ETSI Rack Configuration

> ⚠
>
> **Caution**   Use only the fastening hardware provided with the Cisco ASR 9000v satellite shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

⚠

Caution When mounting the Cisco ASR 9000v satellite shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel), either use the thread-forming screws provided with the Cisco ASR 9000v satellite shelf ship kit or remove the coating from the threads to ensure electrical continuity.

✎

Note The mounting brackets can be installed in the front or the middle position of the chassis.

SUMMARY STEPS

1. Place the mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in the figure *Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration*.
2. Align the mounting bracket screw holes against the shelf assembly screw holes.
3. Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
4. Repeat Step 1 to Step 3 to mount the bracket on the opposite side.
5. Align the cable guide screw hole against the mount bracket screw hole, as shown in this figure.
6. Insert the M4 screw and tighten it to a torque value of 6.5 in-lb (0.75 N-m).
7. Repeat Step 5 and Step 6 to install the cable guide on the opposite side.

DETAILED STEPS

Step 1 Place the mounting bracket flush against the Cisco ASR 9000v satellite shelf, as shown in the figure *Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration*.

Step 2 Align the mounting bracket screw holes against the shelf assembly screw holes.

Step 3 Insert the M4 flat screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat Step 1 to Step 3 to mount the bracket on the opposite side.

Figure 17: Mounting the Brackets on the Cisco ASR 9000v Satellite Shelf for the ANSI Rack Configuration
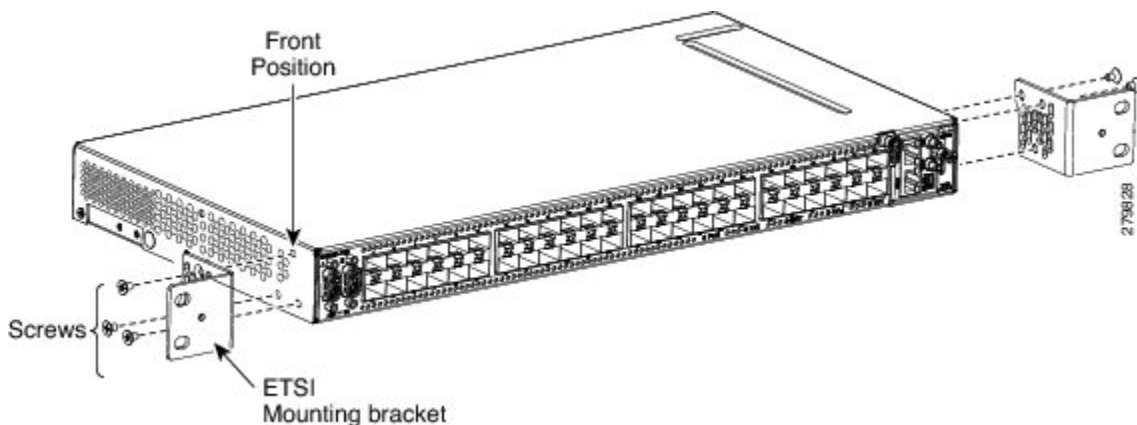
Step 5 Align the cable guide screw hole against the mount bracket screw hole, as shown in this figure.

Figure 18: Mounting the Cable Guide on the Cisco ASR 9000v Satellite Shelf ETSI Mounting Bracket
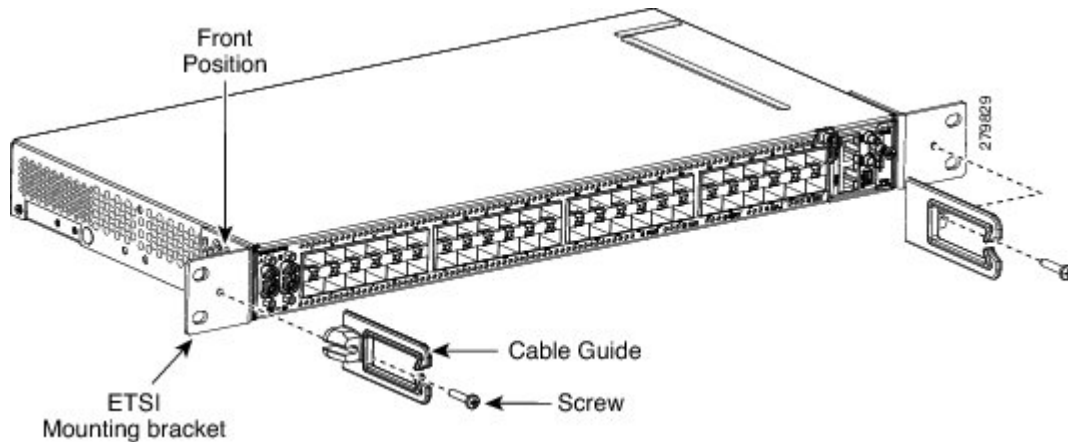
Step 6 Insert the M4 screw and tighten it to a torque value of 6.5 in-lb (0.75 N-m).

Note The cable guide is made of plastic. Therefore a lower torque value should be applied to tighten the cable guide screws to avoid breakage.

Step 7 Repeat Step 5 and Step 6 to install the cable guide on the opposite side.

Mounting the Cisco ASR 9000v Satellite Shelf on a Rack (One Person)

SUMMARY STEPS

1. Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:
2. Ensure that the shelf assembly is mounted on the appropriate rack equipment:
3. Lift the shelf to the desired position in the rack.
4. Align the screw holes on the mounting brackets with the mounting holes in the rack.
5. Using the Phillips Dynamometric screwdriver, install one mounting screw in each side of the assembly:
6. When the shelf assembly is secured to the rack, install the remaining two mounting screws on either sides of the shelf assembly.

DETAILED STEPS

Step 1 Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:

- For a 48 VDC power supply, the fuse rating must not exceed 10 A.

- For a 24 VDC power supply, the fuse rating must not exceed 15 A.

- For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes.

Note   In an ANSI rack, the Cisco ASR 9000v satellite shelf chassis can be installed in the front or the middle position. In an ETSI rack, the Cisco ASR 9000v satellite shelf chassis can be installed only in the front position.

Note   The Cisco ASR 9000v satellite shelf requires a minimum of 1.75 inches (44.44 mm) of vertical rack space. To ensure that the mounting is secure, use two M6 mounting screws on each side of the shelf for ETSI rack installation, and two 12-24 x 3/4 pan-head Phillips mounting screws on each side of the shelf for ANSI rack installation. A Cisco ASR 9000v satellite shelf assembly should be mounted at the bottom of the rack if it is the only unit in the rack.

Step 2   Ensure that the shelf assembly is mounted on the appropriate rack equipment:

- 23 inches (584.2 mm) or 19 inches (482.6 mm) for ANSI racks

- 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

- For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes. Diagram 1 of the figure *Mounting a Cisco ASR 9000v Satellite Shelf in a Rack* shows the Cisco ASR 9000v satellite shelf mounted on an ANSI rack in the middle position using 19-inch mounting brackets. Diagram 2 of the figure *Mounting a Cisco ASR 9000v Satellite Shelf in a Rack* shows the Cisco ASR 9000v satellite shelf mounted on an ETSI rack in the front position using mounting brackets.

Figure 19: Mounting a Cisco ASR 9000v Satellite Shelf in a Rack
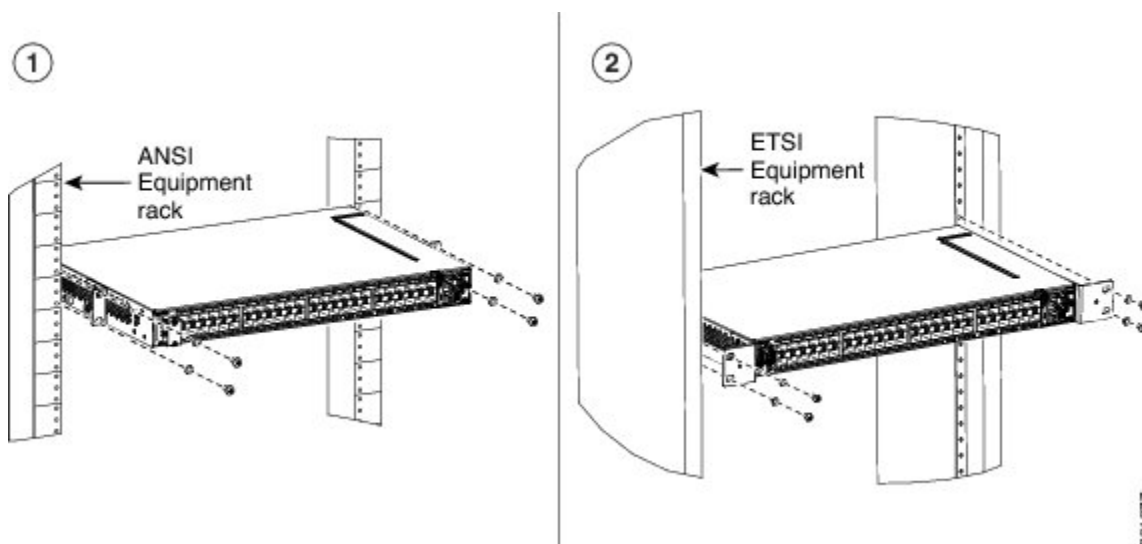
Step 3   Lift the shelf to the desired position in the rack.

Step 4   Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 5   Using the Phillips Dynamometric screwdriver, install one mounting screw in each side of the assembly:

- For an ANSI rack, use 12-24 x 3/4 pan-head Phillips mounting screws and tighten it to a torque value of 22 in-lb (2.5 Nm)

- For an ETSI rack, use M6 mounting screws and tighten it to a torque value of 22 in-lb (2.5 Nm)

Step 6   When the shelf assembly is secured to the rack, install the remaining two mounting screws on either sides of the shelf assembly.

Mounting the Cisco ASR 9000v Satellite Shelf on the Wall

SUMMARY STEPS

1. Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:

2. Mount the bracket on the wall, as shown in the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*. To mount the bracket on a non-concrete wall, choose the bracket holes based on the wall structure. At least four screws must be used to mount the bracket on the wall. Based on the wall material, apply the torque value provided by the screw vendor.

3. Align the mounting bracket screw holes against the shelf screw holes, as shown in diagram 1 of the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*.

4. Insert six M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m), as shown in diagram 2 of the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*.

5. Align the fire protective drip tray screw holes against the wall mounting bracket screw holes, as shown in diagram 1 of the figure *Mounting the Fire Protective Cover*. The fire protective drip tray is present in the wall mount accessory kit provided by Cisco.

6. Insert two M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m), as shown in diagram 2 of the figure *Mounting the Fire Protective Cover*.

DETAILED STEPS

Step 1   Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:

• For a 48 VDC power supply, the fuse rating must not exceed 10 A.

• For a 24 VDC power supply, the fuse rating must not exceed 15 A.

• For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes.

Note   The Cisco ASR 9000v satellite shelf requires a minimum of 23.65 inches (600-mm) vertical length and a minimum of 15.75 inches (400-mm) horizontal width on the wall. Wall mount brackets are used to mount the Cisco ASR 9000v satellite shelf on the wall. The type of screws used to mount the brackets on the wall depends on the wall-type; wall mount brackets are not provided by Cisco. The screws used must be able to sustain an overall weight of at least 10 kg (22 lb).

Step 2   Mount the bracket on the wall, as shown in the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*. To mount the bracket on a non-concrete wall, choose the bracket holes based on the wall structure. At least four screws must be used to mount the bracket on the wall. Based on the wall material, apply the torque value provided by the screw vendor.

Step 3   Align the mounting bracket screw holes against the shelf screw holes, as shown in diagram 1 of the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*.

Step 4   Insert six M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m), as shown in diagram 2 of the figure *Wall Mounting of the Cisco ASR 9000v Satellite Shelf*.

Figure 20: Wall Mounting of the Cisco ASR 9000v Satellite Shelf
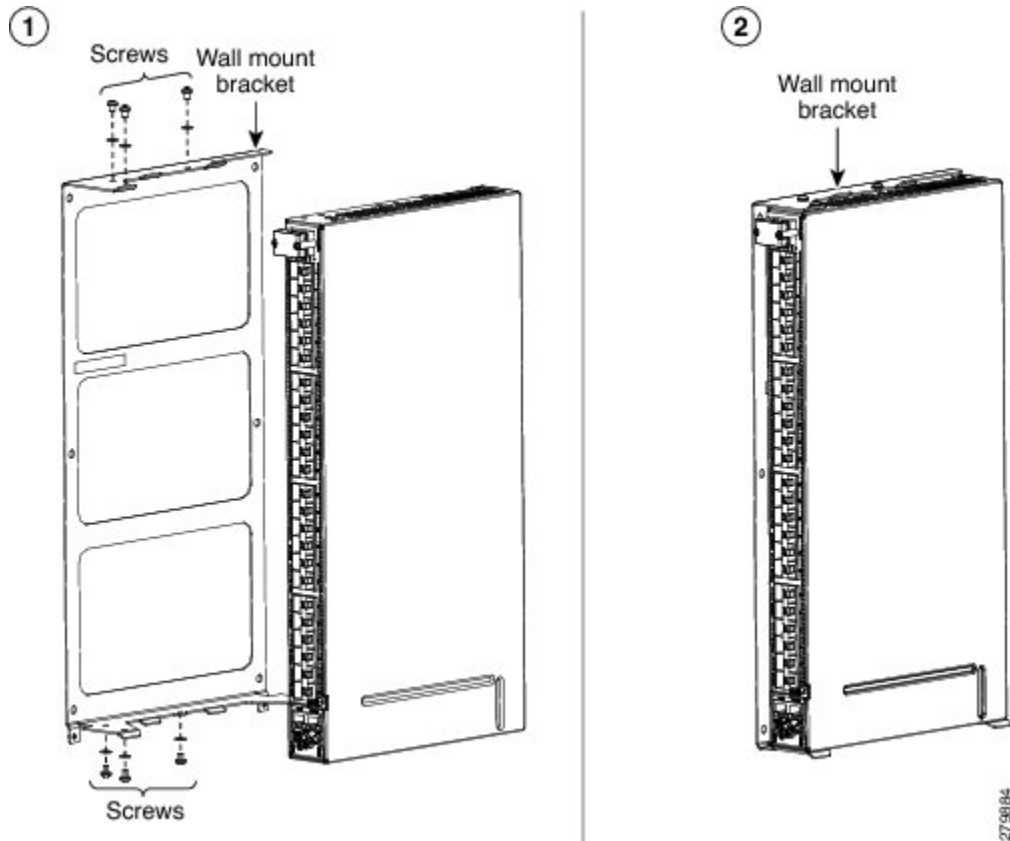
Step 5   Align the fire protective drip tray screw holes against the wall mounting bracket screw holes, as shown in diagram 1 of the figure *Mounting the Fire Protective Cover*. The fire protective drip tray is present in the wall mount accessory kit provided by Cisco.

The part number of the fire protective drip tray is Cisco PN 700-31762-XX. The product identifier (PID) of the wall mount accessory kit is CPT-50-BRKTWM= and the part number is Cisco PN 53-3513-XX.

Step 6   Insert two M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m), as shown in diagram 2 of the figure *Mounting the Fire Protective Cover*.

Figure 21: Mounting the Fire Protective Cover
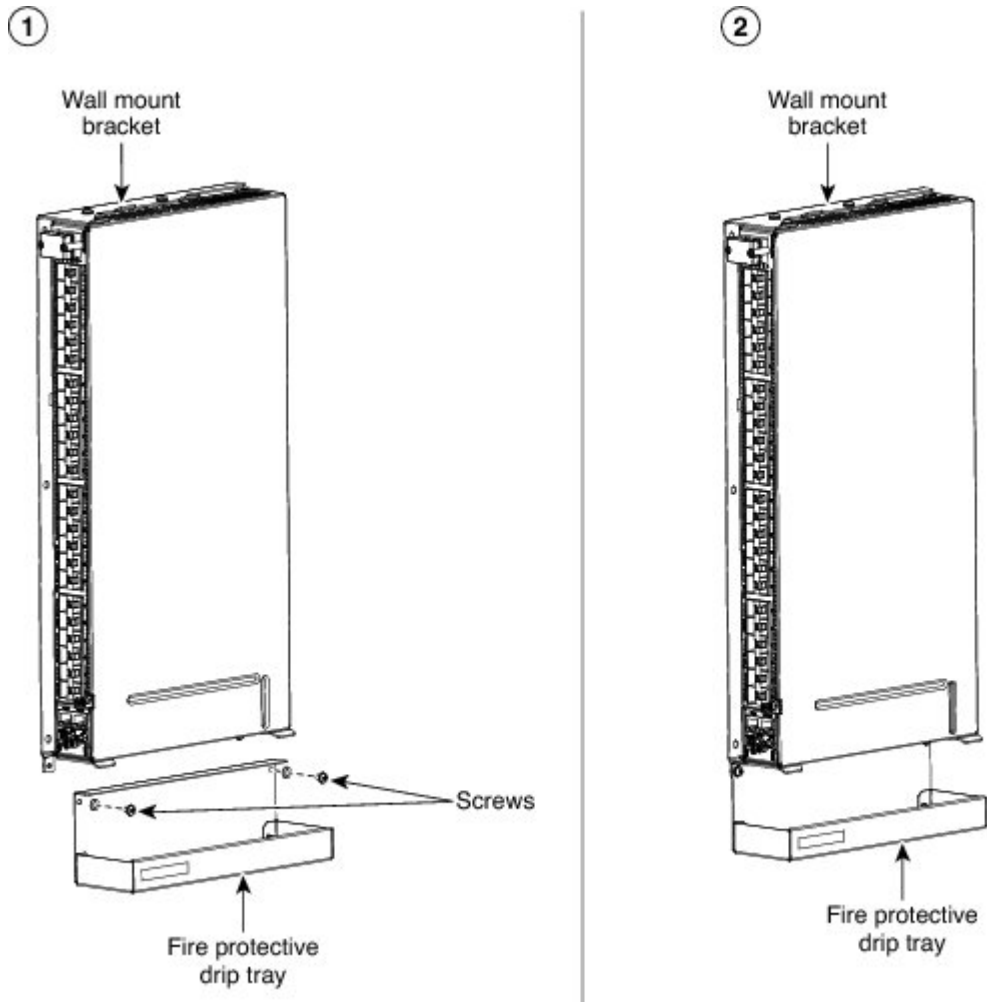
Mounting the Cisco ASR 9000v Satellite Shelf on the Desktop

SUMMARY STEPS

1. Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:
2. Locate the rubber bumpers provided in the accessory tool kit.
3. Place the Cisco ASR 9000v satellite shelf upside down on a smooth, flat surface.
4. Peel off the rubber bumpers from the adhesive strip and place it adhesive-side down onto all the four corners of the surface, as shown in this figure.
5. Place the Cisco ASR 9000v satellite shelf on a desktop, or on a smooth, flat surface.

DETAILED STEPS

Step 1   Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:

- For a 48 VDC power supply, the fuse rating must not exceed 10 A.

- For a 24 VDC power supply, the fuse rating must not exceed 15 A.

- For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes.

Step 2   Locate the rubber bumpers provided in the accessory tool kit.

Step 3   Place the Cisco ASR 9000v satellite shelf upside down on a smooth, flat surface.

Step 4   Peel off the rubber bumpers from the adhesive strip and place it adhesive-side down onto all the four corners of the surface, as shown in this figure.

Figure 22: Desktop Mounting of the Cisco ASR 9000v Satellite Shelf
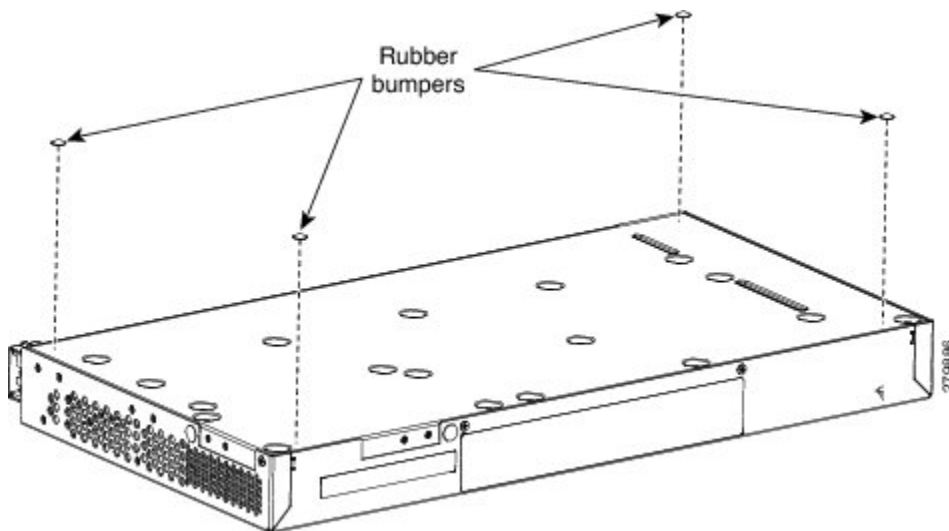
Step 5   Place the Cisco ASR 9000v satellite shelf on a desktop, or on a smooth, flat surface.

Connecting the Chassis Ground and Power

Ground the equipment according to Telcordia standards or local practices. The following sections describe how to power and ground the Cisco ASR 9000v satellite shelf.

Note   For detailed instructions on grounding the Cisco ASR 9000v satellite shelf, see the Electrostatic Discharge, on page 17.

ANSI Power and Ground

For AC power feed, use the power cable shipped with the Cisco ASR 9000v satellite shelf. For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

The Cisco ASR 9000v satellite shelf for 48 VDC power supply has redundant –48 VDC #14 single-hole lug power terminals. The terminals are labeled RET(A), RET(B), –48V(A), and –48V(B) on the power module, as shown in this figure.

Figure 23: Cisco ASR 9000v Satellite Shelf for 48 VDC Power Supply
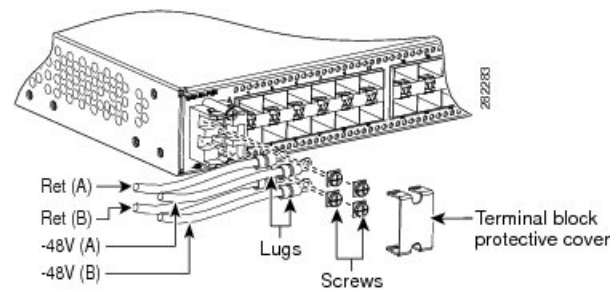
The Cisco ASR 9000v satellite shelf for 24 VDC power supply has redundant –24 VDC #14 single-hole lug power terminals. The terminals are labeled RET(A), RET(B), –24V(A), and –24V(B) on the power module.

To install redundant DC power feeds, use four power cables and one ground cable. For a single power feed, only two power cables (#14 AWG or larger, copper conductor, 194 degrees Fahrenheit [90 degrees Celsius] minimum) and one ground cable (#8 AWG or larger) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed.

For a 24 VDC power supply, the fuse rating must not exceed 15 A. The voltages –20 VDC and –28.3 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is –24 VDC.

For a 48 VDC power supply, the fuse rating must not exceed 10 A. The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. Functionality is guaranteed at –40 VDC input voltage, according to GR-1089, Issue 5. The nominal steady state voltage is –48 VDC.

We recommend the following wiring conventions, but customer conventions prevail:

  • Red wire for battery connections (–48 VDC or –24 VDC).
  • Black wire for battery return connections (RET).
  • The battery return connection is treated as DC-1, as defined in Telcordia GR-1089-CORE, Issue 5.

The ground lug must be a dual-hole type, UL Listed, CSA certified, and rated to accept the #8 AWG cable. Two ground threaded holes with M4 screws are provided on the Cisco ASR 9000v satellite shelf to accommodate the dual-hole lug, as shown in the figure *Ground Points on the Cisco ASR 9000v Satellite Shelf*.

⚠

Caution   Always use M4 screw to install the ground lug on an ASR 9000v shelf. The part number of this screw is Cisco PN 48-0468-01 and the maximum recommended length is 6 millimeters (mm). If you use any other screw longer than 6 mm, it can lead to a short circuit in the ASR 9000v shelf.

Figure 24: Ground Points on the Cisco ASR 9000v Satellite Shelf
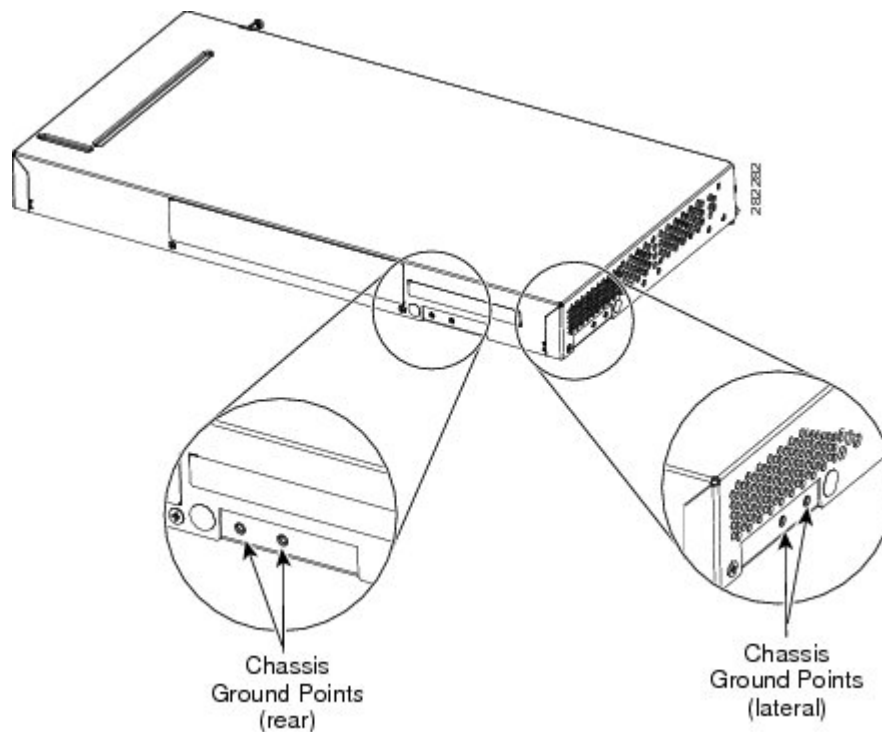
ETSI Power and Ground

The Cisco ASR 9000v satellite shelf for ETSI has redundant –48 VDC power connectors (DSUB for DC power module) on the DC power module. To install redundant power feeds, use the power cable shipped with the Cisco ASR 9000v satellite shelf and one ground cable. For a DC power supply, the fuse rating must not exceed 10 A. The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is –48 VDC.

For AC power feed, use the power cable shipped with the Cisco ASR 9000v satellite shelf. For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 V AC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

⚠️

Caution Use only the power cable shipped with the Cisco ASR 9000v satellite shelf (Cisco PN 72-4974-XX/PID CPT-DC-CBL-E=).

Grounding the Cisco ASR 9000v Satellite Shelf

Before locating and grounding the Cisco ASR 9000v satellite shelf, you must complete the prerequisites mentioned in the Electrostatic Discharge, on page 17.

Warning   This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024.

Warning   Use copper conductors only. Statement 1025.

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046.

Caution   Always use M4 screw to install the ground lug on an ASR 9000v shelf. The part number of this screw is Cisco PN 48-0468-01 and the maximum recommended length is 6 millimeters (mm). If you use any other screw longer than 6 mm, it can lead to a short circuit in the ASR 9000v shelf.

A #6 AWG cable or a 1 inch wide flat copper braid (with minimum total strands count of 1050 x 36 AWG or 260 x 36 AWG) is mandatory to install the Cisco ASR 9000v satellite shelf.

SUMMARY STEPS

1. Verify that the office ground cable is connected to the top of the bay and the office ground, according to local site practice. (See Figure 7: Building with Rack Room Connected to Earth Ground , on page 18 and Figure 8: Rack Room Connected to Earth Ground , on page 19.)
2. Remove any paint and other nonconductive coatings from the surfaces between the shelf ground and bay frame ground point. Clean the mating surfaces and apply appropriate antioxidant compound to the bare conductors.
3. Attach one end of the shelf ground cable (#8 AWG cable) to the ground point (rear or lateral) on the chassis using the specified dual-hole lug connector. (See diagrams 1 and 2 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf*.)
4. Tighten the lug using the M4 pan-head screw to torque value of 11.5 in-lb (1.3 N-m).
5. Attach the other end of the shelf ground cable to the bay frame using a dual-hole lug connector according to the equipment bay frame specifications. (See diagram 3 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf*.)

DETAILED STEPS

Step 1   Verify that the office ground cable is connected to the top of the bay and the office ground, according to local site practice. (See Figure 7: Building with Rack Room Connected to Earth Ground , on page 18 and Figure 8: Rack Room Connected to Earth Ground , on page 19.)

Note   The Cisco ASR 9000v satellite shelf installations are suitable for Network Telecommunication facilities and locations where NEC applies.

	Note	Additional ground cables may be added depending on local site practice. The Cisco ASR 9000v satellite shelf is designated only for a Common Bonding Network (CBN), according to the GR-1089-CORE Issue 5 (sec 9.3) definitions.
	Note	The DC power battery return (BR) terminal or positive terminal must be grounded at the source end (power feed or DC mains power end). The DC power BR input terminal is not connected to the equipment frame (chassis), so it is configured as DC-1 according to the GR-1089-CORE, Issue 5 (sec 9.8.3) definitions.

Step 2   Remove any paint and other nonconductive coatings from the surfaces between the shelf ground and bay frame ground point. Clean the mating surfaces and apply appropriate antioxidant compound to the bare conductors.

Step 3   Attach one end of the shelf ground cable (#8 AWG cable) to the ground point (rear or lateral) on the chassis using the specified dual-hole lug connector. (See diagrams 1 and 2 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf*.)

Step 4   Tighten the lug using the M4 pan-head screw to torque value of 11.5 in-lb (1.3 N-m).

	Note	Ground points are present on the rear and lateral sides of the Cisco ASR 9000v satellite shelf (see diagram 1 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf*). You can connect the grounding cable to either the rear or the lateral side. Diagrams 2 and 3 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf* show the ground connection to the rear side of the Cisco ASR 9000v satellite shelf.

Step 5   Attach the other end of the shelf ground cable to the bay frame using a dual-hole lug connector according to the equipment bay frame specifications. (See diagram 3 in the figure *Grounding the Cisco ASR 9000v Satellite Shelf*.)

Figure 25: Grounding the Cisco ASR 9000v Satellite Shelf
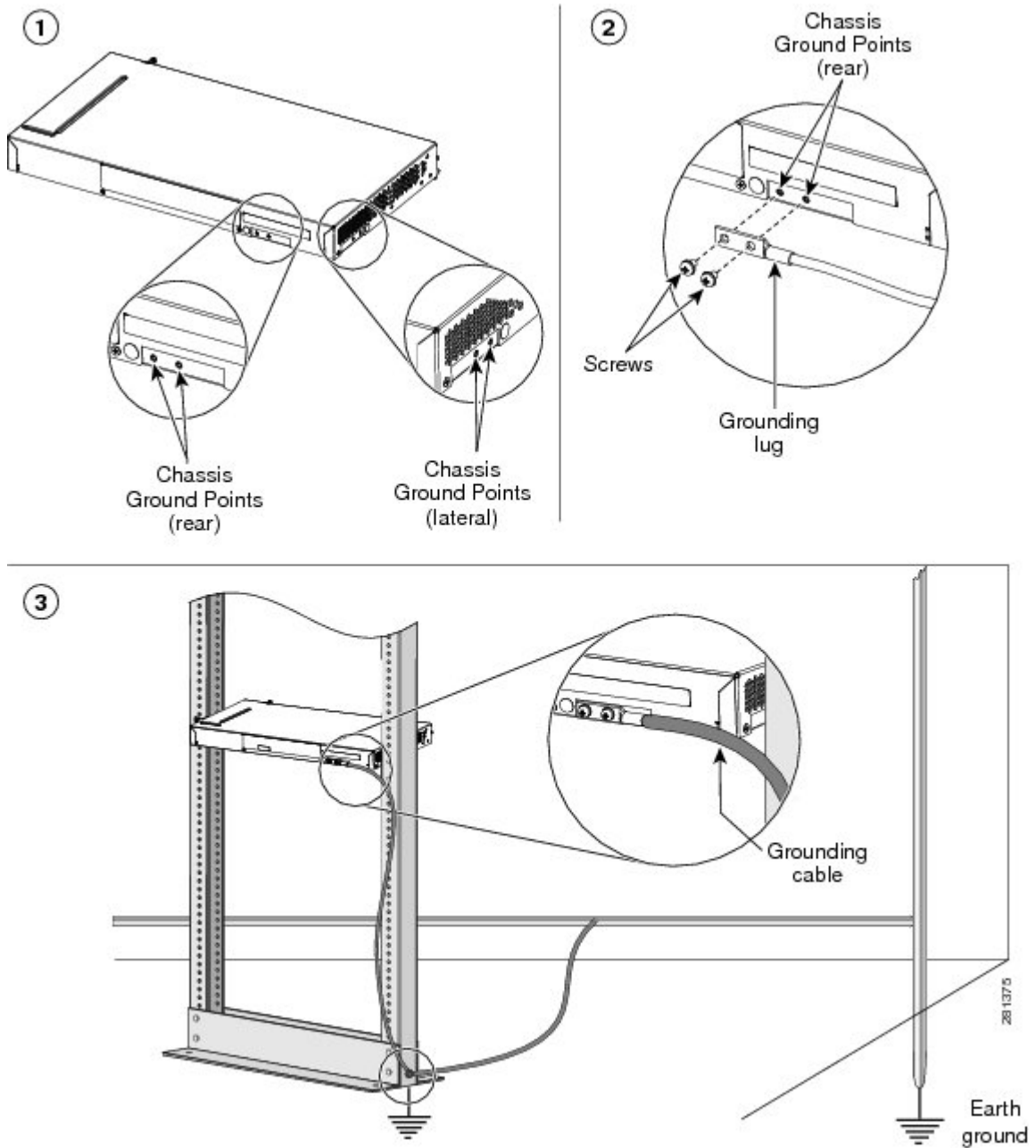
Installing the Power Feeds and Ground to the Cisco ASR 9000v Satellite Shelf

Note Before you install the power feeds to the Cisco ASR 9000v satellite shelf, connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module. Statement 390

Warning When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor. Statement 1002

Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12

Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning Use copper conductors only. Statement 1025

Warning Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards. Statement 1033

Warning   This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A for Cisco ASR 9000v satellite shelf with 48 VDC power supply; 15A for Cisco ASR 9000v satellite shelf with 24 VDC power supply. Statement 1005

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-15A, 100-240 VAC~. Statement 1005

Warning   A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022

Warning   This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Caution   Always use M4 screw to install the ground lug on an ASR 9000v shelf. The part number of this screw is Cisco PN 48-0468-01 and the maximum recommended length is 6 millimeters (mm). If you use any other screw longer than 6 mm, it can lead to a short circuit in the ASR 9000v shelf.

Caution   Always use the supplied ESD wristband when working with a powered Cisco ASR 9000v satellite shelf. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge, on page 17.

Caution   Do not operate the Cisco ASR 9000v satellite shelf without an air filter.

Note   Replacement or cleaning of an air filter is recommended every 60 days. Air filters are replaceable or reusable.

SUMMARY STEPS

1. Verify that the correct fuse panel is installed in the top mounting space:

2. Depending on the shelf and the power module installed, complete the necessary task:

3. Complete the Turning On and Verifying Office Power (AC) on the Cisco ASR 9000v Satellite Shelf , on page 55 or Turning On and Verifying Office Power (DC) on the Cisco ASR 9000v Satellite Shelf , on page 56 as necessary.

DETAILED STEPS

Step 1 Verify that the correct fuse panel is installed in the top mounting space:

- For a 48 VDC power supply, the fuse rating must not exceed 10 A.
- For a 24 VDC power supply, the fuse rating must not exceed 15 A.
- For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries. The overcurrent and short circuit protection must be in accordance with local and national electrical codes.

Step 2 Depending on the shelf and the power module installed, complete the necessary task:

- Connecting Office Power (AC) to the Cisco ASR 9000v Satellite Shelf, on page 48.
- Connecting Office Power (DC) to the Cisco ASR 9000v Satellite Shelf (ANSI Only), on page 50.
- Connecting Office Power (DC) to the Cisco ASR 9000v Satellite Shelf (ETSI Only), on page 53.
- Connect the office ground to the Cisco ASR 9000v satellite shelf. For detailed instructions on grounding, see the Connecting the Chassis Ground and Power, on page 40. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Step 3 Complete the Turning On and Verifying Office Power (AC) on the Cisco ASR 9000v Satellite Shelf , on page 55 or Turning On and Verifying Office Power (DC) on the Cisco ASR 9000v Satellite Shelf , on page 56 as necessary.

Connecting Office Power (AC) to the Cisco ASR 9000v Satellite Shelf

Note This product is intended for use on the TN and TT power systems.

Warning When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

Warning This equipment shall be connected to AC mains provided with a surge protective device (SPD) at the service equipment complying with NFPA 70, the National Electrical Code (NEC). Statement 7012

Caution The Cisco ASR 9000v satellite shelf relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

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Caution   When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

✎

Note   If the Cisco ASR 9000v satellite shelf loses its connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis, the Cisco ASR 9000v satellite shelf resets until the connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis is re-established.

SUMMARY STEPS

1. Attach the AC power cable to the cable connector in the AC power module, as shown in this figure.
2. Close the cable clip to secure the power cable, as shown in this figure.
3. Connect the power cable to the fuse panel or power source.

DETAILED STEPS

Step 1   Attach the AC power cable to the cable connector in the AC power module, as shown in this figure.

Figure 26: Connecting Office Power to the Cisco ASR 9000v Satellite Shelf—AC Power
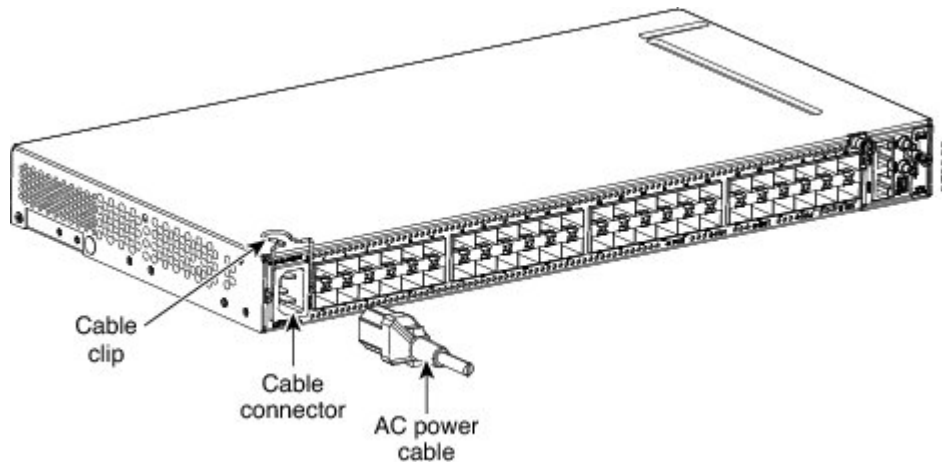
Step 2   Close the cable clip to secure the power cable, as shown in this figure.

Figure 27: Closing the Cable Clip to Secure the Power Cable to the Cisco ASR 9000v Satellite Shelf
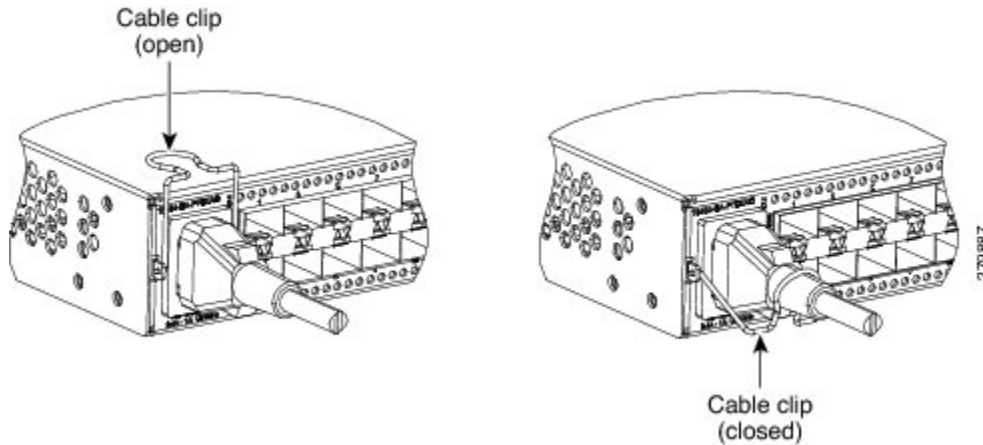
Step 3   Connect the power cable to the fuse panel or power source.

Note   The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries.

Connecting Office Power (DC) to the Cisco ASR 9000v Satellite Shelf (ANSI Only)

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

Warning   Hazardous voltage or energy may be present on power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1086

Note   The battery return connection is treated as DC-1, as defined in Telcordia GR-1089-CORE Issue 5.

Caution   The Cisco ASR 9000v satellite shelf relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

✎

Note   If the Cisco ASR 9000v satellite shelf loses its connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis, the Cisco ASR 9000v satellite shelf resets until the connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis is re-established.

SUMMARY STEPS

1. Connect the return cables of the power supply to the earth ground located at the power supply side.
2. Connect the office power according to the fuse panel engineering specifications.
3. Measure and cut the cables as needed to reach the Cisco ASR 9000v satellite shelf from the fuse panel.
4. Dress the power according to local site practice.
5. Strip 1/2 inch (12.7 mm) of insulation from all power cables that you will use.
6. Crimp the lugs onto the ends of all the power leads.
7. Remove the terminal block protective cover, as shown in this figure.
8. Untighten the terminal block screws, as shown in this figure.
9. Insert the lugs, as shown in this figure.
10. Tighten the M3.5 screws to a torque value of 7 in-lb (0.79 N-m) to lock the lugs.
11. Mount the terminal block protective cover on the Cisco ASR 9000v satellite shelf, as shown in this figure.

DETAILED STEPS

Step 1   Connect the return cables of the power supply to the earth ground located at the power supply side.

Step 2   Connect the office power according to the fuse panel engineering specifications.

Step 3   Measure and cut the cables as needed to reach the Cisco ASR 9000v satellite shelf from the fuse panel.

Step 4   Dress the power according to local site practice.

Step 5   Strip 1/2 inch (12.7 mm) of insulation from all power cables that you will use.

Step 6   Crimp the lugs onto the ends of all the power leads.

Step 7   Remove the terminal block protective cover, as shown in this figure.

Figure 28: Removing the Terminal Block Protective Cover on the Cisco ASR 9000v Satellite Shelf

Terminal block protective cover
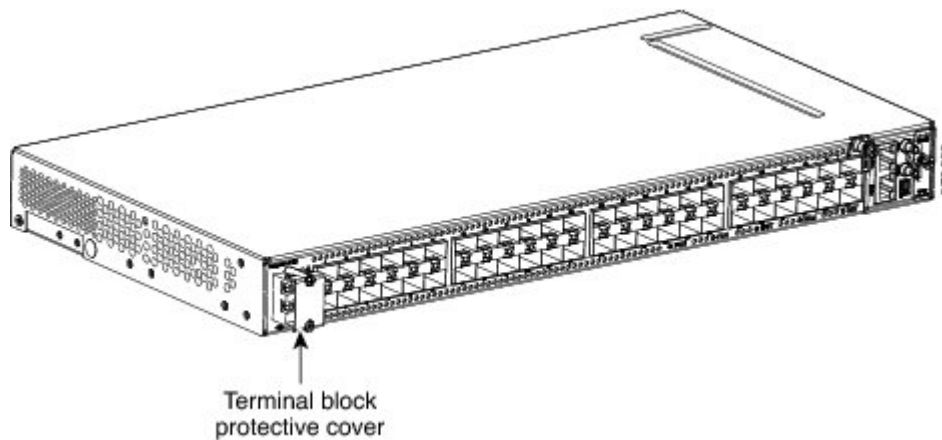
Step 8   Untighten the terminal block screws, as shown in this figure.

Figure 29: Loosening the Terminal Block Screws on the Cisco ASR 9000v Satellite Shelf
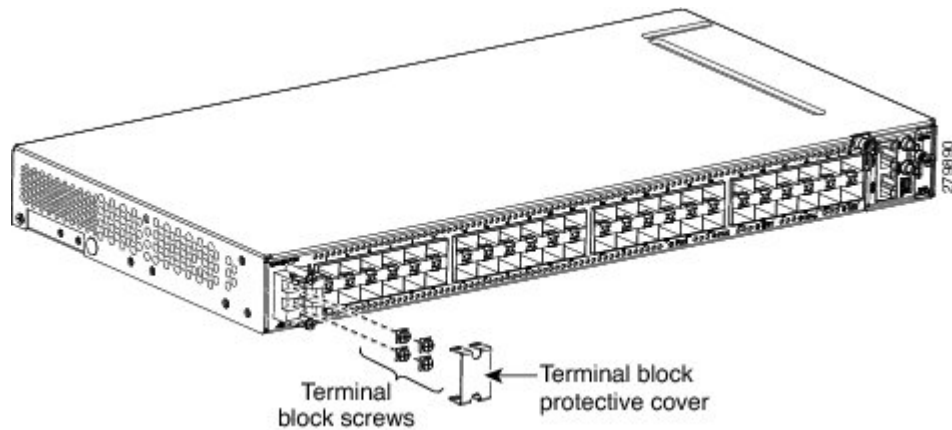
Step 9   Insert the lugs, as shown in this figure.

Figure 30: Inserting the Lugs on the Cisco ASR 9000v Satellite Shelf
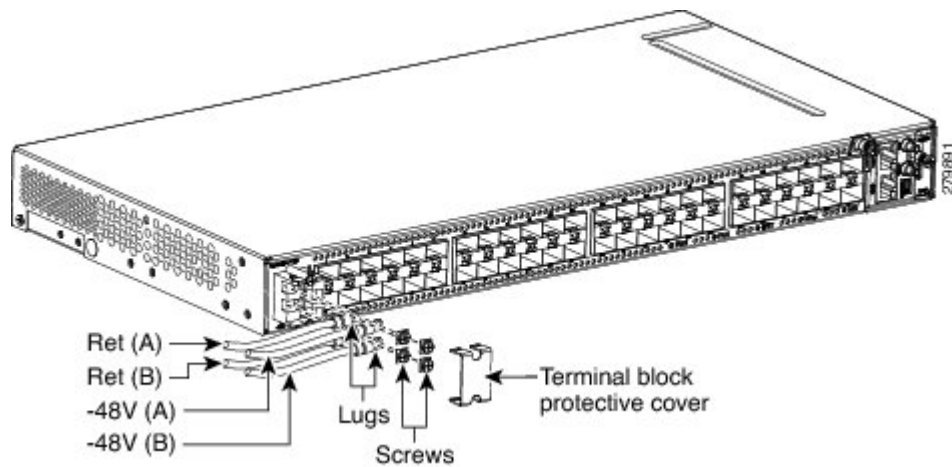
Step 10   Tighten the M3.5 screws to a torque value of 7 in-lb (0.79 N-m) to lock the lugs.

Step 11   Mount the terminal block protective cover on the Cisco ASR 9000v satellite shelf, as shown in this figure.

Figure 31: Replacing the Terminal Block Protective Cover on the Cisco ASR 9000v Satellite Shelf

Note	Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors.
Caution	Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants.
Caution	When terminating power, return (RET), and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors.

Connecting Office Power (DC) to the Cisco ASR 9000v Satellite Shelf (ETSI Only)

Warning	When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046
Warning	Hazardous voltage or energy may be present on power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1086
Note	The battery return connection is treated as DC-1, as defined in Telcordia GR-1089-CORE Issue 5.

⚠️

Caution   The Cisco ASR 9000v satellite shelf relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

✎

Note   If the Cisco ASR 9000v satellite shelf loses its connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis, the Cisco ASR 9000v satellite shelf resets until the connection to the Cisco ASR 9000 Router or Cisco CRS Line Card Chassis is re-established.

SUMMARY STEPS

1. Connect the return cables of the power supply to the earth ground located at the power supply side.
2. Attach the DC ETSI power cables to the DSUB power connectors of the DC power module, as shown in this figure.
3. Tighten the M3 pan-head screws to a torque value of 4 in-lb (0.45 N-m) to secure the cable, as shown in this figure.

DETAILED STEPS

Step 1   Connect the return cables of the power supply to the earth ground located at the power supply side.

Step 2   Attach the DC ETSI power cables to the DSUB power connectors of the DC power module, as shown in this figure.

Figure 32: Connecting DC ETSI Power Cables to the DSUB Power Connectors on the Cisco ASR 9000v Satellite Shelf
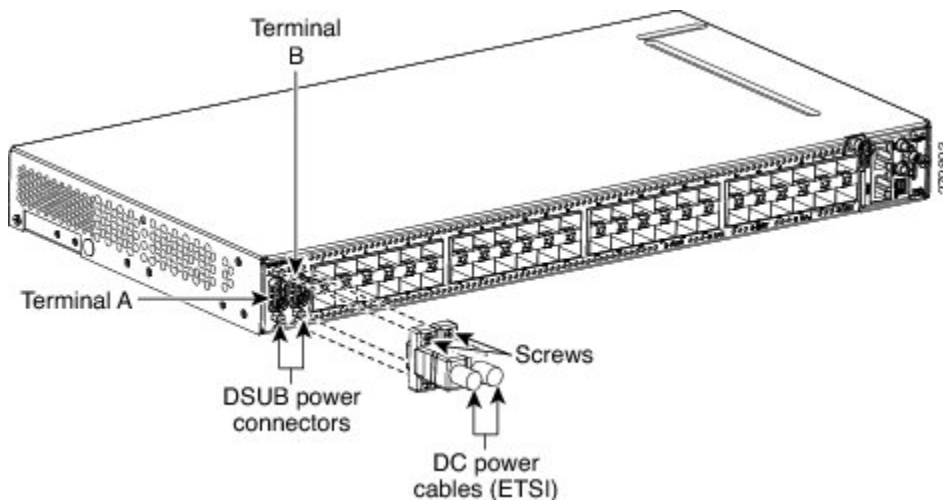
Step 3   Tighten the M3 pan-head screws to a torque value of 4 in-lb (0.45 N-m) to secure the cable, as shown in this figure.

Figure 33: Securing the DC Power Cables to the Cisco ASR 9000v Satellite Shelf

| Note | Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors. |

| Caution | Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants. |

| Caution | When terminating power, return (RET), and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors. |

Turning On and Verifying Office Power (AC) on the Cisco ASR 9000v Satellite Shelf

| Note | Before you turn on the power on the Cisco ASR 9000v satellite shelf, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42. |

| Danger | To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module. Statement 390 |

| Note | Do not apply power to the shelf assembly until you complete all the installation steps. |

SUMMARY STEPS

1. To power up the node, insert the fuse into the fuse position according to site practice. For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries.
2. If the Cisco ASR 9000v satellite shelf does not power up, check the voltage at the power source using a voltmeter. The voltage should be 100 VAC to 240 VAC ±10 percent.

DETAILED STEPS

Step 1   To power up the node, insert the fuse into the fuse position according to site practice. For an AC power supply, the fuse rating must not exceed 10 A or 15 A, depending on the standards in various countries.

Step 2   If the Cisco ASR 9000v satellite shelf does not power up, check the voltage at the power source using a voltmeter. The voltage should be 100 VAC to 240 VAC ±10 percent.

Turning On and Verifying Office Power (DC) on the Cisco ASR 9000v Satellite Shelf

Note   Before you turn on the power on the Cisco ASR 9000v satellite shelf, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Danger   To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module. Statement 390

Note   Do not apply power to the shelf assembly until you complete all the installation steps.

SUMMARY STEPS

1. Using a voltmeter, verify the office battery and ground at the following points on the fuse panel:
2. To power up the node, insert the fuse into the fuse position according to site practice. For a 24 VDC power supply, the fuse rating must not exceed 15 A. For a 48 VDC power supply, the fuse rating must not exceed 10 A.
3. Using a voltmeter, verify the Cisco ASR 9000v satellite shelf for –48 VDC or –24 VDC battery and return:

DETAILED STEPS

Step 1   Using a voltmeter, verify the office battery and ground at the following points on the fuse panel:

a) To verify the power, place the black test lead of the voltmeter to the return (RET). Place the red test lead on the BAT-A connection and verify that:

- For a 24 V DC power supply, the voltage is between –20 V DC and –28.3 V DC. Place the red test lead on the BAT-B connection and verify that it is between –20 VDC and –28.3 V DC

Note The voltages –20 VDC and –28.3 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf that has 24 VDC power supply. The nominal steady state voltage is –24 VDC.

- For a 48 VDC power supply, the voltage is between –40.5 VDC and –57.6 VDC. Place the red test lead on the BAT-B connection and verify that it is between –40.5 VDC and –57.6 VDC.

Note The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf that has 48 VDC power supply. The nominal steady state voltage is –48 VDC.

b) To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the BAT-A return ground and verify that no voltage is present, that is, meter reading must be 0 VDC. Place the red test lead on the BAT-B return ground and verify that no voltage is present, that is, that the meter reading is 0 VDC.

Step 2 To power up the node, insert the fuse into the fuse position according to site practice. For a 24 VDC power supply, the fuse rating must not exceed 15 A. For a 48 VDC power supply, the fuse rating must not exceed 10 A.

Step 3 Using a voltmeter, verify the Cisco ASR 9000v satellite shelf for –48 VDC or –24 VDC battery and return:

a) To verify the BAT-A of the Cisco ASR 9000v satellite shelf, place the black lead of the voltmeter to the return. Place the red test lead to the –48-V or –24-V (BAT-A battery connection) red cable. For a 48-VDC power supply, verify that it reads between –40.5 VDC and –57.6 VDC. For a 24-VDC power supply, verify that the voltage reads between –20 VDC and –28.3 VDC. Then place the red test lead of the voltmeter to the RET1 (BAT-A return ground) black cable and verify that no voltage is present, that is, that the meter reading is 0 VDC.

Note For a Cisco ASR 9000v satellite shelf that has a 24-VDC power supply, the voltages –20 VDC and –28.3 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf. The nominal steady state voltage is –24 VDC. To prevent damage to the Cisco ASR 9000v satellite shelf, the voltage must not exceed –30 VDC.

Note For a Cisco ASR 9000v satellite shelf that has a 48-VDC power supply, the voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf. The nominal steady state voltage is –48 VDC.

b) To verify the BAT-B of the Cisco ASR 9000v satellite shelf, place the black test lead of the voltmeter to the return. Place the red test lead to the –48-V or –24-V(BAT-B battery connection) red cable. For a 48-VDC power supply, verify that it reads between –40.5 VDC and –57.6 VDC. For a 24-VDC power supply, verify that the voltage reads between –20 VDC and –28.3 VDC.Then place the red test lead of the voltmeter to the RET2 (BAT-B return ground) black cable and verify that no voltage is present, that is, that the meter reading is 0 VDC.

c) To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the BAT-A return ground and verify that no voltage is present, that is, that the meter reading is 0 VDC. Place the red test lead on the BAT-B return ground and verify that no voltage is present, that is, that the meter reading is 0 VDC.

Connecting Cables to the EOBC, Timing, and Console Ports on the Cisco ASR 9000v Satellite Shelf

Note Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Caution Always use the supplied Electrostatic Discharge (ESD) wristband when working with a powered Cisco ASR 9000v satellite shelf. For detailed instructions on how to wear the ESD wristband, see the Preparing Yourself, on page 19.

SUMMARY STEPS

1. Complete the Connecting the Timing Cables to the PPS, 10-MHz, and ToD/PPS Ports on the Cisco ASR 9000v Satellite Shelf , on page 58 procedure to connect timing to external equipment.
2. Complete the Connecting Cables to the EOBC, Timing, and Console Ports on the Cisco ASR 9000v Satellite Shelf , on page 58 procedure to install the cables to the EOBC or console port.

DETAILED STEPS

Step 1 Complete the Connecting the Timing Cables to the PPS, 10-MHz, and ToD/PPS Ports on the Cisco ASR 9000v Satellite Shelf , on page 58 procedure to connect timing to external equipment.

Step 2 Complete the Connecting Cables to the EOBC, Timing, and Console Ports on the Cisco ASR 9000v Satellite Shelf , on page 58 procedure to install the cables to the EOBC or console port.

Connecting the Timing Cables to the PPS, 10-MHz, and ToD/PPS Ports on the Cisco ASR 9000v Satellite Shelf

Note Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Warning The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.Statement 7005

Note	For rules about provisioning timing references, see ITU-T G.813.

Note	To unplug the RJ-45 cables connected to the ToD/PPS and EOBC ports on the fan tray, use small pliers or a screwdriver.

SUMMARY STEPS

1. Locate the timing connectors (PPS, 10 MHz, or ToD/PPS) on the fan tray assembly of the Cisco ASR 9000v satellite shelf, as shown in this figure.
2. To connect the PPS or 10 MHz port:
3. To connect the ToD/PPS RJ-45 output port:

DETAILED STEPS

Step 1 Locate the timing connectors (PPS, 10 MHz, or ToD/PPS) on the fan tray assembly of the Cisco ASR 9000v satellite shelf, as shown in this figure.

Figure 34: Timing Connectors (PPS, 10 MHz, or ToD/PPS) on the Fan Tray Assembly
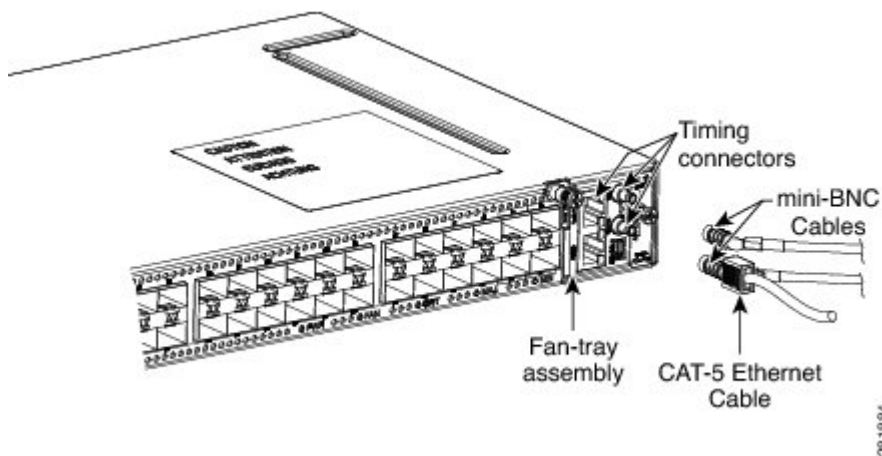
Step 2 To connect the PPS or 10 MHz port:

   a) Connect one end of the mini-BNC cable to the PPS or 10 MHz mini-BNC output port.
   b) Connect the other end of the mini-BNC cable to external equipment to provide timing signals.

Step 3 To connect the ToD/PPS RJ-45 output port:

   a) Connect one end of a standard CAT-5 Ethernet cable to the ToD/PPS RJ-45 output port.
   b) Connect the other end of the CAT-5 Ethernet cable to an external equipment to provide timing signals.

Connecting the Cables to the EOBC or Console Port on the Cisco ASR 9000v Satellite Shelf

Note   Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Warning   The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7005

Note   The console port is used for the setup and maintenance of the Cisco ASR 9000v satellite shelf. The EOBC port is used for disaster recovery, that is, to log in to the Cisco ASR 9000v satellite shelf for troubleshooting when the connection between the Cisco ASR 9000v satellite shelf and the Cisco ASR 9000 router or Cisco CRS Line Card Chassis is lost.

Note   To unplug the RJ-45 cables connected to the ToD/PPS and EOBC ports on the fan tray, use small pliers or a screwdriver.

SUMMARY STEPS

1. Locate the EOBC port or the console port on the fan tray assembly of the Cisco ASR 9000v satellite shelf, as shown in Figure 34: Timing Connectors (PPS, 10 MHz, or ToD/PPS) on the Fan Tray Assembly, on page 59.
2. To connect the EOBC port:
3. To connect the console port:

DETAILED STEPS

Step 1   Locate the EOBC port or the console port on the fan tray assembly of the Cisco ASR 9000v satellite shelf, as shown in Figure 34: Timing Connectors (PPS, 10 MHz, or ToD/PPS) on the Fan Tray Assembly, on page 59.

Figure 35: EOBC or Console Port on the Fan Tray Assembly
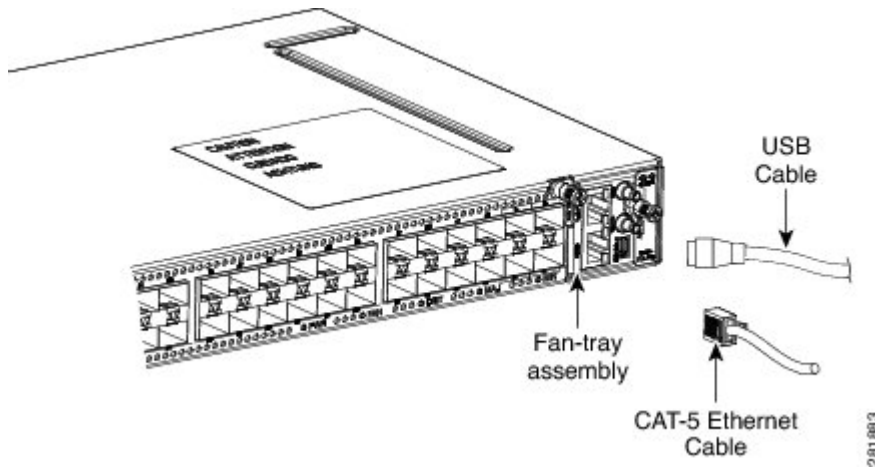
Step 2 To connect the EOBC port:

a) Connect one end of a standard CAT-5 Ethernet cable to the EOBC port.

b) Connect the other end of the standard CAT-5 Ethernet cable to external equipment to establish external connectivity.

Step 3 To connect the console port:

a) Connect one end of the USB cable to the console port.

b) Connect the other end of the USB cable to the console terminal or a modem that connects to the console terminal.

Installing and Routing Fiber-Optic Cables

Note Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Caution When connecting an optical-fiber patch cord between the Cisco ASR 9000v satellite shelf and the optical card ports in the Cisco ASR 9000 router or Cisco CRS Line Card Chassis, use the electrostatic discharge wristband supplied with the Cisco ASR 9000 router or Cisco CRS Line Card Chassis.

Note   Always clean all the fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the Cisco ASR 9000v satellite shelf, which makes regular cleaning imperative. For cleaning instructions, see Cleaning Fiber Connectors, on page 72.

Note   The Cisco ASR 9000v satellite shelf features LC/UPC bulkhead adapters. Always use fiber-optic cables equipped with the corresponding (LC/UPC) connector type. Using any other type of connector results in damage to the connector or adapter, or both.

SUMMARY STEPS

1. Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the Cisco ASR 9000v satellite shelf.
2. Align the keyed ridge of the cable connector with the slot in the receiving adapter.
3. Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
4. Route the fiber cables through the cable guide (left and right side). A tie-wrap is tied around the fiber and cables through the cable guide.

DETAILED STEPS

Step 1   Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the Cisco ASR 9000v satellite shelf.

Step 2   Align the keyed ridge of the cable connector with the slot in the receiving adapter.

Step 3   Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.

Step 4   Route the fiber cables through the cable guide (left and right side). A tie-wrap is tied around the fiber and cables through the cable guide.

The cables are routed through the cable guide in an ANSI (23-inch) rack configuration, as shown in this figure.

Figure 36: Cable Management in an ANSI Rack Configuration
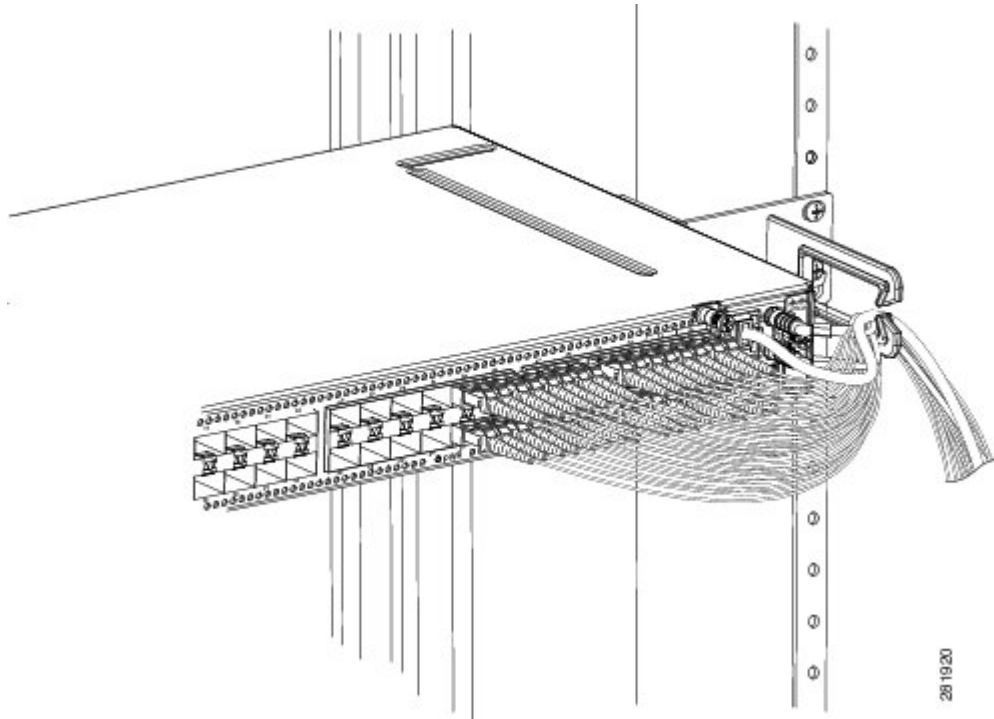
The cables are routed through the cable guide in an ETSI rack configuration, as shown in this figure.

Figure 37: Cable Management in an ETSI Rack Configuration
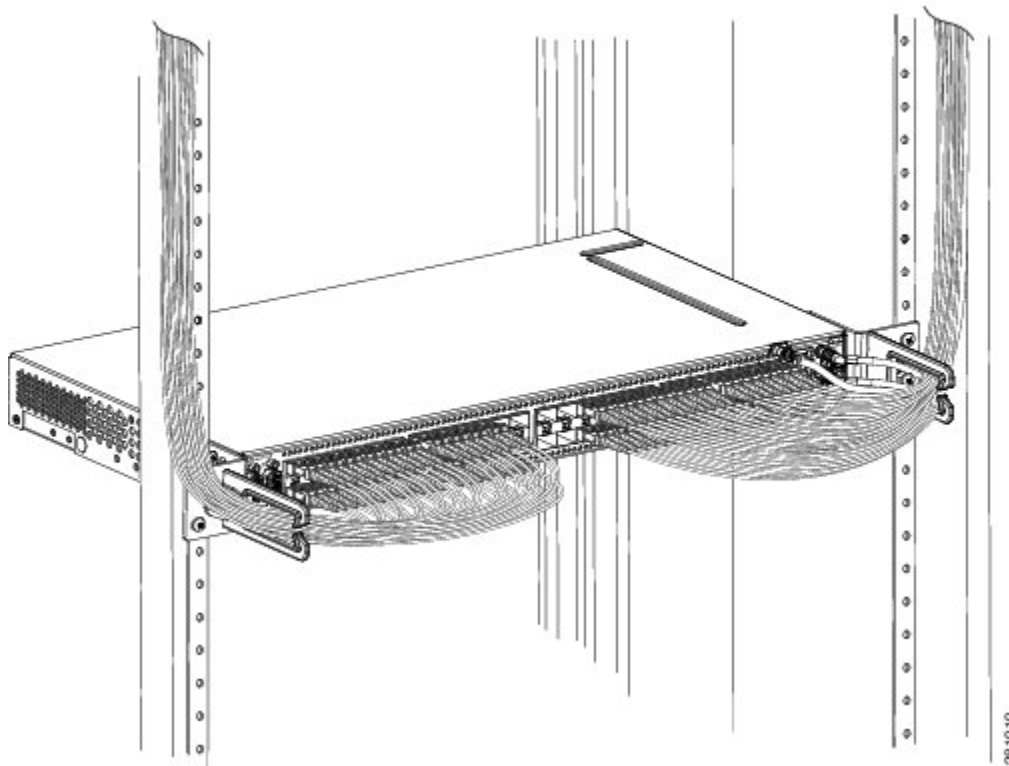
Note   If no cable guide is installed, bind the cables and fibers using the tie-wrap.

Performing the Cisco ASR 9000v Satellite Shelf Installation Acceptance Test

SUMMARY STEPS

1. Once you have installed your Cisco ASR 9000v satellite shelf, verify that you have completed each applicable procedure listed in this table.
2. Inspecting the Cisco ASR 9000v Satellite Shelf Installation and Connections, on page 65.
3. Measuring DC Voltage on the Cisco ASR 9000v Satellite Shelf, on page 65.
4. Continue with Performing the Cisco ASR 9000v Satellite Shelf Installation Acceptance Test, on page 64.

DETAILED STEPS

Step 1   Once you have installed your Cisco ASR 9000v satellite shelf, verify that you have completed each applicable procedure listed in this table.

Table 13: Procedure Summary for Installing the Cisco ASR 9000v Satellite Shelf

Procedure	Completed
Unpacking and Inspecting the Cisco ASR 9000v Satellite Shelf, on page 24	
Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge, on page 17 section.	
Installing the Power Feeds and Ground to the Cisco ASR 9000v Satellite Shelf, on page 46	
Connecting Cables to the EOBC, Timing, and Console Ports on the Cisco ASR 9000v Satellite Shelf , on page 58	
Installing and Routing Fiber-Optic Cables, on page 61	

Step 2   Inspecting the Cisco ASR 9000v Satellite Shelf Installation and Connections, on page 65.

Step 3   Measuring DC Voltage on the Cisco ASR 9000v Satellite Shelf, on page 65.

Step 4   Continue with Performing the Cisco ASR 9000v Satellite Shelf Installation Acceptance Test, on page 64.

Inspecting the Cisco ASR 9000v Satellite Shelf Installation and Connections

SUMMARY STEPS

1. Make sure that all external wiring connections (that is, power, ground, alarms, and so on) are secure. If a wire or cable is loose, return to the appropriate procedure in this chapter to correct it.

DETAILED STEPS

Make sure that all external wiring connections (that is, power, ground, alarms, and so on) are secure. If a wire or cable is loose, return to the appropriate procedure in this chapter to correct it.

Measuring DC Voltage on the Cisco ASR 9000v Satellite Shelf

Warning   To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module. Statement 390

Caution   Do not apply power to the shelf assembly until you complete all the installation steps.

SUMMARY STEPS

1. Using a voltmeter, verify the office battery and ground at the following points on the fuse panel:

2. Using a voltmeter, verify the shelf ground and power wiring: Place the black lead (positive) on the RET1(A) and the red lead on the –48 V (A) or –24 V (A) point.

3. Using a voltmeter, verify the Cisco ASR 9000v satellite shelf for –48 VDC or –24 VDC battery and return:

DETAILED STEPS

Step 1 Using a voltmeter, verify the office battery and ground at the following points on the fuse panel:

a) To verify the power, place the black test lead of the voltmeter to the return (RET). Hold it there while completing Step b.

b) Place the red test lead on the fuse power points on the third-party power distribution panel to verify that they read between:

   • For a 48-VDC power supply, the voltage is between –40.5 VDC and –57.6 VDC. Place the red test lead on the BAT-B connection and verify that it is between –40.5 VDC and –57.6 VDC.
   • For a 24-VDC power supply, the voltage is between –20 VDC and –28.3 VDC. Place the red test lead on the BAT-B connection and verify that it is between –20 VDC and –28.3 VDC.

   Note The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf with a 48-VDC power supply. The nominal steady state voltage is –48 VDC.

   Note The voltages –20 VDC and –28.3 VDC are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf with a 24-VDC power supply. The nominal steady state voltage is –24 VDC.

Step 2 Using a voltmeter, verify the shelf ground and power wiring: Place the black lead (positive) on the RET1(A) and the red lead on the –48 V (A) or –24 V (A) point.

   • For the Cisco ASR 9000v satellite shelf with 48 V power supply, verify a reading between –40.5 VDC and –57.6 VDC.
   • For the Cisco ASR 9000v satellite shelf with 24V power supply, verify a reading between –20 VDC and –28.3 VDC.

If there is no voltage, check the following and correct if necessary:

   • Battery and ground are reversed to the shelf.
   • Battery is open or missing.
   • Return is open or missing.

Step 3 Using a voltmeter, verify the Cisco ASR 9000v satellite shelf for –48 VDC or –24 VDC battery and return:

a) To verify the BAT-A of the Cisco ASR 9000v satellite shelf, place the black lead of the voltmeter to the return. Place the red test lead to the –48-V or –24-V (BAT-A battery connection) red cable. For a 48-VDC power supply, verify that it reads between –40.5 VDC and –57.6 VDC. For a 24-VDC power supply, verify that it reads between –20 VDC and –28.3 VDC. Then place the red test lead of the voltmeter to the RET1 (BAT-A return ground) black cable and verify that no voltage is present, that is, that the meter reading is 0 VDC.

   Note For a Cisco ASR 9000v satellite shelf that has 24 VDC power supply, the voltages –20 VDC and –28.3 VDC. are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf. The nominal steady state voltage is –24 VDC.

   Note For a Cisco ASR 9000v satellite shelf that has 48 VDC power supply, the voltages –40.5 VDC and –57.6 VDC. are, respectively, the minimum and maximum voltages required to power the Cisco ASR 9000v satellite shelf. The nominal steady state voltage is –48 VDC.

b) To verify the BAT-B of the Cisco ASR 9000v satellite shelf, place the black test lead of the voltmeter to the return. Place the red test lead to the –48 V o4 –24 V(BAT-B battery connection) red cable. For a 48-VDC power supply, verify that it reads between –40.5 VDC and –57.6 VDC. For a 24-VDC power supply, verify that it reads between –20 VDC and –28.3 VDC. Then place the red test lead of the voltmeter to the RET2 (BAT-B return ground) black cable and verify that no voltage is present, that is, that the meter reading is 0 VDC.

Maintaining the Cisco ASR 9000v Satellite Shelf

Air Filter Overview

The Cisco ASR 9000v satellite shelf contains a preinstalled reusable air filter (A9KV-50-FTF=) on the right side of the shelf.

The reusable filter is made up of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. Spare filters should be kept in stock. The air filter can be replaced without removing the fan tray assembly. However, the fan tray must be turned off to remove the air filter.

A periodic health check of the air filter, every 3 months depending on the level of dust in the environment, will help to avoid over-clogging of the air filter and provide better life.The Cisco ASR 9000v satellite shelf's air filter may be used as a single-use or be reused depending on local deployment requirements.

- If reuse of the air filter is prohibited, it should be replaced every six months with a new air filter (A9KV-50-FTF=), as described in the section.
- If reuse of the air filter is permitted, the filter media can be cleaned with slightly compressed air, vacuumed, or rinsed with clean water. If a degreaser is required, use only a mild detergent such as dishwashing liquid. Avoid cleaning the air filter with harsh cleaning agents or solvents. If the air filter is cleaned with water, it should be completely dry before reinstalling. Even though the air filter can be cleaned, replacement is recommended every two to three years to ensure media durability and to eliminate residual dust build-up and subsequent air flow resistance.

⚠

Caution   Do not operate a Cisco ASR 9000v satellite shelf without the mandatory air filter.

Replacing the Air Filter in the Cisco ASR 9000v Satellite Shelf

✎

Note   Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the .

⚠

Caution   Do not operate the Cisco ASR 9000v satellite shelf without an air filter.

✎

Note Replacement or cleaning of an air filter is recommended every 60 days. Air filters are replaceable or reusable.

SUMMARY STEPS

1. Loosen the screw on the air filter faceplate, as shown in this figure.
2. Extract the air filter from the Cisco ASR 9000v satellite shelf, as shown in this figure.
3. Remove the air filter faceplate from the air filter frame, as shown in this figure.
4. Clean or replace the air filter.
5. Insert the air filter faceplate engaging the air filter frame, as shown in this figure.
6. Insert the air filter into the Cisco ASR 9000v satellite shelf.
7. Tighten the M3 screw on the air filter to a torque value of 4 in-lb (0.45 N-m).

DETAILED STEPS

Step 1   Loosen the screw on the air filter faceplate, as shown in this figure.

Figure 38: Removing the Air Filter in the Cisco ASR 9000v Satellite Shelf
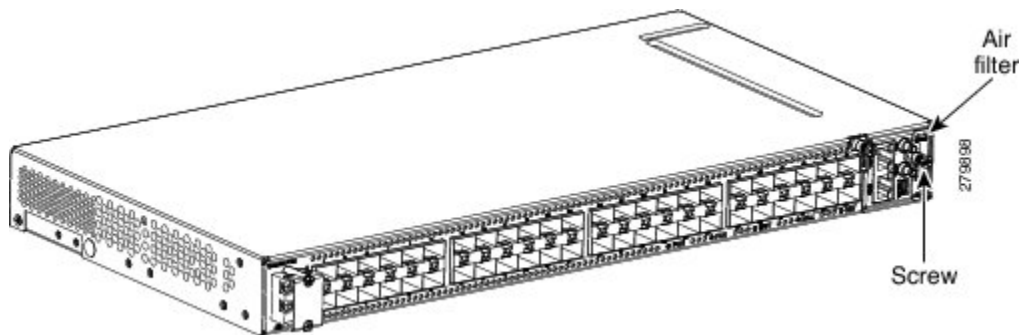
Step 2   Extract the air filter from the Cisco ASR 9000v satellite shelf, as shown in this figure.

Figure 39: Extracting the Air Filter in the Cisco ASR 9000v Satellite Shelf
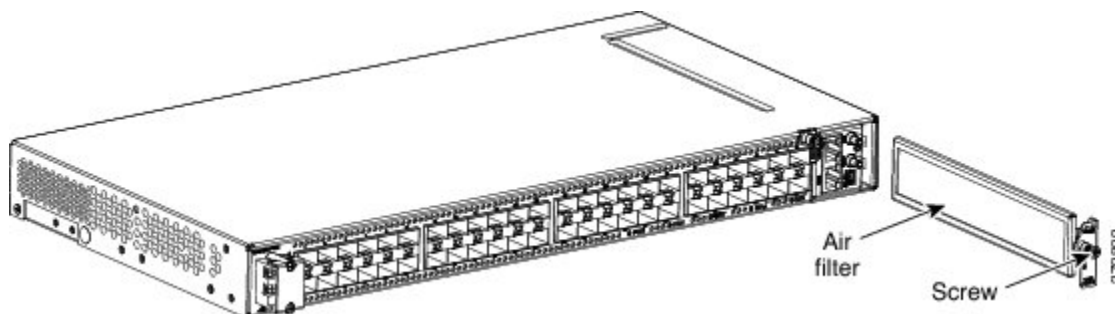
Step 3   Remove the air filter faceplate from the air filter frame, as shown in this figure.

Figure 40: Removing the Air Filter from the Air Filter Faceplate
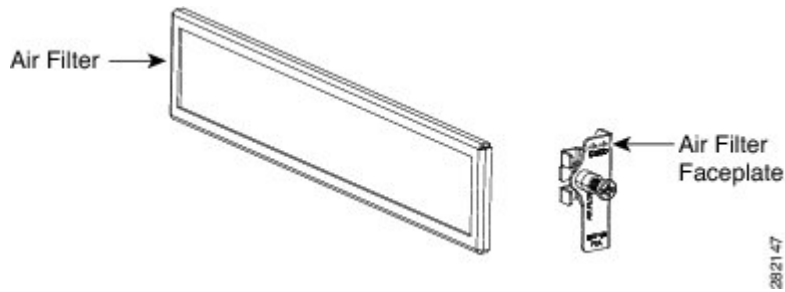
Step 4   Clean or replace the air filter.

Step 5   Insert the air filter faceplate engaging the air filter frame, as shown in this figure.

Figure 41: Attach the Air Filter Faceplate to the Air Filter Frame
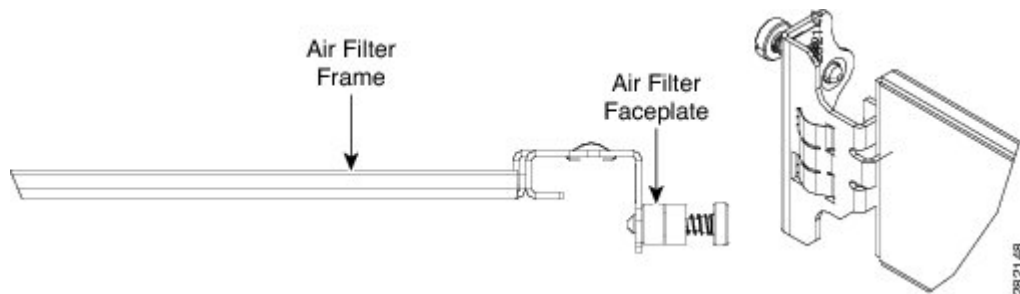
Step 6   Insert the air filter into the Cisco ASR 9000v satellite shelf.

Step 7   Tighten the M3 screw on the air filter to a torque value of 4 in-lb (0.45 N-m).

Fan Tray Assembly

The fan tray assembly is preinstalled on the right side of the Cisco ASR 9000v satellite shelf. The fan tray assembly is removable and holds fans and fan-control circuitry for the Cisco ASR 9000v satellite shelf. The fan tray assembly should be accessed only if a fan failure occurs.

The fan tray assembly has the following ports:

- EOBC (Ethernet Out-of-Band Channel)—An RJ-45 port that supports high bandwidth external connectivity. If the Cisco ASR 9000v satellite shelf fails to boot up, the EOBC port also called as the disaster recovery port is used to log in to the Cisco ASR 9000v satellite shelf for troubleshooting.

Note   The EOBC port is meant for usage only by TAC (Technical Assistance Center).

- PPS (Pulse Per Second)—A mini-BNC output port that provides timing signals to an external equipment from the Cisco ASR 9000v satellite shelf.
- 10MH—A mini-BNC output port that provides timing signals at a frequency of 10 MHz to an external equipment from the Cisco ASR 9000v satellite shelf and RET for power terminals A and B.

- ToD/PPS (Time of Day/Pulse Per Second)—An RJ-45 serial output port that provides time and day information and timing signals to an external equipment from the Cisco ASR 9000v satellite shelf.
- CONSOLE—A USB port that is used to connect a console terminal. The console terminal can be one of the following:

  - An ASCII terminal or a PC running terminal emulation software
  - A modem

The following figure shows the ports on the fan tray assembly:

Figure 42: Ports on the Fan Tray Assembly
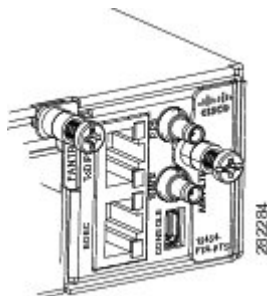
The console port provides access to the Cisco ASR 9000v satellite shelf either locally (using a console terminal), or remotely (using a modem). Console connections transmit at slower speeds than modems; therefore, the console connection is suited for use with console terminals.

Note An RJ-45 serial port is used for TOD/PPS functionality. The two RJ-45 pins 7 and 8 is used for TOD (Time Of Day) functionality and the other two RJ-45 pins 1 and 2 are used for PPS functionality. Even though an RJ-45 cable is used for TOD/PPS connection, a serial link is established. Two mini coax connectors with RG316 1.0/2.3 M/M cables (50 ohm) are used for PPS (Pulse Per Second) and for 10MHz sinusoidal signal. Cable for TOD/PPS and 10MHz shall be shielded.

Note For rules about provisioning timing references, see Telcordia SR-NWT-002224.

Fan Speed

Fan speed is controlled by the microprocessor present in the Cisco ASR 9000v satellite shelf. The sensors measure the critical component temperature of the Cisco ASR 9000v satellite shelf. Fan speed options are low, medium, and high.

Fan Failure

If one or more fans fail on the fan tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the Cisco ASR 9000v satellite shelf illuminates when one or more fans fail. The red Fan Fail LED clears after you install a working fan tray.

Replacing the Fan Tray Assembly in the Cisco ASR 9000v Satellite Shelf

Note Before you perform this procedure, ensure that the chassis is connected to the office ground. For detailed instructions on how to ground the chassis, see the Grounding the Cisco ASR 9000v Satellite Shelf, on page 42.

Caution Do not operate the Cisco ASR 9000v satellite shelf without an air filter.

Note The estimated time for a skilled technician to replace an equipment fan or fan tray is 2 minutes.

Note The fan or the cooling unit can be replaced without service interruption.

Caution Do not force a fan tray module into place. Doing so can damage either the connectors on the fan tray or the connectors on the back panel of the shelf assembly, or both.

Note Error messages appear on the fan tray LED and in Cisco IOS XR software when the fan tray module is removed from the shelf or when one fan is not working.

SUMMARY STEPS

1. Loosen the screw on the fan tray assembly, as shown in this figure.
2. Extract the fan tray assembly partially (not more than 1 inch) to disconnect the backplane connector and wait until the fan stops.
3. When the fans have stopped, pull the fan tray assembly completely out of the shelf, as shown in this figure.
4. Slide the new fan tray assembly into the Cisco ASR 9000v satellite shelf until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.
5. Tighten the M3 screw on the fan tray assembly to a torque value of 4 in-lb (0.45 N-m).

DETAILED STEPS

Step 1 Loosen the screw on the fan tray assembly, as shown in this figure.

Figure 43: Fan Tray Assembly in the Cisco ASR 9000v Satellite Shelf
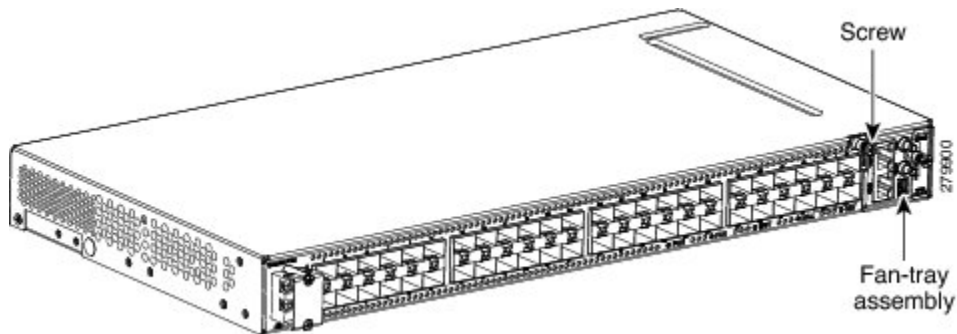
Step 2   Extract the fan tray assembly partially (not more than 1 inch) to disconnect the backplane connector and wait until the fan stops.

Step 3   When the fans have stopped, pull the fan tray assembly completely out of the shelf, as shown in this figure.

Figure 44: Fan Tray Assembly in the Cisco ASR 9000v Satellite Shelf Extracted
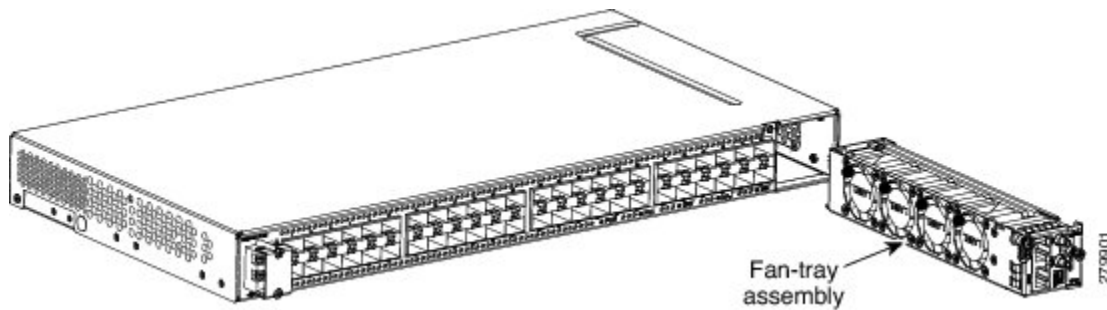
Step 4   Slide the new fan tray assembly into the Cisco ASR 9000v satellite shelf until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.

Step 5   Tighten the M3 screw on the fan tray assembly to a torque value of 4 in-lb (0.45 N-m).

Cleaning Fiber Connectors

Required Tools and Equipment

You need the following tools and equipment:

- Inspection microscope
- Type A Fiber Optic Connector Cleaner (CLETOP reel)
- Optical swab
- Optical receiver cleaning stick

> ⚠
>
> **Warning** Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. Statement 1056

SUMMARY STEPS

1. Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.
2. Replace any damaged fiber connectors.
3. Complete the Cleaning Fiber Connectors with CLETOP, on page 74 as necessary.
4. Complete the Cleaning Fiber Adapters, on page 74 as necessary.

DETAILED STEPS

Step 1 Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2 Replace any damaged fiber connectors.

> **Note** Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Step 3 Complete the Cleaning Fiber Connectors with CLETOP, on page 74 as necessary.

Step 4 Complete the Cleaning Fiber Adapters, on page 74 as necessary.

> **Note** To clean multi-fiber optic connectors, complete the Cleaning Multi-Fiber Optic Cable Connectors, on page 73 as necessary.

Cleaning Multi-Fiber Optic Cable Connectors

> ⚠
>
> **Warning** Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

SUMMARY STEPS

1. Remove the protective cap on the optical-fiber cable connector.
2. Read the manufacturer (cleaning cartridge) instructions to insert the connector into the cleaning cartridge.
3. Slide the lever on the cartridge to swipe the connector surface.
4. Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

DETAILED STEPS

Step 1 Remove the protective cap on the optical-fiber cable connector.

Step 2 Read the manufacturer (cleaning cartridge) instructions to insert the connector into the cleaning cartridge.

Step 3   Slide the lever on the cartridge to swipe the connector surface.

Step 4   Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note   If you must replace a dust cap on a connector, first verify that the dust cap is clean.

Cleaning Fiber Connectors with CLETOP

Required Tools and Equipment

You need the following tools and equipment:

- Type A Fiber Optic Connector Cleaner (CLETOP reel)
- Optical receiver cleaning stick

SUMMARY STEPS

1. Remove the dust cap from the fiber connector.
2. Press the lever up to open the shutter door. Each time you press the lever, you expose a clean wiping surface.
3. Insert the connector into the CLETOP cleaning cassette slot, rotate one quarter turn, and gently swipe downwards.
4. Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat Steps 1 to 3.
5. Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

DETAILED STEPS

Step 1   Remove the dust cap from the fiber connector.

Step 2   Press the lever up to open the shutter door. Each time you press the lever, you expose a clean wiping surface.

Step 3   Insert the connector into the CLETOP cleaning cassette slot, rotate one quarter turn, and gently swipe downwards.

Step 4   Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat Steps 1 to 3.

Step 5   Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note   If you must replace a dust cap on a connector, first verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry, lint-free wipe and the inside of the dust cap using a CLETOP stick swab (14100400).

Cleaning Fiber Adapters

SUMMARY STEPS

1. Remove the dust plug from the fiber adapter.
2. Insert a CLETOP stick swab (14100400) into the adapter opening and rotate the swab.

3. Place dust plugs on the fiber adapters when not in use.

DETAILED STEPS

Step 1   Remove the dust plug from the fiber adapter.

Step 2   Insert a CLETOP stick swab (14100400) into the adapter opening and rotate the swab.

Step 3   Place dust plugs on the fiber adapters when not in use.

Next Steps

For information on powering up your system, see the "Plug and Play Satellite nV Switch Turn Up" section in the "Configuring the Satellite Network Virtualization (nV) System on the Cisco ASR 9000 Series Router" chapter of the *Cisco ASR 9000 Series Aggregation Services Router InV System Configuration Guide*.

C H A P T E R 3

Installing the Cisco ASR 901 Mobile Wireless Router as a Satellite Shelf

The chapter describes how to install the Cisco ASR 901 router as a satellite shelf, and how to connect it to networks and external devices. These procedures are described in the following sections:

⚠

Danger   Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

⚠

Danger   This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Safety Guidelines

Before you begin installing the Cisco ASR 901 router, review the safety guidelines and rack-mounting configuration guidelines in the Cisco ASR 901 Series Aggregation Services Router Hardware Installation Guide to avoid injuries or damaging the equipment.

In addition, before replacing, configuring, or maintaining the Cisco ASR 901 router, review the safety warnings listed in the document *Cisco Regulatory Compliance and Safety Information for Cisco ASR 901 Series Aggregation Services Router*.

Safety with Equipment

The following guidelines help ensure your safety and protect the equipment. This list does not include all the potentially hazardous situations, so be alert.

⚠️

Warning Read the installation instructions before connecting the system to the power source.Statement 1004

- Before moving the system, always disconnect all the power cords and interface cables.
- Never assume that power is disconnected from a circuit; always check.
- Before and after installation, keep the chassis area clean and dust-free.
- Keep tools and assembly components away from walk areas to avoid tripping over them.
- Do not work alone in potentially hazardous conditions.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Do not wear loose clothing that may get caught in the chassis.
- When working under conditions hazardous to your eyes, wear safety glasses.

Safety with Electricity

⚠️

Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

⚠️

Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

⚠️

Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Statement 1021

⚠️

Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

⚠️

Warning Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12

Warning Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning. Statement 1088

Warning There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015

Warning This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

When working on electrical equipment, follow these guidelines:

- Locate the room's emergency power switch. If an electrical accident occurs, you can quickly switch off the power.
- Before working on the system, switch off the DC main circuit breaker and disconnect the power terminal block cable.
- Disconnect all power before performing the following:

  - Working on or near power supplies.
  - Installing or removing a router chassis, or network processor module.
  - Performing most hardware upgrades.

- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as wet floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:

  - Use caution, and do not become a victim yourself.
  - Switch off power to the router.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
  - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch un-insulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

Preventing Electrostatic Discharge Damage

Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. ESD can occur when electronic printed circuit cards are improperly handled, and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.

⚠

Caution   For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. It should be between 1 and 10 Mohm.

Prerequisites

Before installing the Cisco ASR 901 router, it is important to prepare for installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOPs).
- Unpacking and inspecting the Cisco ASR 901 router.
- Gathering tools and test equipment required to properly install the Cisco ASR 901 router.

Site Planning

Ideally, you should have prepared the installation site beforehand. As part of your preparation, obtain a floor plan of the site and the equipment rack where the Cisco ASR 901 router would be housed. Determine the location of any existing routers and their interconnections, including communications and power. Following the airflow guidelines (see the Airflow Guidelines, on page 81), ensure that adequate cooling air is provided to the router.

All personnel involved in the installation of the router including installers, engineers, and supervisors should participate in the preparation of a Method of Procedure (MOP) for approval by the customer.

Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). Install a power conditioner if necessary (see the Cisco ASR 901 Power Specifications for power requirements).

⚠

Warning   This equipment has been designed for connection to TN and IT power systems. Statement 1007

Site Environment

Install the Cisco ASR 901 router in an equipment rack. The location of your router and the layout of your equipment rack, or wiring room are extremely important considerations for proper operation. Cramped equipment, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdown and can make maintenance difficult. Plan to access the front and rear panels of the router.

Take the following precautions for an acceptable operating environment for your router and to avoid environmentally caused equipment failures:

- Ensure that the room where your router operates has adequate air circulation. Electrical equipment generates heat. Without adequate circulation, ambient air temperature may not cool the equipment to acceptable operating temperatures.
- Always follow ESD-prevention procedures described in the Preventing Electrostatic Discharge Damage, on page 80 to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Airflow Guidelines

To ensure adequate airflow through the equipment rack, we recommend that you maintain a clearance of at least 6 inches (15.24 cm) on each side of the rack at all times.

Caution If airflow through the equipment rack and the routers that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an over temperature condition can occur within the rack and the routers that occupy it.

The site should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers. Thus, increasing the risk of an over temperature condition.

Use the following guidelines to plan your equipment rack configuration:

- Mount the Cisco ASR 901 router in a 19-inch rack (with a 17.5- or 17.75-inch opening).
- Beside airflow, you must allow clearance around the rack for maintenance.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the intakes or (on the left side of the chassis) or the exhaust (on the right side of the chassis).
- When a rack-installed equipment fails, especially equipment in an enclosed rack, try making the equipment operate by itself, if possible. Power off other equipment in the rack (and in adjacent racks) to give the router a maximum of cooling air and clean power.

Method of Procedure

Part of site preparation includes reviewing installation plans or method of procedures (MOPs). An example of a MOP that includes pre-installation checklist of tasks, considerations to address and agree upon before proceeding with the installation, is as follows:

1. Read this hardware installation guide.

2. Assign personnel.
3. Determine protection requirements for personnel, equipment, and tools.
4. Evaluate potential hazards that may affect service.
5. Schedule time for installation.
6. Determine space requirements.
7. Determine power requirements.
8. Identify required procedures or tests.
9. On an equipment plan, make a preliminary decision that locates each Cisco ASR 901 router that you plan to install.
10. Verify the list of replaceable parts for installation (screws, bolts, washers, and so on) so that the parts are identified.
11. Check the required tools list to make sure the necessary tools and test equipment are available (see the section).
12. Perform the installation.

Unpacking and Checking the Contents of Your Shipment

The shipping package for the Cisco ASR 901 router is designed to reduce the possibility of product damage associated with routine handling experienced during shipment. Do not remove the router from its shipping container until you are ready to install it.

Note Do not discard the packaging materials used in shipping your Cisco ASR 901 router. You will need the packaging materials in the future if you move or ship the router.

The Cisco ASR 901 router, cables, and any optional equipment you ordered may be shipped in more than one container. When you unpack the containers, check the packing list to ensure that you receive all of the following items:

- Router
- Accessory kit (part number 53-3085-01/53-3295-0 for the Cisco ASR 901), containing

  - Terminal block (part number 53-3085-01)
  - Two hole lug, 6-AWG ground wire, #10 blue stud (part number 32-0629-01)
  - Two pan-head Phillips screws used to attach the lug to the router, M5.0x10mm
  - Two cable guides (part number 700-01663-01)
  - Two pan-head Phillips screws used to attach the cable guides, M4,0x20mm (part number 48-0654-01)

Note There is no AC power option.

- Cisco Information Packet publication

Inspect all items for shipping damage. If an item appears to be damaged, or if you encounter problems installing or configuring your router, contact customer service. The Cisco Information Packet provides warranty, service, and support information.

Required Tools and Equipment

You need the following tools and equipment to install and upgrade the router and its components:

⚠️

Danger Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

- ESD-preventive cord and wrist strap.
- Number 2 Phillips screwdriver.
- Flat-blade screwdrivers: small, 3/16-inch (0.476 cm) and medium, 1/4-inch (0.625 cm).

  - To install or remove modules
  - To remove the cover, if you are upgrading memory or other components

- Number 12-24 pan-head screws to secure the router to the equipment rack.
- Cables for connection to the WAN and LAN ports (depending on the configuration).

✎

Note For more information on cable specifications, see the Dressing Router Cables, on page 100.

- Ethernet hub or PC with a network interface card for connection to the Ethernet (LAN) ports.
- Console terminal (an ASCII terminal or a PC running terminal emulation software) is configured for 9600 baud, 8 data bits, no parity, and 2 stop bits.
- Console cable for connection to the console port.
- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound-force inches (lbf-in) of pressure.
- Crimping tool as specified by the ground lug manufacturer.
- 16-AWG copper wire for the power cord.
- Wire-stripping tools for stripping both 6-AWG and 18-AWG wire.
- Serial interfaces may require a channel service unit/data service unit (CSU/DSU).

Installation Checklist

To assist you with your installation and to provide a historical record of completed tasks and users, use the following installation checklist. Make a copy of this checklist and mark the entries as you complete each task. When the checklist is completed, include a copy of the checklist for each router in your site log along with other records for your new router. See Site Log, on page 193 for information on the site log, including a sample site log.

Installation Checklist for Site:

Router Name:

Task	Verified by	Date
Installation checklist copied		
Background information placed in site log		

Task	Verified by	Date
Site power voltages verified		
Installation site power check completed		
Required tools available		
Additional equipment available		
Router received		
Documentation DVD received (if ordered)		
Cisco Information Packet publication received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration)		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		
Software image verified		

Creating a Site Log

The site log provides a record of all actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

Create the site log prior to installation. (See Site Log, on page 193 for more detailed information on the site log as well as a sample site log that can be used to make copies.)

Console Port Considerations

The Cisco ASR 901 router provides a single console port (labeled CONSOLE). A single RJ-45 cable is used for a console connection.

This section describes important cabling information to consider before connecting a console terminal—either an ASCII terminal or a PC running terminal emulation software—or a modem to the console port. The console port provides access to the router either locally (using a console terminal) or remotely (using a modem).

Note The Cisco ASR 901 router uses only console port.

Note Console and rollover cables are not included with the Cisco ASR 901 router. You can order the console cable from Cisco Systems, Inc. (Part number ACS-1900ASYN=).

Console Port Connections

The router provides an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port appears as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable.

To connect an ASCII terminal to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-25 adapter (labeled TERMINAL). To connect a PC running terminal emulation software to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-9 adapter (labeled TERMINAL). The default parameters for the port are 9600 baud, 8 data bits, no parity, and 2 stop bits. As a console port, hardware flow control is not supported. For instructions on installing a console terminal, see the Connecting the Console Port, on page 95.

For cable and port pinouts, see the *Cisco Modular Access Router Cable Specifications* document. This document is provided on the documentation DVD that accompanied your router (if ordered), and is also available online at Cisco.com.

Network Modules

You can order the Cisco ASR 901 router as a satellite shelf with the following interface modules.

- SFP Ethernet interface module
- RJ-45 Ethernet interface module

Interface modules are installed and shipped with the router; they are not field replaceable.

Mounting the Cisco ASR 901 Router

Each Cisco ASR 901 router includes rack-mounting brackets. Using the rack-mounting brackets, you can front-mount theCisco ASR 901 router in a 19-inch (48.3-cm) equipment rack that conforms to the EIA-310-D specification (the inside width of the rack should be 17.72 to 17.80 inches [45 to 45.21 cm]).

Using the two rack-mounting brackets for mounting (part number 700-33522-01), you can recess Cisco ASR 901 router in the equipment rack. This arrangement provides extra space in front of the router for the cables and allows you to close the doors of racks equipped with front-close doors.

If you need to attach or replace the rack-mounting brackets, see the Attaching the Rack-Mounting Brackets, on page 86.

The rack-mounting brackets are slotted to allow the router to be mounted in racks with EIA 1.25-inch (3.175-cm) or WECO 1.0-inch (2.54-cm) hole spacing. When installed in the rack, the Cisco ASR 901 router requires one EIA 1.75-inch (4.4-cm) vertical mounting space (or 1 rack unit [RU]) for mounting (see the Mounting the Cisco ASR 901 Router in a Rack, on page 87).

⚠

Caution   Allow clearance on either side of the Cisco ASR 901 router for cooling air to be drawn in through the left side and circulated through the chassis and out the two fan exhaust ports mounted on the other side of the chassis.

Rack-Mounting Configuration Guidelines

Follow these guidelines to configure the equipment rack:

- When mounting the router to an equipment rack, ensure that the rack is bolted to the floor.
- Because you may install more than one router into the rack, ensure that the weight of all of the routers installed does not make the rack unstable.

⚠

Caution   Some equipment racks are also secured to ceiling brackets, if necessary, due to the weight of the equipment in the rack. Make sure that the rack that you are using to install the routers is secured to the building structure.

- As mentioned in the Airflow Guidelines, on page 81, maintain a 6-inch (15.24-cm) clearance on each side of the router to ensure adequate air intake and exhaust.
- Avoid installing the routers in an overly congested rack. Air flowing to or from other routers in the rack might interfere with the normal flow of cooling air through the routers, increasing the potential for overtemperature conditions within the routers.
- Allow at least 19 inches (48.7 cm) of clearance at the front and rear of the rack for router maintenance.
- Follow your local practices for cable management. Ensure that cables to and from the routers do not impede access to perform equipment maintenance or upgrades.

Attaching the Rack-Mounting Brackets

Complete the following tasks to install, replace, or rearrange the rack-mounting brackets so you can then mount the Cisco ASR 901 router in a 19-inch (48.3-cm) equipment rack. You can use the same rack-mounting brackets to front-mount the Cisco ASR 901 router in the equipment rack.

SUMMARY STEPS

1. Locate the mounting holes of the Cisco ASR 901 router.
2. Align the rack-mounting bracket with the Cisco ASR 901 router and position with the four #6-32 x 0.25-inch screws (provided) (see this figure for front-mounting).
3. Insert the screws (four places) and tighten using a Number 2 Phillips screwdriver.
4. Repeat Steps 2 and 3 for the other rack-mounting bracket.

DETAILED STEPS

Step 1   Locate the mounting holes of the Cisco ASR 901 router.

Step 2   Align the rack-mounting bracket with the Cisco ASR 901 router and position with the four #6-32 x 0.25-inch screws (provided) (see this figure for front-mounting).

Figure 45: Attaching the Bracket for Front-Mounting
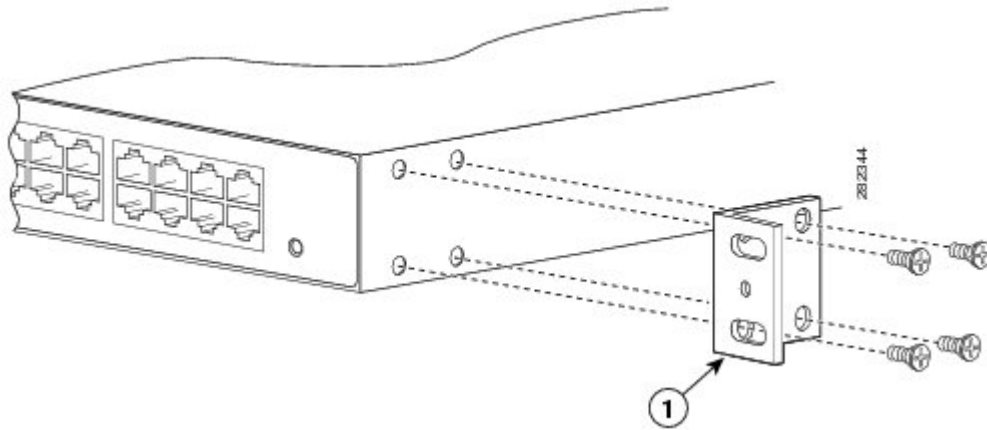
1	Rack mount bracket

Step 3   Insert the screws (four places) and tighten using a Number 2 Phillips screwdriver.

Step 4   Repeat Steps 2 and 3 for the other rack-mounting bracket.

Proceed to the next section, "Mounting the Cisco ASR 901 Router in a Rack, on page 87", to continue the installation.

Mounting the Cisco ASR 901 Router in a Rack

Typically, the Cisco ASR 901 router mounts to a 19-inch (48.3-cm) 2-post equipment rack with rack-mounting brackets that attach toward the front of the router sides. The inside width between the two posts or mounting strips (left and right) must be at least 17.72 to 17.80 inches (45 to 45.21 cm). For more information about the equipment rack, see the Cisco ASR 901 Router Hardware Description.

No vertical clearance is necessary above or below the router when it is mounted in the rack.

To secure the Cisco ASR 901 router to the equipment rack, you must use the two mounting screws (provided) for each side or follow your local practices for installing the router into your equipment rack. Ensure that the rack-mount brackets are securely fastened. For more information, see the Attaching the Rack-Mounting Brackets, on page 86.

To mount the Cisco ASR 901 router into the equipment rack, perform the following procedure.

⚠

Caution   To prevent injury, review the Safety Guidelines, on page 77 and the Rack-Mounting Configuration Guidelines, on page 86 before installing the Cisco ASR 901 router in the equipment rack.

SUMMARY STEPS

1.   Locate the equipment rack position where you plan to install the router.

2.   Verify that there are no obstructions and ensure that the equipment rack is stabilized.

3. Position the router in the equipment rack lining up the bracket holes on the router with the holes on the rack and secure with four #6-32 x 0.25-inch mounting screws (two on each side).

4. Tighten the screws using a 1/4-inch flat-blade screwdriver (each side).

DETAILED STEPS

Step 1 Locate the equipment rack position where you plan to install the router.

Step 2 Verify that there are no obstructions and ensure that the equipment rack is stabilized.

Step 3 Position the router in the equipment rack lining up the bracket holes on the router with the holes on the rack and secure with four #6-32 x 0.25-inch mounting screws (two on each side).

> **Note** The vertical spacing for EIA equipment racks is 1.75 inches (4.44 cm), with mounting holes spaced 1.5 inches (3.81 cm) apart.

Step 4 Tighten the screws using a 1/4-inch flat-blade screwdriver (each side).

Attaching the Cable Guides

Complete the following steps to attach the two cable guides to the front of the mounting brackets. This procedure is optional.

> **Note** The cable guides are useful only if your router is front-mounted. Do not attach the cable guides if your router is center-mounted or recess-mounted.

Use the cable guides to dress the cables that attach to the front of the Cisco ASR 901 router. The cable guides allow you to gather the cables and direct them to the left and right sides of the router. This helps to keep the cables from obscuring the fronts of lower routers in the same rack.

SUMMARY STEPS

1. In the accessory kit, locate the two cable guides (part number 700-01663-01) and two M4.0x20mm Phillips screws used to attach the cable guides (part number 48-0654-01).

2. Position the cable guide over the threaded hole in the front flange of either the left or right mounting bracket. The threaded hole is located midway between the two slotted holes used to mount the unit to the rack.

3. Use an M4.0x20mm Phillips screw to fix the cable guide to the mounting bracket. Do not over-tighten the screw.

4. Repeat Steps 2 and 3 to attach the other cable guide.

DETAILED STEPS

Step 1 In the accessory kit, locate the two cable guides (part number 700-01663-01) and two M4.0x20mm Phillips screws used to attach the cable guides (part number 48-0654-01).

Step 2   Position the cable guide over the threaded hole in the front flange of either the left or right mounting bracket. The threaded hole is located midway between the two slotted holes used to mount the unit to the rack.

Figure 46: Attaching the Cable Guide
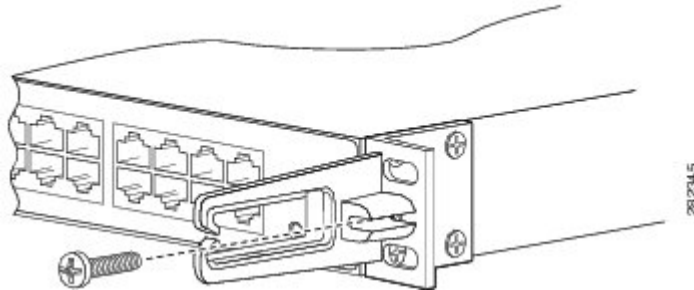
Step 3   Use an M4.0x20mm Phillips screw to fix the cable guide to the mounting bracket. Do not over-tighten the screw.

Step 4   Repeat Steps 2 and 3 to attach the other cable guide.

Note   If you find it awkward to insert the screw while holding the cable guide in place, you can first insert the screw only far enough so that it does not fall out. Then, using the slot in the mounting pillar of the cable guide, slide the cable guide into place around the screw. Finally, tighten the screw to fix the cable guide to the mounting bracket.

Connecting the Chassis Ground and Power

Before you connect power or turn on power to the Cisco ASR 901 router, you must provide an adequate chassis ground (earth) connection to your router.

Grounding the Cisco ASR 901 Router

The Cisco ASR 901 router provides a grounding point on the rear of the unit for a 2-hole lug.

To ensure the chassis ground connection that you provide is adequate, you need the following parts and tools:

• Ratcheting torque screwdriver with Phillips head that exerts up to 15 pound-force inches (lbf-in) of pressure for attaching the ground wire to the router.

• Crimping tool as specified by the ground lug manufacturer

• 16-AWG copper wire for the power cord

• Wire-stripping tools appropriate to the wire you are using

Warning   Before making connections to the Cisco ASR 901 router, ensure that you disconnect the power at the circuit breaker. Otherwise it may result in severe injury or damage to the router.

⚠️

Warning   This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

⚠️

Warning   Use copper conductors only. Statement 1025

⚠️

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

This figure shows the grounding point marked on the rear panel of the Cisco ASR 901 router for ease of installation

Figure 47: Grounding Point
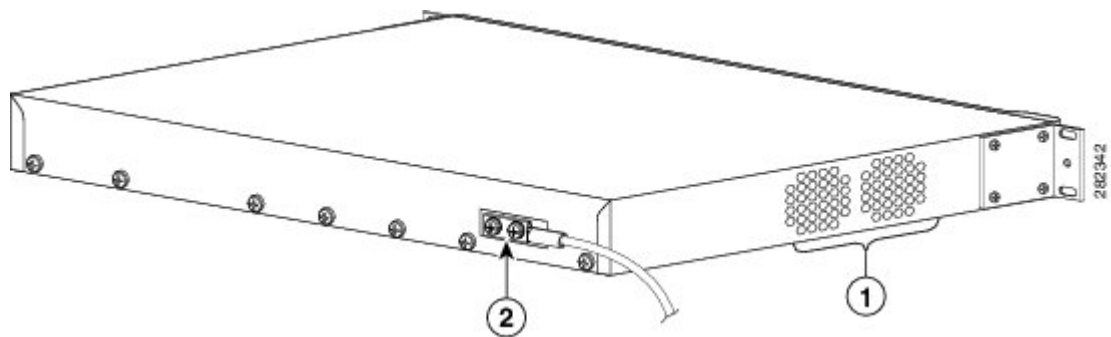
1	Fan
2	Grounding point lug

This unit is to be installed in a restrictive access location and must be permanently grounded to minimum 6-AWG copper ground wire.

Complete the following steps to ground the Cisco ASR 901 router using a 2-hole lug and the corresponding mounting point. Most carriers require a 6-AWG ground connection. Verify your carrier's requirements for the ground connection.

Step 1   In the accessory kit, locate the 2-hole lug, 2 pan-head Phillips head screws used to attach the lug to the router, and 6-AWG ground wire. (Lug, screws, and wire are part number 32-0629-01.)

Step 2   Set the parts aside.

Step 3   If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch ± 0.02 inch (12.7 mm ±0.5 mm) for the ring terminal.

Figure 48: Stripping a Ground Wire
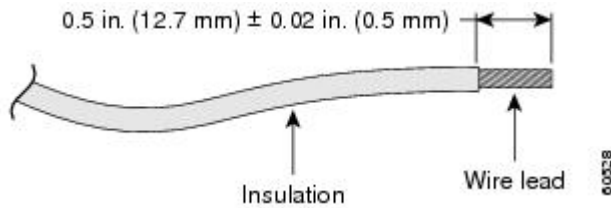
Step 4 Slide the open end of your ground lug over the exposed area of the ground wire.

Step 5 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire (as shown in this figure).

Figure 49: Crimping a Ground Lug onto the Ground Wire
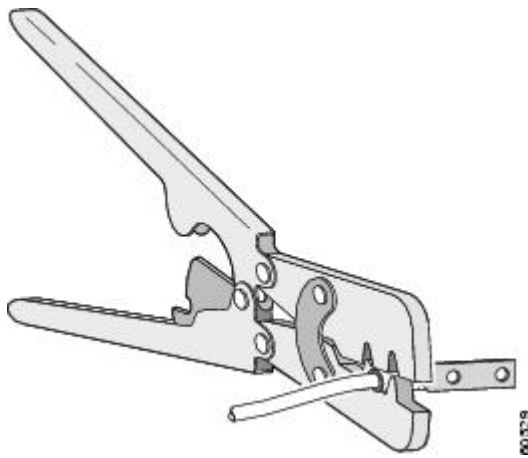
Step 6 Use a Phillips head screwdriver to attach the ground lug and wire assembly to the front of the router with the 2 screws from the accessory kit.

Step 7 Connect the other end of the ground wire to a suitable grounding point at your site.

Power Connection Compliance

⚠

Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

⚠

Warning Use copper conductors only. Statement 1025

✎

Note The installation must comply with the 2002 National Electric Code (NEC) and other applicable codes.

Wiring the DC Input Power Source

⚠️

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 10 A minimum, 60 VDC. Statement 1005

Complete the following steps to connect the DC power supply to the Cisco ASR 901 router:

SUMMARY STEPS

1. Switch off the DC power source at the circuit breaker, and place the circuit breaker in the Off position.
2. Locate the 6-pin terminal block (part number 27-2030-01). The terminal block is located in the accessory kit (part number 53-3085-01 for the Cisco ASR 901 router), which is shipped with the router.
3. Plug the 6-pin terminal block into the power connector located on the front side of the router.
4. Connect one end of the customer-supplied power cord (16-AWG copper wire) to the site DC power source.
5. Plug the connector on the power supply cord into the 6-pin terminal block that you plugged into the rear of the router in Step 3.

DETAILED STEPS

Step 1   Switch off the DC power source at the circuit breaker, and place the circuit breaker in the Off position.

Step 2   Locate the 6-pin terminal block (part number 27-2030-01). The terminal block is located in the accessory kit (part number 53-3085-01 for the Cisco ASR 901 router), which is shipped with the router.

Figure 50: 6-Pin Terminal Block
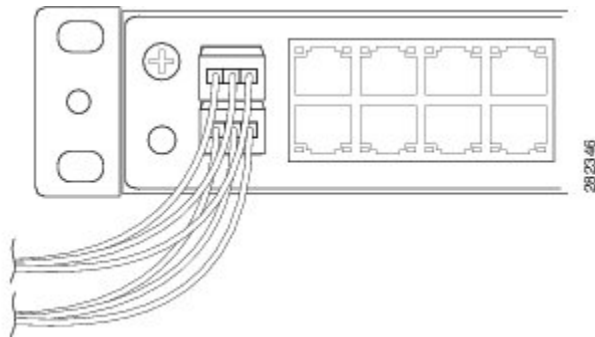
Step 3   Plug the 6-pin terminal block into the power connector located on the front side of the router.

Step 4   Connect one end of the customer-supplied power cord (16-AWG copper wire) to the site DC power source.

Step 5   Plug the connector on the power supply cord into the 6-pin terminal block that you plugged into the rear of the router in Step 3.

What to do next

⚠

Warning   An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the connector(s) or terminal block(s). Statement 122

⚠

Warning   Secure all power cabling when installing this unit to avoid disturbing field-wiring connections. Statement 38

⚠

Caution   Do not power on the unit yet.

Installing and Removing SFP Modules

This section describes how to install and remove SFP modules. The modules are inserted into the SFP module slots on the front of the Cisco ASR 901 router. These field-replaceable modules provide interfaces.

See the *Release Notes for Cisco ASR 901 Series Aggregation Services Router* for the list of supported SFP modules. Each port must match the wavelength specifications on the other end of the cable. For reliable communications, the cable must not exceed 328 feet (100 meters).

For detailed instructions on installing, removing, and cabling the SFP module, see the SFP module documentation.

Installing SFP Modules

This figure shows an SFP module that has a bale-clasp latch.

⚠

Caution   We strongly recommend that you do not install or remove fiber-optic SFP modules with cables attached because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module.Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 51: SFP Module with a Bale-Clasp Latch
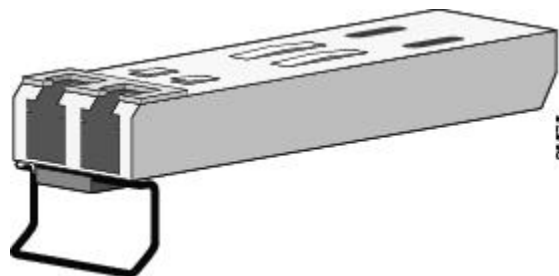
Complete the following steps to insert an SFP module into the module slot:

SUMMARY STEPS

1. Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.
2. If the SFP module that you are using has the markings, use them to identify the top side of the module.
3. Align the SFP module in front of the slot opening.
4. Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot (see the figure below).
5. For fiber-optic SFP modules, remove the dust plugs from the optical ports, and store them for later use.
6. Insert the cable connector into the SFP module:

DETAILED STEPS

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

Some SFP modules identify the top side of the module with transmit (TX) and receive (RX) markings or arrows that show the direction of the connection.

Step 2 If the SFP module that you are using has the markings, use them to identify the top side of the module.

Step 3 Align the SFP module in front of the slot opening.

Step 4 Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot (see the figure below).

Figure 52: Installing an SFP Module into an SFP Module Slot
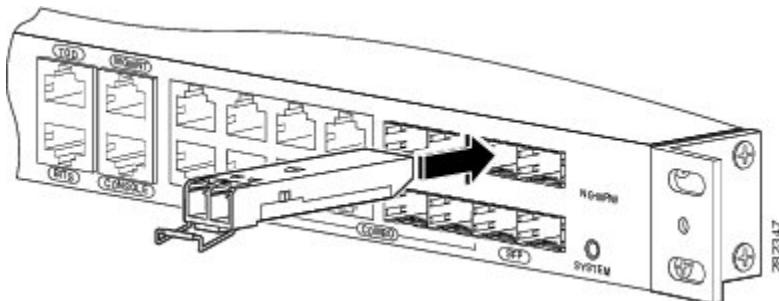
Step 5 For fiber-optic SFP modules, remove the dust plugs from the optical ports, and store them for later use.

Caution Do not remove the dust plugs from the fiber-optic SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Step 6 Insert the cable connector into the SFP module:

• For fiber-optic SFP modules, insert the line card or MT-RJ cable connector into the SFP module.
• For copper 1000BASE-T SFP modules, insert the RJ-45 cable connector into the SFP module.

Removing SFP Modules

Complete the following steps to remove an SFP module from a module receptacle:

Step 1   Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

Step 2   Disconnect the cable from the SFP module, and insert a dust plug into the cable end.

> **Tip**   For reattachment, note which cable connector plug is transmit (TX) and which is receive (RX).

Step 3   Unlock and remove the SFP module, as shown in this figure.

If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

Figure 53: Removing a Bale-Clasp Latch SFP Module by Using a Flat-Blade Screwdriver
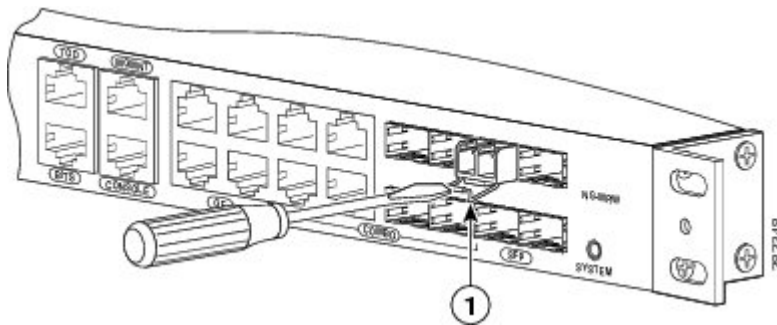
1	Bale clasp

Step 4   Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.

Step 5   For fiber-optic SFP modules, insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.

Step 6   Place the removed SFP module in an antistatic bag or other protective environment.

Connecting Cables

This section describes how to connect the Cisco ASR 901 router to external devices and networks. It includes the following sections:

Connecting the Console Port

> **Warning**   Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning. Statement 1088

The Cisco ASR 901 router has a single console port that can function in DTE mode:

- DTE-mode console (terminal) port for connecting a console terminal

---

Note   The console port functions are asynchronous serial ports; any devices connected to the console port must be cabled for asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco ASR 901 router uses RJ-45 ports for console port function.

We provide the following cables and adapters for connecting the Cisco ASR 901 router to a console terminal:

- One console adapter cable (RJ-45-to-DB-9, blue)

Types of RJ-45 Cables

Cisco products use the following three types of RJ-45 cables:

- Straight-through
- Crossover
- Rolled (or Rollover)

The Cisco ASR 901 router ships with and uses the rollover cable. For instructions on how to identify a rollover cable, see Identifying a Rollover Cable, on page 99.

Console Port

Complete the following steps to connect a terminal or a PC running terminal emulation software to the console port on the router:

SUMMARY STEPS

1. Connect the terminal using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter (labeled TERMINAL) to the console port. For cable pinouts, see the Console Port Signals and Pinouts.
2. Configure the terminal or terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.

DETAILED STEPS

Step 1   Connect the terminal using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter (labeled TERMINAL) to the console port. For cable pinouts, see the Console Port Signals and Pinouts.

Note   The RJ-45-to-DB-25 adapter (Cisco part number 29-0810-01) can be purchased from Cisco Systems.

Step 2   Configure the terminal or terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.

Note   Hardware flow control is not possible on the console port.

Connecting the Network Cables

This section describes how to connect the following router interfaces:

Connecting Gigabit Ethernet Interface Cables

The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco Systems does not supply Category 5 UTP cables; these cables are available commercially.

Complete the following steps to connect the cable to the router Gigabit Ethernet port:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of the cable to the GE port on the router.
3. Connect the other end to the BTS patch or demarcation panel at your site.

DETAILED STEPS

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of the cable to the GE port on the router.

Step 3 Connect the other end to the BTS patch or demarcation panel at your site.

What to do next

For more information about Gigabit Ethernet connectors including pinouts, see the Gigabit Ethernet Connector Pinouts.

Connecting SFP Cables

Complete these steps to connect the cable to a router SFP port.

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Insert the SFP module patch cable into the slot until you feel the connector on the cable snap into place in the rear of the slot.
3. Connect the other end to the patch or demarcation panel at your site.
4. Turn on power to the router (see the Powering On the Router, on page 100 for more details).

DETAILED STEPS

Step 1 Confirm that the router is powered off.

Step 2 Insert the SFP module patch cable into the slot until you feel the connector on the cable snap into place in the rear of the slot.

Step 3 Connect the other end to the patch or demarcation panel at your site.

Step 4 Turn on power to the router (see the Powering On the Router, on page 100 for more details).

What to do next

For more information about SFP connectors, see the SFP Port Pinouts and Cable Specifications, on page 181.

Connecting Cables to the BITS Interface

Complete these steps to connect the cable to the router BITS port:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of the cable to the BITS port using a T1/E1 cable.
3. Connect the other end to the SETS unit.
4. Turn on power to the router (see the Powering On the Router, on page 100 for more details).

DETAILED STEPS

Step 1	Confirm that the router is powered off.
Step 2	Connect one end of the cable to the BITS port using a T1/E1 cable.
Step 3	Connect the other end to the SETS unit.
Step 4	Turn on power to the router (see the Powering On the Router, on page 100 for more details).

What to do next

For more information about T1/E1 connectors including pinouts, see the T1/E1 Port Pinouts, on page 182.

Connecting GPS Cables

The following sections describe how to connect cables from the Cisco ASR 901 router to a GPS unit for input or output timing or frequency.

- Connecting Cables to the 10-Mhz or 1-PPS Interface, on page 98
- Connecting Cables to the ToD Interface, on page 99

Connecting Cables to the 10-Mhz or 1-PPS Interface

Complete these steps to connect cables to the 10-Mhz or 1-PPS interface:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of a mini-coax cable to the GPS unit.
3. Connect the other end of the mini-coax cable to the 10-Mhz or 1-PPS port on the Cisco ASR 901 router.

DETAILED STEPS

Step 1	Confirm that the router is powered off.
Step 2	Connect one end of a mini-coax cable to the GPS unit.

Step 3 Connect the other end of the mini-coax cable to the 10-Mhz or 1-PPS port on the Cisco ASR 901 router.

For instructions on how to configure clocking, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*.

What to do next

For more information about 10-Mhz and 1-PPS port pinouts, see the GPS Port Pinouts, on page 186.

Connecting Cables to the ToD Interface

Complete these steps to connect cables to the ToD interface for GPS timing.

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of a straight-through Ethernet cable to the GPS unit.
3. Connect the other end of the cable to the ToD port on the Cisco ASR 901 router.

DETAILED STEPS

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of a straight-through Ethernet cable to the GPS unit.

Step 3 Connect the other end of the cable to the ToD port on the Cisco ASR 901 router.

For instructions on how to configure clocking, see the Cisco ASR 901 *Router Software Configuration Guide.*

Note For more information about BITS port pinouts, see the Time of Day Pinouts, on page 185.

Connecting to the Alarm Port

Use a straight cable to connect to the alarm port. For details on the pinouts, see the Alarm Port Pinouts, on page 186 section.

Connecting to the Management Ethernet Port

Use a straight or a crossover Ethernet cable to connect to the management ethernet port. For details on the pinouts, see the Management Ethernet Port Pinouts, on page 187 section.

Identifying a Rollover Cable

To identify a rollover cable, compare the modular plugs at the two ends of the cable. When you hold the plugs side by side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug (see figure below.) If you purchased your cable from Cisco Systems, pin 1 is white on one connector, and pin 8 is white on the other (a rollover cable connects pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure 54: Identifying a Rollover Cable
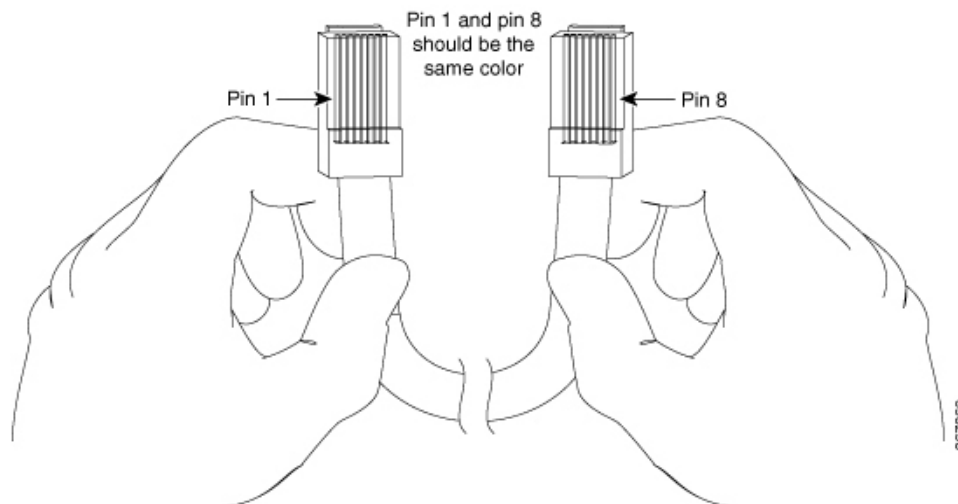
Dressing Router Cables

Ensure that all Cisco router cables are properly dressed so as not to interfere with each other or other pieces of equipment. Use local practices to ensure that the cables attached to your router are properly dressed.

> **Note** If your Cisco ASR 901 router is front-mounted, you can use the cable guide (found in the accessory kit) to dress the cables.

To continue the installation, proceed to the next section, "Powering On the Router, on page 100."

Powering On the Router

> **Warning** Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. Statement 4

> **Warning** This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Checklist for Power Up

Complete these steps to power on the Cisco ASR 901 router:

- Securely mount the router.
- Properly connect the power, network, and interface cables.

Interpreting Front-Panel LEDs

The Cisco ASR 901 router provides a number of LEDs on the front panel to monitor conditions and to aid in troubleshooting problems. For a description of the LEDs, see the LEDs, on page 12 section.

Power-On Procedure

Complete these steps to power on the Cisco ASR 901 router and verify its initialization and self-test:

SUMMARY STEPS

1. Remove the tape from the circuit breaker switch handle.
2. Restore power by moving the handle of the circuit breaker to the ON position.

DETAILED STEPS

Step 1   Remove the tape from the circuit breaker switch handle.

Step 2   Restore power by moving the handle of the circuit breaker to the ON position.

The LED (labeled POWER) on the front panel should go ON, and the fans should operate.

Depending on your installation, other front-panel LEDs can also come on.

Note   If you encounter problems when you power on the router, see the "Troubleshooting" section in the *Cisco ASR 901 Series Aggregation Services Router Hardware Installation Guide*.

What to Do After Installing the Hardware

After you install the router hardware, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide* for the software configuration information.

Installing the Cisco ASR 903 Router as a Satellite Shelf

The chapter describes how to install the Cisco ASR 903 Router as a satellite shelf, and how to connect it to networks and external devices.

Safety Guidelines

Before you begin the installation of the Cisco ASR 903 Router as a satellite shelf, review the safety guidelines in this chapter to avoid injuring yourself or damaging the equipment.

In addition, before replacing, configuring, or maintaining the Cisco ASR 903 Router as a satellite shelf, review the safety warnings listed in Regulatory Compliance and Safety Information for the Cisco ASR 903 Router .

Standard Warning Statements

To see translations of the warnings that appear in this publication, see the Regulatory Compliance and Safety Information document that accompanied this device.

Warning To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:This unit should be mounted at the bottom of the rack if it is the only unit in the rack.When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006

Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Warning To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 149°F (65°C). Statement 1047

Warning The chassis should be mounted on a rack that is permanently affixed to the building. Statement 1049

Warning IMPORTANT SAFETY INSTRUCTIONS: This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

Warning This is a Class A Device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type. Statement 294

Warning This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. Statement 340

⚠️

Warning   This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. Statement 287.

Safety Guidelines for Personal Safety and Equipment Protection

The following guidelines help ensure your safety and protect the equipment. This list does not include all the potentially hazardous situations. Therefore, you should be on alert.

- Before moving the system, always disconnect all the power cords and interface cables.
- Never assume that power is disconnected from a circuit; always check.
- Before and after installation, keep the chassis area clear and dust-free.
- Keep tools and assembly components away from walk areas where you or others could trip over them.
- Do not work alone if potentially hazardous conditions exist.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Do not wear loose clothing that may get caught in the chassis.
- When working under conditions that may be hazardous to your eyes, wear safety glasses.

Safety Precautions for Module Installation and Removal

Be sure to observe the following safety precautions when you work on the router.

To see translations of the warnings that appear in this publication, see the Regulatory Compliance and Safety Information document that accompanied this device.

⚠️

Warning   Class 1 laser product. Statement 1008

⚠️

Warning   Do not stare into the beam or view it directly with optical instruments. Statement 1011

⚠️

Warning   Invisible laser radiation present. Statement 1016

⚠️

Warning   Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

⚠️

Warning   Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Warning   Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034

Warning   Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Safety with Electricity

Warning   Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12

Warning   Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

Warning   Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning. Statement 1088

Warning   Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning   Read the installation instructions before connecting the system to the power source. Statement 1004

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated: For a -48/-60 VDC installation, the wire shall be 12 AWG minimum with a 20 A branch circuit breaker. For a 24 VDC installation, the wire shall be 8 AWG minimum with a 40 A branch circuit breaker. Statement 1005

Warning   This product relies on the building's installation for short-circuit (overcurrent) protection. For an AC installation, ensure that the branch circuit breaker is rated a maximum 20A. Statement 1005

Warning There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015

Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Warning When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Statement 1058

Warning Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018

Warning The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019

Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021

Warning A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022

Warning To reduce the risk of fire, use only 26 AWG or larger telecommunication line cord. Statement 1023

Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning Use copper conductors only. Statement 1025

Warning   This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Warning   To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032

Warning   Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards. Statement 1033

Warning   Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool. Statement 1035

Warning   Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Statement 1036

Warning   Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages. Statement 1041

Warning   This product requires short-circuit (overturned) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

Warning   Never install an AC power module and a DC power module in the same chassis. Statement 1050

Warning   When you connect or disconnect the power and/or alarm connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that all power is removed from the switch and any other circuits. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Statement 1058

⚠

Warning This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064

⚠

Warning If you connect or disconnect the console cable with power applied to the switch or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. Statement 1080

⚠

Warning Installation of the equipment must comply with local and national electrical codes. Statement 1074

⚠

Warning Hazardous voltage or energy may be present on power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1086

When working on equipment powered by electricity, follow these guidelines:

- Locate the room's emergency power-off switch. If an electrical accident occurs, you will be able to quickly turn off the power.
- Before working on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Before doing the following, disconnect all power:

    - Working on or near power supplies
    - Installing or removing a router chassis or network processor module
    - Performing most hardware upgrades

- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:

    - Use caution, and do not become a victim yourself.
    - Turn off power to the router.
    - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
    - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.

- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). Install a power conditioner if necessary.

Warning This equipment has been designed for connection to TN and IT power systems. Statement 1007

Preventing ESD Damage

Warning This equipment needs to be grounded. Use a green and yellow 6 AWG ground wire to connect the host to earth ground during normal use. Statement 383

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD can occur when electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use available ejector levers or captive installation screws, if any, to release the bus connectors from the backplane or midplane.
- Handle components by their handles or edges only; do not touch the printed circuit boards or connectors.
- Place a removed component board side up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

Note For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. It should be between 1 and 10 Mohm.

Site Planning

These sections describe how to plan for the installation of the Cisco ASR 903 Router as a satellite shelf:

General Precautions

Observe the following general precautions when using and working with your Cisco ASR 903 Router as a satellite shelf system:

- Keep the system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on the system components and never operate the product in a wet environment.
- Do not push any objects into the openings of the system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cables carefully. Route system cables and the power supply cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing else rests on the system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid system component damage.

Site Planning Checklist

Use the following checklist to perform and account for all the site planning tasks described in this chapter:

- The site meets the environmental requirements of the Cisco ASR 903 Router as a satellite shelf.
- The site's air conditioning system can compensate for the heat dissipation of the Cisco ASR 903 Router as a satellite shelf.
- The floor space that the Cisco ASR 903 occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the Cisco ASR 903 Router as a satellite shelf complies with the requirements.
- Consideration has been given to the console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- Ethernet cabling distances for the Cisco ASR 903 Router as a satellite shelf are within limitations.
- The equipment rack in which you plan to install the Cisco ASR 903 Router as a satellite shelf complies with requirements.
- In selecting the location of the rack, careful consideration has been given to safety, ease of maintenance, and proper airflow.

Site Selection Guidelines

The Cisco ASR 903 Router as a satellite shelf requires specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the router. The following sections provide specific information to help you plan for the proper operating environment.

The Cisco ASR 903 Router as a satellite shelf is designed to meet the industry EMC, safety, and environmental standards described in the Regulatory, Safety, and Compliance Information for the Cisco ASR 903 Router.

Environmental Requirements

Environmental monitoring in the Cisco ASR 903 Router as a satellite shelf protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, make sure that the site maintains the environmental characteristics described in the *Cisco ASR 903 System Specifications* section.

Physical Characteristics

Be familiar with the physical characteristics of the Cisco ASR 903 Router as a satellite shelf to assist you in placing the system in the proper location. For more information, see the *Cisco ASR 903 System Specifications* section.

AirFlow Guidelines

Cool air is circulated through the Cisco ASR 903 Router as a satellite shelf by a fan tray located along the right side of the router. Airflow is side to side, right to left, as shown in this figure.

Figure 55: Cisco ASR 903 as a Satellite Shelf Chassis Airflow
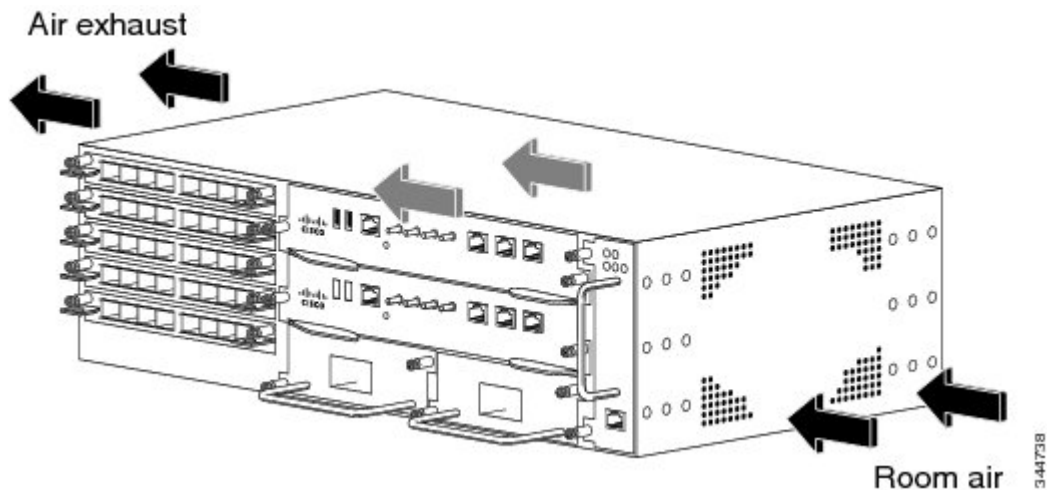
The fan trays maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents, and circulating the air through the chassis.

The following guidelines will help you plan your equipment rack configuration:

- To ensure adequate airflow through the equipment rack, we recommend that you maintain a clearance of at least 80 mm on each side of the rack at all times.
- If airflow through the equipment rack and the routers that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an overtemperature condition can occur within the rack and the routers that occupy it.
- The site should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers that occupy it, thus increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that

is generated by the equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.

- When mounting a chassis in an open rack, ensure that the rack frame does not block the side intakes and the exhaust fans.
- When rack-installed equipment fails, especially equipment in an enclosed rack, try operating the equipment by itself, if possible. Power off all other equipment in the rack (and in adjacent racks) to give the router maximum cooling air and clean power.
- Avoid locating the Cisco ASR 903 Router as a satellite shelf in a location in which the chassis air intake vents may draw in the exhaust air from adjacent equipment. Consider how the airflows through the router; the airflow direction is side to side, with ambient air drawn in from the vents located on the front right of the chassis.

Airflow Guidelines for Enclosed Rack Installation

To install a Cisco ASR 903 Router as a satellite shelf in a 4-post enclosed cabinet, the front and rear doors of the cabinet must be removed or be perforated with a minimum of 65 percent open area (70 percent for 800-mm racks).

If you are mounting the chassis in a 4-post enclosed cabinet, ensure that you have a minimum of 6 inches (15.24 cm) of clearance on each side of the chassis.

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco ASR 903 Router as a satellite shelf is capable of supporting the combined weight of the rack and all the other installed equipment.

To assess the weight of a fully configured Cisco ASR 903 Router as a satellite shelf, see the *Cisco ASR 903 System Specifications* section.

For additional information about floor loading requirements, consult *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection* .

Site Power Guidelines

The Cisco ASR 903 Router as a satellite shelf has specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site power for the Cisco ASR 903 Router as a satellite shelf:

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- In systems configured with the redundant power option, connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and the breakers.
- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.

⚠️

Warning   This product requires short-circuit (overturned) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

✎

Note   The installation of the Cisco ASR 903 Router as a satellite shelf must comply with all applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and should preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. The chassis ground must be attached to a central office or other interior ground system using a 6-AWG gauge wire, copper ground conductor at a minimum.

The maximum power draw of the Cisco ASR 903 Router satellite shelf chassis and its configurable hardware components are listed in the following table. The maximum power draw values are not affected by whether the router chassis contains one or two AC or DC power supplies.

Hardware Component	Maximum Power Draw Value
Sat-ASR903-nV Router satellite shelf chassis with two power supplies, one fan tray, and one RSP1A	195 W
Sat-ASR903-nV Router satellite shelf chassis with two power supplies, one fan tray, and one RSP1B	210 W
A900-RSP1A-55 (standby)	100 W
A900-RSP1B-55 (standby)	100 W
A900-IMA1X (1-port 10-GE XFP interface module)	13.0 W
A900-IMA8T (8-port 1-GE RJ-45 interface module)	17.5 W
A900-IMA8S (8-port 1-GE SFP interface module)	17.5 W

Electrical Circuit Requirements

Each Cisco ASR 903 Router as a satellite shelf requires a dedicated electrical circuit. If you equip it with dual power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco ASR 903 Router as a satellite shelf can be powered by a DC source or an AC source. Ensure that equipment grounding is present and observe the power-strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80 percent of the rating.

For more information about the Cisco ASR 903 Router power supply, see the*Cisco ASR 903 Router Hardware Installation Guide*.

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco ASR 903 Router as a satellite shelf, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, electromagnetic

interference (EMI), and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSU), or data service units (DSU).

Before you begin, read these important notes about cabling:

- The T1/E1 interface module for the Cisco ASR 903 Router uses a high-density connector that requires the use of a T1/E1 interface cable and a customer-provided patch panel. For more information, see the *Cisco ASR 903 Router Hardware Installation Guide* . Note that the Cisco ASR 903 Router as a satellite shelf does not use the T1/E1 interface module. The Cisco ASR 903 Router as a satellite shelf supports only ethernet ports.
- Shielded cables must be used to connect to the DB-25 alarm connector on the fan tray in order to comply with FCC/EN55022/CISPR22 Class A emissions requirements. For information about the fan tray alarm port, see the *Cisco ASR 903 Router Hardware Installation Guide*.

Before you install the Cisco ASR 903 Router as a satellite shelf, have all the additional external equipment and cables on hand. For information about ordering, contact a Cisco customer service representative.

The extent of your network and the distances between the network interface connections depend in part on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections >*prior to* installing the Cisco ASR 903 Router as a satellite shelf.

If wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

Asynchronous Terminal Connections

The RSP provides a console port to connect a terminal or computer for local console access. The port has an RJ-45 connector and supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they can cause data errors or damage to the equipment.

The following sections describe sources of interference and how to minimize its effects on the Cisco ASR 903 system.

Electromagnetic Interference

All equipment powered by AC current can propagate electrical energy that can cause EMI and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the Cisco ASR 903 and even create an electrical hazard by causing power surges through the power lines into installed equipment. These problems are rare but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment that could consume substantial time and money. However, you can ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

For information about the electrode magnetic compliance standards supported on the Cisco ASR 903 Router as a satellite shelf, see *Regulatory Compliance and Safety Information for the* Cisco ASR 903 Router.

Radio Frequency Interference

When electromagnetic fields act over a long distance, radio frequency interference (RFI) may be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal.

Lightning and AC Power Fault Interference

If signal wires exceed the recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco ASR 903 Router as a satellite shelf.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI and EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco ASR 903 Router as a satellite shelf operating environment.

Rack-Mounting Guidelines

These sections provide guidelines for rack-mounting the Cisco ASR 903 Router as a satellite shelf:

Rack-Mounting Precautions

These rack-mount guidelines are provided to ensure your safety:

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step on or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco ASR 903 Router as a satellite shelf in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Rack Selection Guidelines

The Cisco ASR 903 Router as a satellite shelf can be mounted in most two-post or four-post, 19-inch equipment racks that comply with the Electronic Industries Association (EIA) standard for equipment racks (EIA-310-D 19-inch). The rack must have at least two posts with mounting flanges to mount the chassis.

⚠️

Caution When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 65 degrees C.

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). The rack-mounting hardware included with the chassis is suitable for most 19-inch equipment racks.

Consider installing the Cisco ASR 903 Router as a satellite shelf in a rack with the following features:

- Network Equipment Building System (NEBS) compliant, 19-inch (48.3-cm) wide rack.
- EIA or European Telecommunications Standards Institute (ETSI) hole patterns in the mounting rails. The required mounting hardware is shipped with the Cisco ASR 903. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric-mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

✎

Note The Cisco ASR 903 Router as a satellite shelf should *not* be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—*even with the side doors removed*—could disrupt the airflow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, ensure that there are air vents on all sides of the rack and there is proper ventilation.

Equipment Rack Guidelines

The placement of the rack can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics described in the *Cisco ASR 903 System Specifications* section. Choose a proper location for the Cisco ASR 903 Router as a satellite shelf by following these guidelines.

Locating for Safety

If the Cisco ASR 903 Router as a satellite shelf is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

For additional information about the proper placement of electronic equipment, consult the document GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection.

Locating for Easy Maintenance

Keep at least 3 feet of clear space at the front and back of the rack. This space ensures that you can remove the Cisco ASR 903 Router as a satellite shelf components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco ASR 903 Router as a satellite shelf in a congested rack and consider how routing of cables from other pieces of equipment in the same rack could affect access to the router cards.

The sides of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 inches (7.6 cm)
- Sides of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

To avoid problems during installation and ongoing operations, follow these general precautions when you plan equipment locations and connections:

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings about high temperature and creates reports on other potentially dangerous occurrences. If warning messages are displayed, take immediate action to identify the cause, and correct the problem.
- Keep the Cisco ASR 903 Router as a satellite shelf off the floor and out of areas that collect dust.
- Follow ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for Proper Airflow

Ensure that the Cisco ASR 903 Router as a satellite shelf has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system. For more information, see the *AirFlow Guidelines* section.

Installation Checklist

To assist you with your installation and to provide a record of what was done by whom and when, photocopy the Cisco ASR 903 Router installation checklist shown in this table. Use this to record the completion and verification of each procedure. After the checklist is completed, place it in your site log along with the other records pertaining to your new Cisco router.

Table 14: Cisco ASR 903 Router Installation Checklist

Task	Verified By	Date
Date on which chassis received		
Chassis and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on available		
Required tools available		

Task	Verified By	Date
Network connection equipment available		
Cable-management brackets installed (optional, but recommended)		
AC power cables connected to AC sources and router		
DC power cables connected to DC sources and router		
Network interface cables and devices connected		
System power turned on		
System boot complete (STATUS LED is on)		
Shared port adapters are operational		
Correct software configuration displayed after system banner appears		

Creating a Site Log

The site log provides a record of all the actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

Create the site log prior to the installation. (See Site Log, on page 193 for more information on the site log and a sample site log that can be used to make copies.)

Receiving the Cisco ASR 903 Router

Each Cisco ASR 903 Router satellite shelf chassis is shipped in a container that is strapped to a pallet, as illustrated in this figure.

Figure 56: Cisco ASR 903 Router Packaged for Shipping
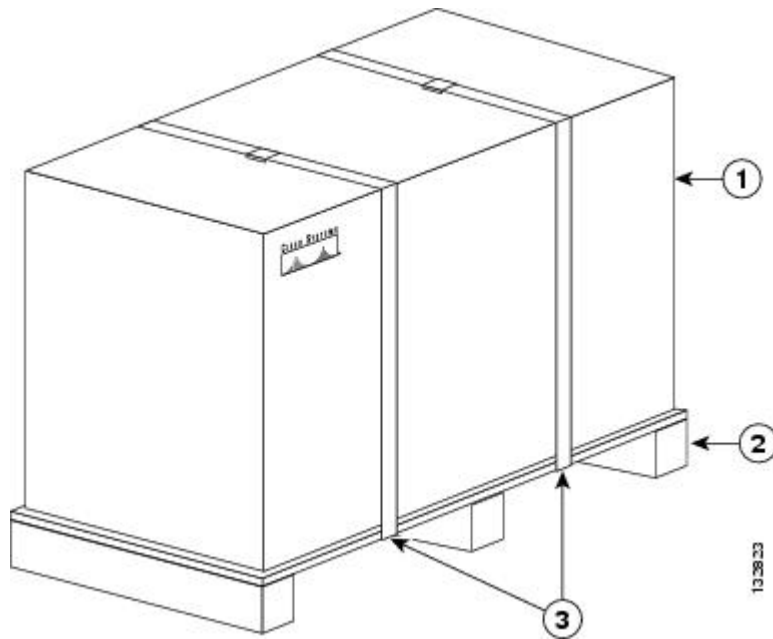
1	Outside carton	3	Packing straps
2	Pallet		

Note   We recommend that you have at least two people available to help with the installation and ensure safe lifting.

Chassis-Lifting Guidelines

The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so that you can avoid having to move the chassis later to accommodate power sources and network connections.

Two or more people are required to lift the chassis. Each time you lift the chassis or any heavy object, follow these guidelines:

- Never attempt to lift the chassis by yourself. Because of the size and weight of the chassis, use at least two people to safely lift and move it without causing injury to yourself or damaging the equipment.
- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.

⚠

Warning   To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032

Perform the following to lift a chassis:

SUMMARY STEPS

1. Each person should stand on either side of the chassis and place one hand under the air intake at the bottom front of the chassis.
2. With the other hand, grasp the top rear of the chassis under the air exhaust, and carefully lift the chassis.

DETAILED STEPS

Step 1   Each person should stand on either side of the chassis and place one hand under the air intake at the bottom front of the chassis.

Step 2   With the other hand, grasp the top rear of the chassis under the air exhaust, and carefully lift the chassis.

Tools and Equipment

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- Flat-blade screwdrivers: Small 3/16-inch (0.476 cm) and medium 1/4-inch (0.625 cm):

    - To install or remove modules
    - To remove the cover if you are upgrading the memory or other components

- #12-24 pan-head screws to secure the router to the equipment rack
- Cables for connecting to the WAN and LAN ports (depending on the configuration)

✎

Note   For more information on cable specifications, see the *Cisco ASR 903 Series Aggregation Services Router Hardware Installation Guide*.

- Ethernet hub or switch or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 9600 baud, 8 data bits, no parity, and 2 stop bits
- Console cable for connecting to the console port
- (Optional) Modem for connecting to the auxiliary port for remote administrative access
- Auxiliary cable for connecting to the auxiliary port (you can supply this cable or order one)
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30 pound-force per square inch (lbf/sq in) of pressure

- Crimping tool as specified by the ground lug manufacturer
- 18-AWG copper wire for the power cord
- Wire-stripping tools for stripping both 6-AWG and 18-AWG wire
- Tape measure and level

⚠️

Warning   Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Unpacking and Verifying the Shipped Contents

When you receive your chassis, perform the following steps and use the Shipping Contents Checklist:

1. Inspect the box for any shipping damage. If there is obvious physical damage, contact your Cisco service representative.

2. Unpack the Cisco ASR 903 Router satellite shelf.

3. Perform a visual inspection of the chassis.

4. Use this table to check the contents of the Cisco ASR 903 Router as a satellite shelf shipping container. Do not discard the shipping container. You will need the container if you move or ship the Cisco ASR 903 Router as a satellite shelf in the future.

Table 15: Cisco ASR 903 Router Satellite Shelf Shipping Container Contents

Component	Description
Chassis	Cisco ASR 903 Router satellite shelf chassis
	Fan tray
	Power supplies
	RSP
	Interface modules
Accessories kit	Chassis rack-mount brackets (19-inch EIA)
	Three sets of screws: • Front and rear rack-mount bracket screws (two sets) • Cable-management bracket screws
	Six cable-management brackets (one per bracket)
	One earth lug with two 10-32 screws.
	1 RJ-45 to RJ-45 crossover cable 1 RJ-45 to DB-9 (female) adapter

Component	Description
ESD, wrist strap (disposable)	One disposable wrist strap (optional)
Documentation	*Regulatory Compliance and Safety Information for the Cisco ASR 903 Router*
Optional equipment	Check the container for the following optional equipment: • Power cord if an AC power supply was shipped. There are no cords for the DC power supply units. • T1/E1 cable connector (required only for T1/E1 interface modules)

✎

Note   Most Cisco documentation is available online. Documentation that is shipped with your Cisco ASR 903 includes the *Regulatory Compliance and Safety Information for the Cisco ASR 903 Router document and Cisco ASR 903 Documentation Roadmap* which contains information about the various documents that are available online and the links to them.

Installing the Router in a Rack

These sections describe how to install the Cisco ASR 903 Router in a rack:

Installing the Chassis Brackets

The chassis is shipped with mounting brackets that can be installed on the front or rear of the chassis. To install the brackets on the front of the chassis, perform these steps:

SUMMARY STEPS

1. Remove the rack-mount brackets from the accessory kit and position them beside the router chassis.
2. Position one of the brackets against the chassis side, and align the screw holes.
3. Secure the bracket to the chassis with the screws removed when performing Step 1 . The recommended maximum torque is 28 lbf/sq in.
4. Repeat Step 2 and Step 3 for the other bracket.

DETAILED STEPS

Step 1   Remove the rack-mount brackets from the accessory kit and position them beside the router chassis.

This figure shows how to attach the brackets on the Cisco ASR 903 Router as a satellite shelf for a 19-inch EIA rack.

Figure 57: Attaching Mounting Brackets for a 19-Inch EIA Rack
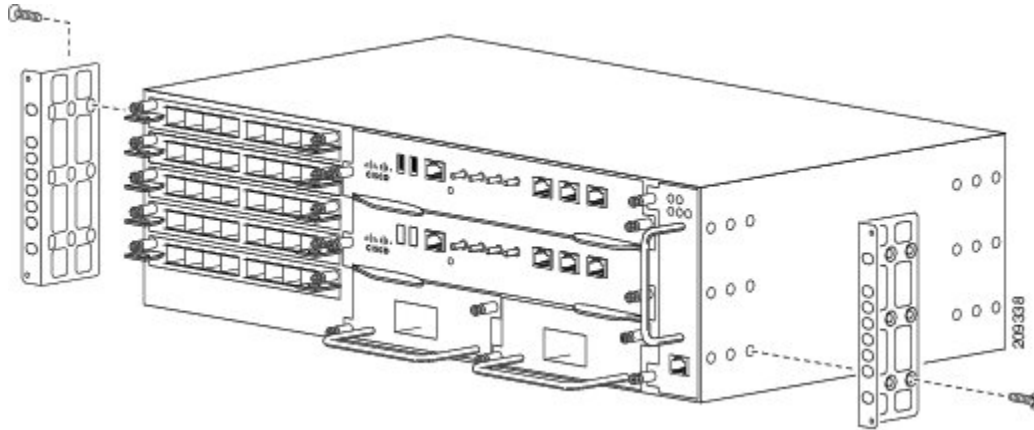
Figure 4-4 shows how to attach the brackets on the Cisco ASR 903 Router as a satellite shelf for a 300-mm ETSI cabinet.

Figure 58: Attaching Mounting Brackets for a 300 -mm ETSI Cabinet
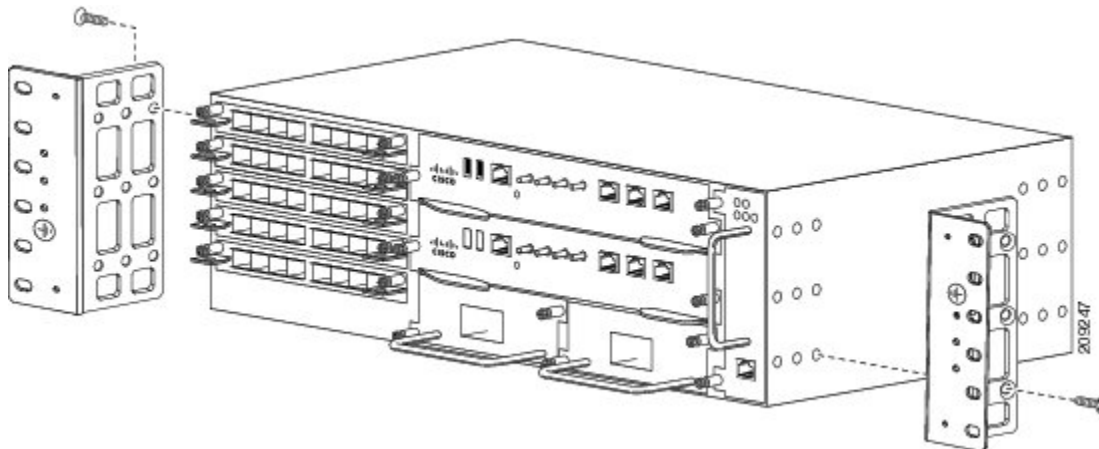
Step 2   Position one of the brackets against the chassis side, and align the screw holes.

Step 3   Secure the bracket to the chassis with the screws removed when performing Step 1 . The recommended maximum torque is 28 lbf/sq in.

Step 4   Repeat Step 2 and Step 3 for the other bracket.

Installing the Router Chassis in the Rack

To install the router chassis in the equipment rack, perform these steps:

SUMMARY STEPS

1. Position the chassis in the rack as follows:
2. Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.

3. Install the 8 or 12 (4 or 6 per side) 12-24 x 3/4-inch or 10-32 x 3/4-inch screws through the holes in the bracket and into the threaded holes in the equipment rack posts.

4. Use a tape measure and level to verify that the chassis is installed straight and level.

DETAILED STEPS

Step 1 Position the chassis in the rack as follows:

- If the front of the chassis (front panel) is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the chassis is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 2 Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.

Caution Do not use interface-module and power-supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

Figure 59: Installing the Chassis in a 19-Inch EIA Rack
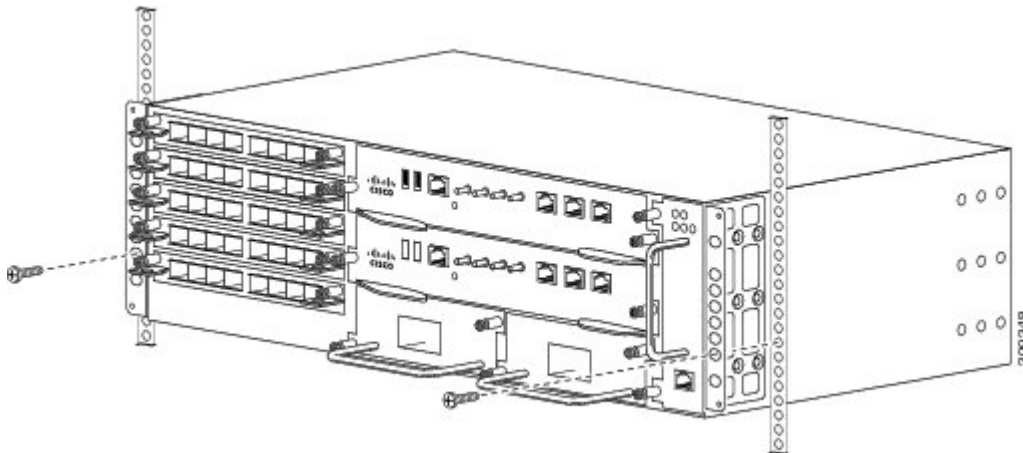
Figure 60: Installing the Chassis to Support the Japanese JIS Rack Standard
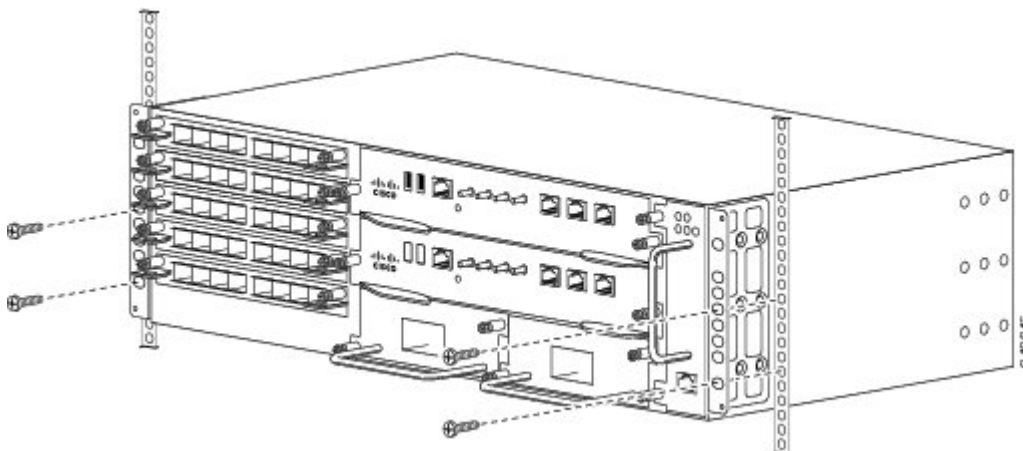
Figure 61: Installing the Chassis in a 300-mm ETSI Cabinet
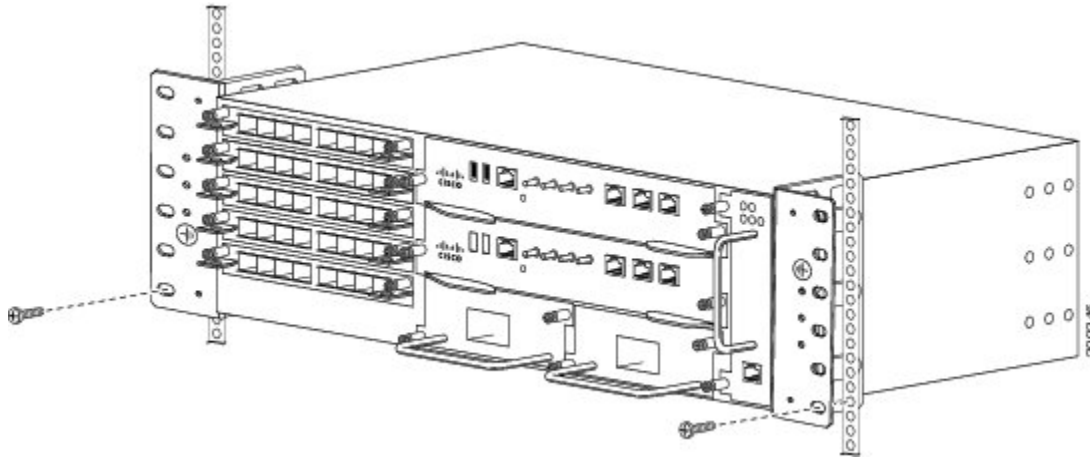
Step 3   Install the 8 or 12 (4 or 6 per side) 12-24 x 3/4-inch or 10-32 x 3/4-inch screws through the holes in the bracket and into the threaded holes in the equipment rack posts.

Step 4   Use a tape measure and level to verify that the chassis is installed straight and level.

Attaching the Cable Management Brackets

To install the optional cable management brackets, perform these steps:

SUMMARY STEPS

1. Position the cable management brackets against the front of the chassis and align the four screw holes, as shown in this figure.
2. Secure the cable management brackets with four M4 screws. The recommended maximum torque is 10 lbf/sq in.

DETAILED STEPS

Step 1   Position the cable management brackets against the front of the chassis and align the four screw holes, as shown in this figure.

Figure 62: Cable Management Bracket Installation
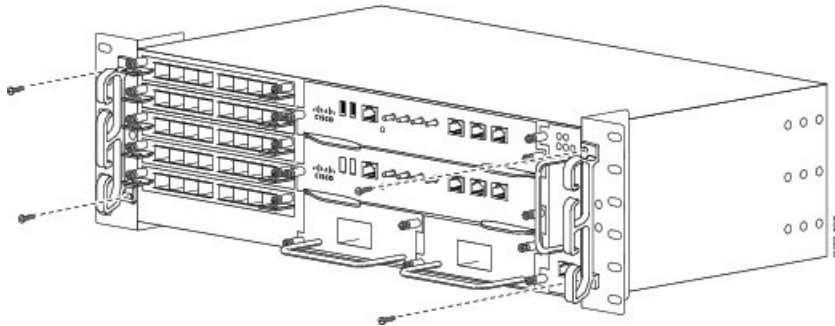
Step 2   Secure the cable management brackets with four M4 screws. The recommended maximum torque is 10 lbf/sq in.

Installing the Chassis Ground Connection

Before you connect the power or turn on the power to the Cisco ASR 903 Router as a satellite shelf, you must provide an adequate chassis ground (earth) connection to your router.

This section describes how to ground the Cisco ASR 903 Router satellite shelf chassis. The router provides two locations for attaching a 2-hole grounding lug according to the rack-mounting brackets you use to install the router. The Cisco ASR 903 Router as a satellite shelf supports the following rack-mounting types:

- EIA 19-inch rack—Attach the grounding lug to the rear of the router, as shown in this figure.

Figure 63: Attaching a Grounding Lug to the Rear of the Router
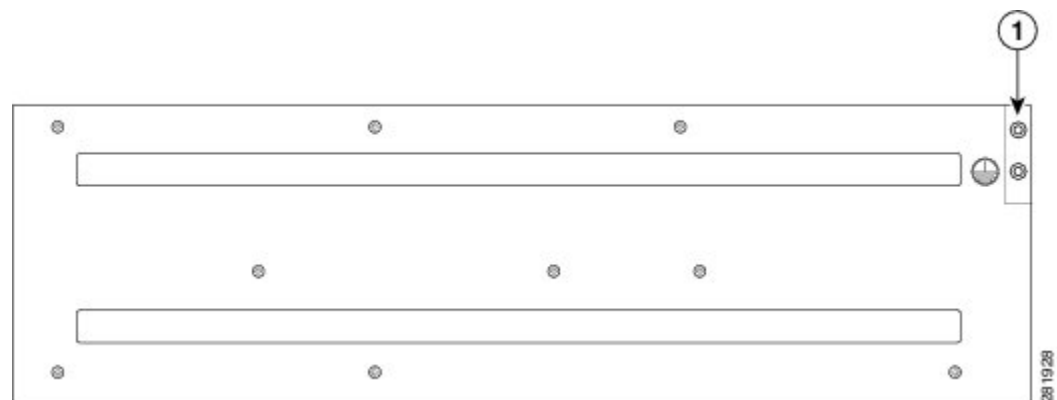
| 1 | Grounding lug (19-inch EIA rack) |

- 300-mm ETSI cabinet—Attach the grounding lug on the rack-mount bracket on the front of the router, as shown in this figure.

Figure 64: Attaching a Grounding Lug to the Rack-Mount Bracket
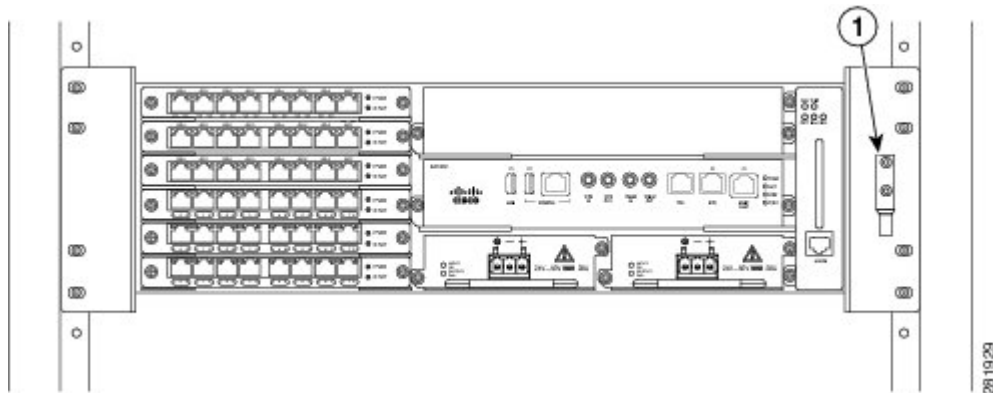
| 1 | Grounding lug (3000-mm ETSI cabinet) |

To ensure that the chassis ground connection that you provide is adequate, you need the following parts and tools:

- Ratcheting torque screwdriver with Phillips head that exerts up to 15 lbf/sq in. of pressure for attaching the ground wire to the router
- Crimping tool as specified by the ground lug manufacturer
- 18-AWG copper wire for the power cord
- 6-AWG or larger copper wire for the ground wire
- Wire-stripping tools appropriate to the wire that you are using

⚠️

Caution   Before making connections to the Cisco ASR 903 Router as a satellite shelf, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the router may occur.

⚠️

Warning   This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

⚠️

Warning   Use copper conductors only. Statement 1025

⚠️

Warning   When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

This unit is to be installed in a restrictive access location and must be permanently grounded to minimum 6-AWG copper ground wire.

Installing the Chassis Ground

Perform the following procedure to ground the Cisco ASR 903 Router as a satellite shelf using a 2-hole lug and the corresponding mounting point. Most carriers require a minimum 6-AWG ground connection. Verify your carrier's requirements for the ground connection.

SUMMARY STEPS

1. If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch ± 0.02 inch (12.7 mm ±0.5 mm).
2. Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.
3. Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in this figure.
4. Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the router with the 2 pan-head Phillips head screws. For a 19-inch EIA rack, attach the 2-hole ground lug to the rear of the router.
5. Connect the other end of the ground wire to a suitable grounding point at your site.

DETAILED STEPS

Step 1   If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch ± 0.02 inch (12.7 mm ±0.5 mm).

Figure 65: Stripping a Ground Wire
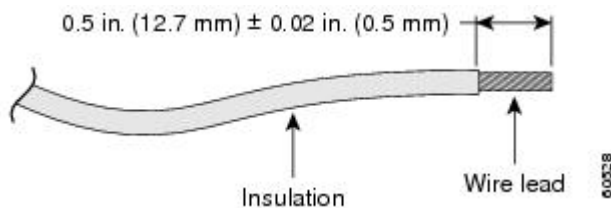
Step 2   Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.

Step 3   Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in this figure.

Figure 66: Crimping a Ground Lug onto the Ground Wire
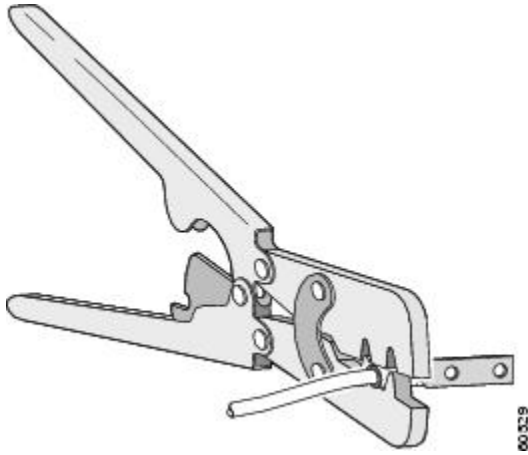
Step 4 Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the router with the 2 pan-head Phillips head screws. For a 19-inch EIA rack, attach the 2-hole ground lug to the rear of the router.

Step 5 Connect the other end of the ground wire to a suitable grounding point at your site.

Installing the Fan Tray

The fan tray is a modular unit that provides cooling to the Cisco ASR 903 Router as a satellite shelf. Follow these steps to install the fan tray in the chassis:

SUMMARY STEPS

1. Orient the fan tray so that the captive screws are on the left side of the fan tray's front panel. This figure shows how to orient the fan tray.
2. Guide the fan tray into the chassis until it is fully seated.
3. Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 lbf/sq in.

DETAILED STEPS

Step 1 Orient the fan tray so that the captive screws are on the left side of the fan tray's front panel. This figure shows how to orient the fan tray.

Figure 67: Installing the Fan Tray
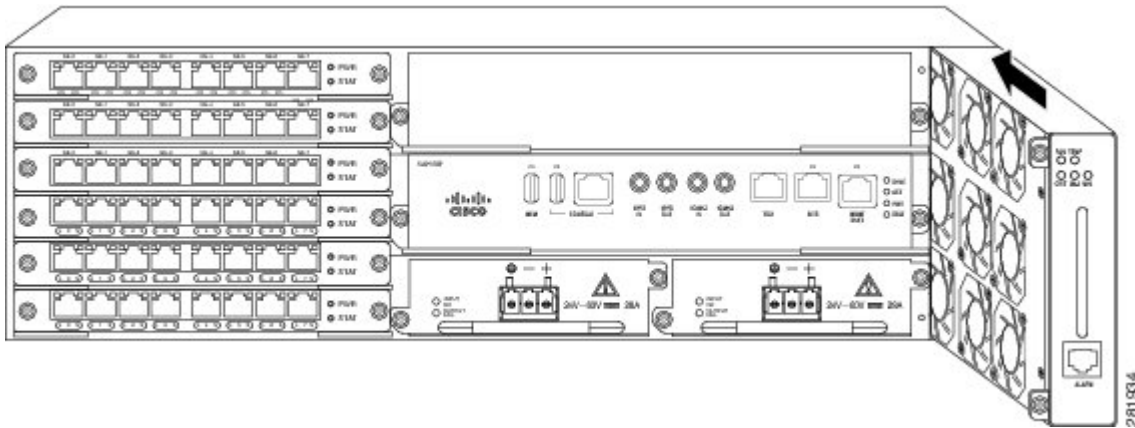
Step 2   Guide the fan tray into the chassis until it is fully seated.

Caution   The fans are exposed on the left side of the fan tray. Keep your fingers, clothing, and jewelry away from the fans. Always handle the fan tray by the handle.

Step 3   Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 lbf/sq in.

For information about connecting cables to the fan tray alarm port, see the Connecting the Fan Tray Alarm Port, on page 159 section. For a summary of the LEDs on the fan tray, see the Fan Tray LEDs, on page 15 section. For more information about airflow guidelines, see the AirFlow Guidelines, on page 112 section.

Removing and Replacing the Fan Tray

The fan tray supports online insertion and removal (OIR). There is no need to power down the Cisco ASR 903 Router as a satellite shelf to remove or replace the fan tray. However, the router will shut down if the fan tray is removed from the chassis for more than five minutes.

Caution   The router can stay active for up to five minutes if the temperature is below the ambient limit. However, in the event of an overtemperature alarm, the router can shut down in less than five minutes. In the event of a critical temperature alarm, the router shuts down immediately.

Follow these steps to remove and replace the fan tray on the Cisco ASR 903 Router as a satellite shelf:

SUMMARY STEPS

1. Using a No. 2 Phillips screwdriver or your fingers, loosen the captive installation screw that secures the fan tray to the chassis. This figure shows the front of the fan tray, including the captive installation screws.
2. Grasp the fan tray handle with one hand and the outside of the chassis with the other hand. The figure above shows the front of the fan tray, including the handle.
3. Pull the fan tray backward toward you no more than 1 inch to disengage it from the power receptacle on the midplane, as shown in this figure .

4. Wait at least 5 seconds to allow the fans to stop spinning. Then, pull the fan tray backward toward you and out of the chassis.

DETAILED STEPS

Step 1   Using a No. 2 Phillips screwdriver or your fingers, loosen the captive installation screw that secures the fan tray to the chassis. This figure shows the front of the fan tray, including the captive installation screws.

Figure 68: Detaching the Fan Tray
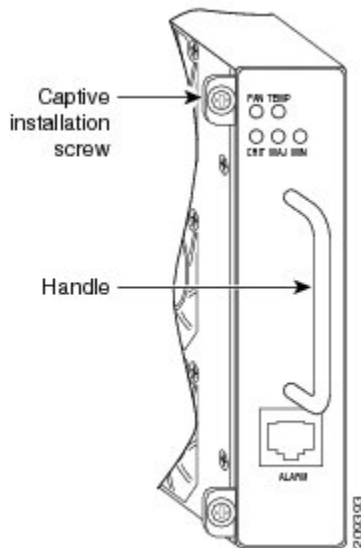
Step 2   Grasp the fan tray handle with one hand and the outside of the chassis with the other hand. The figure above shows the front of the fan tray, including the handle.

> **Caution**   The fans are exposed on the left side of the fan tray. Keep your fingers, clothing, and jewelry away from the fans. Always handle the fan tray by the handle.

Step 3   Pull the fan tray backward toward you no more than 1 inch to disengage it from the power receptacle on the midplane, as shown in this figure .

Figure 69: Fan Tray Removal
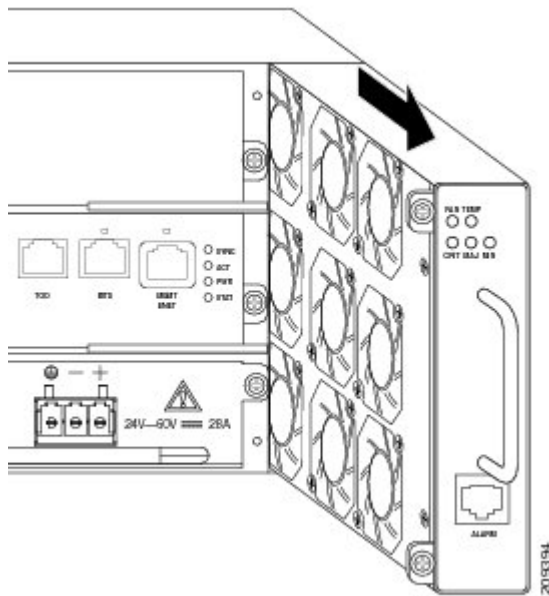
Danger	The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing. Statement 263

Step 4   Wait at least 5 seconds to allow the fans to stop spinning. Then, pull the fan tray backward toward you and out of the chassis.

As the fan tray slides out the chassis, support the bottom of the fan tray with one hand and keep your other hand on the fan tray handle. To install the new fan tray, follow the steps in the section.

Installing and Removing an RSP Module

Follow these steps on handling an RSP module in the Cisco ASR 903 Router as a satellite shelf:

Installing an RSP Module

To install an RSP module in the router chassis, perform the following steps:

SUMMARY STEPS

1. Choose a slot for the module. Make sure that there is enough clearance to accommodate any equipment that will be connected to the ports on the module. If a blank module filler plate is installed in the slot in which you plan to install the module, remove the plate by removing its two Phillips pan-head screws.
2. Fully open both the ejector levers on the new module, as shown in this figure.
3. Position the module in the slot. Make sure that you align the sides of the module with the guides on each side of the slot, as shown in this figure.

4. Carefully slide the module into the slot until the EMI gasket on the module makes contact with the module in the adjacent slot and both the ejector levers have closed to approximately 45 degrees with respect to the module faceplate.

5. While pressing down, simultaneously close both the ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.

6. Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 lbf/sq in.

7. Verify that the captive installation screws are tightened on all of the modules installed in the chassis. This step ensures that the EMI gaskets on all the modules are fully compressed in order to maximize the opening space for the new or replacement module.

DETAILED STEPS

Step 1 Choose a slot for the module. Make sure that there is enough clearance to accommodate any equipment that will be connected to the ports on the module. If a blank module filler plate is installed in the slot in which you plan to install the module, remove the plate by removing its two Phillips pan-head screws.

Step 2 Fully open both the ejector levers on the new module, as shown in this figure.

Caution To prevent ESD damage, handle modules by carrier edges only.

Step 3 Position the module in the slot. Make sure that you align the sides of the module with the guides on each side of the slot, as shown in this figure.

Figure 70: Cisco ASR 903 RSP Installation
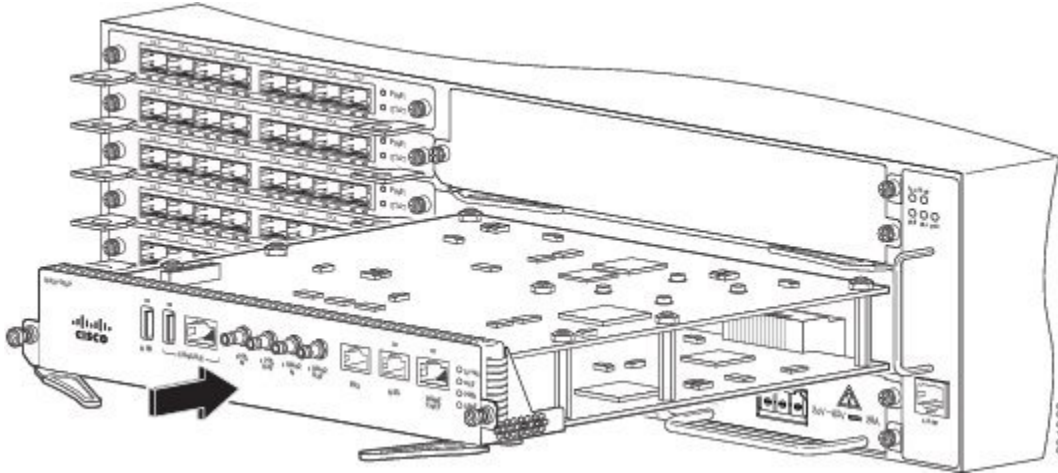
Step 4 Carefully slide the module into the slot until the EMI gasket on the module makes contact with the module in the adjacent slot and both the ejector levers have closed to approximately 45 degrees with respect to the module faceplate.

Caution If the top slot already has an RSP module installed, and you install a second RSP module in the slot below it, be careful during insertion not to damage the EMI gasket of the bottom RSP module against the ejector levers of the top RSP.

Step 5 While pressing down, simultaneously close both the ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.

Step 6 Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 lbf/sq in.

Note   Make sure that the ejector levers are fully closed before tightening the captive installation screws.

Step 7   Verify that the captive installation screws are tightened on all of the modules installed in the chassis. This step ensures that the EMI gaskets on all the modules are fully compressed in order to maximize the opening space for the new or replacement module.

If the captive installation screws are loose, the EMI gaskets on the installed modules will push adjacent modules toward the open slot, which reduces the size of the opening and makes it difficult to install the new module.

Blank module filler plates (Cisco part number A900-RSPA-BLANK) should be installed in any empty chassis slots to keep dust out of the chassis and to maintain consistent airflow through the chassis.

Removing an RSP Module

Before you remove an RSP from the router, you should save the current configuration using the **write {host file | network | terminal}** command. This saves you time when bringing the module back online.

If the module is running Cisco IOS software, save the current running configuration by entering the **copy running-config startup-config** command.

Warning   Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034

Warning   Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

To remove an RSP module, perform the following steps:

SUMMARY STEPS

1. Disconnect any cables attached to the ports on the module.
2. Verify that the captive installation screws on all the modules in the chassis are tight. This step ensures that the space created by the removed module is maintained.
3. Loosen the two captive installation screws on the module that you plan to remove from the chassis.
4. Place your thumbs on the ejector levers (see the figure *Cisco ASR 903 RSP Installation*) and simultaneously rotate the ejector levers outward to unseat the module from the backplane connector.
5. Grasp the front edge of the module and slide the module straight out of the slot. If the chassis has horizontal slots, place your hand under the module to support its weight as you slide it out from the slot. Do not touch the module circuitry.
6. Place the module on an antistatic mat or antistatic foam, or immediately reinstall the module in another slot.
7. Install blank module filler plates (Cisco part number A900-RSPA-BLANK) in empty slots, if any.

DETAILED STEPS

Step 1   Disconnect any cables attached to the ports on the module.

Step 2   Verify that the captive installation screws on all the modules in the chassis are tight. This step ensures that the space created by the removed module is maintained.

Note   If the captive installation screws are loose, the EMI gaskets on the installed modules will push the modules toward the open slot, which in turn reduces the size of the opening and makes it difficult to remove the module.

Step 3   Loosen the two captive installation screws on the module that you plan to remove from the chassis.

Step 4   Place your thumbs on the ejector levers (see the figure *Cisco ASR 903 RSP Installation*) and simultaneously rotate the ejector levers outward to unseat the module from the backplane connector.

Step 5   Grasp the front edge of the module and slide the module straight out of the slot. If the chassis has horizontal slots, place your hand under the module to support its weight as you slide it out from the slot. Do not touch the module circuitry.

Caution   To prevent ESD damage, handle modules by the carrier edges only.

Step 6   Place the module on an antistatic mat or antistatic foam, or immediately reinstall the module in another slot.

Step 7   Install blank module filler plates (Cisco part number A900-RSPA-BLANK) in empty slots, if any.

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Installing and Removing an Interface Module

These sections describe the various tasks of associated with interface module installation on the Cisco ASR 903 Router as a satellite shelf:

Installing an Interface Module

SUMMARY STEPS

1. Before inserting an interface module, make sure that the chassis is grounded.
2. To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.
3. Carefully slide the interface module into the router slot until the interface module makes contact with the backplane. This figure shows how to install the interface module.
4. Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 lbf/sq in.
5. Connect all the cables to each interface module.

DETAILED STEPS

Step 1   Before inserting an interface module, make sure that the chassis is grounded.

Step 2   To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.

Step 3   Carefully slide the interface module into the router slot until the interface module makes contact with the backplane. This figure shows how to install the interface module.

Figure 71: Inserting an Interface Module
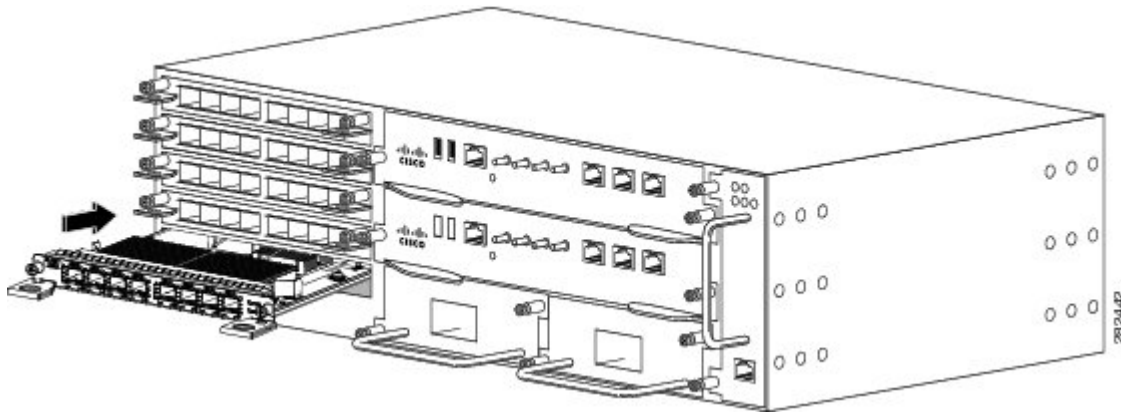
Step 4   Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 lbf/sq in.

Step 5   Connect all the cables to each interface module.

10 Gigabit Ethernet interface modules are not supported in slots 4 and 5. Do not use interface-module and power-supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

Removing an Interface Module

SUMMARY STEPS

1. To remove an interface module, disconnect all the cables from each interface module.
2. Loosen the locking thumbscrews on both sides of the interface module.
3. Slide the interface module out of the router slot by pulling on the handles. If you are removing a blank filler plate, pull the blank filler plate completely out of the router slot using the captive screws.

DETAILED STEPS

Step 1   To remove an interface module, disconnect all the cables from each interface module.

Step 2   Loosen the locking thumbscrews on both sides of the interface module.

Step 3   Slide the interface module out of the router slot by pulling on the handles. If you are removing a blank filler plate, pull the blank filler plate completely out of the router slot using the captive screws.

Installing the Power Supply

The Cisco ASR 903 Router as a satellite shelf provides the choice of two different power supplies:

- DC power—19.2VDC to –72VDC

The DC power supply uses three-position terminal block-style connector with positive latching/securing and labeled connections for +24/48V, GRD, –24/48V. The terminal block connector is of suitable size to carry the appropriate AWG wire size to handle the input current of the power supply. No ON/OFF switch is provided.

- AC power—85 VAC to 264 VAC

The AC power supply has an IEC 320-type power receptacle and a 15-A service connector. You can use standard right angle power cords with the AC power supply. The power supply includes a power cord retainer. No ON/OFF switch is provided.

Each power supply provides a single primary input power connection. You can install dual power supplies for redundancy.

⚠️

Warning   Read the installation instructions before connecting the system to the power source. Statement 1004

✎

Note   Products that have an AC power connection are required to have an external surge protective device (SPD) provided as part of the building installation to comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety.

⚠️

Caution   Do not use interface-module and power-supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

These sections describe the Cisco ASR 903 Router satellite shelf power supplies:

Preventing Power Loss

Use the following guidelines to prevent power loss to the router.

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems like the Cisco ASR 903 Router as a satellite shelf, which can have substantial current draw fluctuations due to bursty data traffic patterns.

Use the information in the Cisco ASR 9000v Satellite Shelf with a DC Power Module, on page 6 section to estimate the power requirements and heat dissipation of a Cisco ASR 903 Router as a satellite shelf based on a given configuration of the router. Determining power requirements is useful for planning the power distribution system needed to support the router.

Power Connection Guidelines

This section provides guidelines for connecting the Cisco ASR 903 Router satellite shelf power supplies to the site power source.

Warning   This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064

Warning   The plug-socket combination must be accessible at all times because it serves as the main disconnecting device. Statement 1019

Warning   This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply should have its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA 60950, EN 60950, and IEC 60950 standards.
- The circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered the disconnect device and should be easily accessible.
- The system ground is the power supply and chassis ground.
- Do not connect the DC return wire to the system frame or to the system grounding equipment.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.

Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

- Each chassis power supply should have its own dedicated branch circuit.
- The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Installing the DC Power Supply

The following sections describe how to install a DC power supply in the Cisco ASR 903 Router as a satellite shelf:

- Installing the DC Power Supply Module
- Installing the Terminal Block, on page 141
- Activating the DC Power Supply, on page 144

✎

Note   This equipment is suitable for installation in Network Telecommunications Facilities and locations where the NEC applies.

✎

Note   This equipment is suitable for installations utilizing the Common Bonding Network (CBN).

✎

Note   The grounding architecture of this product is DC-Isolated (DC-I) for DC-powered products. DC-powered products have a nominal operating DC voltage of 48 VDC.

Installing the DC Power Supply Module

SUMMARY STEPS

1. Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the Installing the Chassis Ground Connection, on page 127 section.
2. If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.
3. Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.
4. Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.
5. Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 lbf/sq in.

DETAILED STEPS

Step 1   Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the Installing the Chassis Ground Connection, on page 127 section.

Step 2   If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

Step 3   Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.

Step 4   Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Figure 72: Installing the DC Power Supply
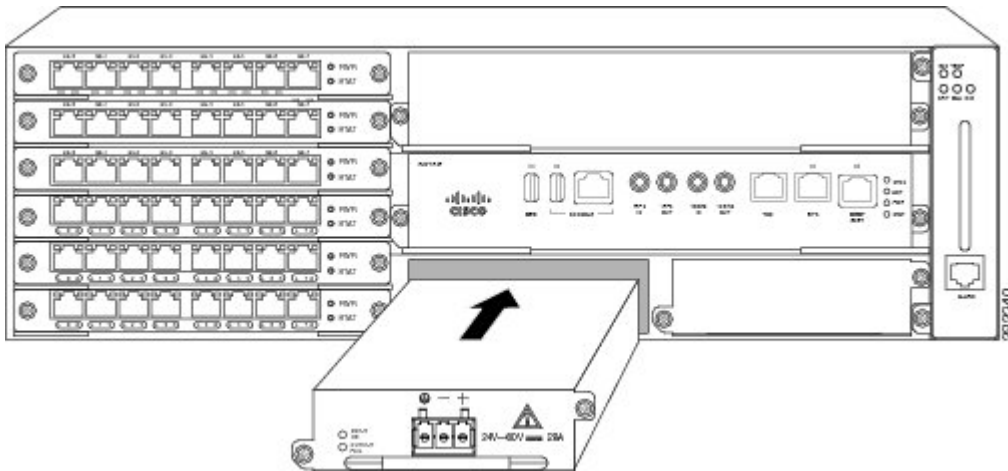
Step 5   Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 lbf/sq in.

If you are installing a redundant DC power supply, repeat these steps for the second power source.

Installing the Terminal Block

Step 1   Locate the terminal block plug.

Step 2   Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC input power source to 0.27 inch (6.6 mm) ± 0.02 inch (0.5 mm) and the wire for grounding. Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block plug after installation.

Step 3   Identify the ground, positive, and negative feed positions for the terminal block connection. The recommended wiring sequence is:

a)   Ground lead wire (right)
b)   Negative (–) lead wire (left)
c)   Positive (+) lead wire (middle)

Figure 73: DC Power Supply with Lead Wires
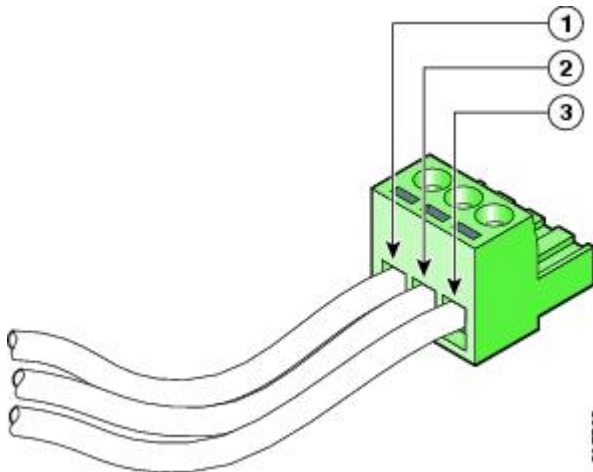
1	Ground lead wire	3	Positive (+) lead wire
2	Negative (−) lead wire		

Step 4   Insert the exposed wire of one of the three DC input power source wires into the terminal block plug. Make sure that you cannot see any wire lead. Only wire with insulation should extend from the terminal block.

    Caution   Do not overtorque the plug captive screws of the terminal block. The recommended maximum torque is from 0.5 Nm (4.425 lbf/sq in) to 0.6 Nm (5.310 lbf/sq in).

Step 5   Use a ratcheting torque screwdriver to torque the terminal block plug captive screw (above the installed wire lead) from 0.5 Nm (4.425 lbf/sq in) to 0.6 Nm (5.310 lbf/sq in) as shown in the figure.

Figure 74: Torquing the DC Power Supply Terminal Block Plug Screws
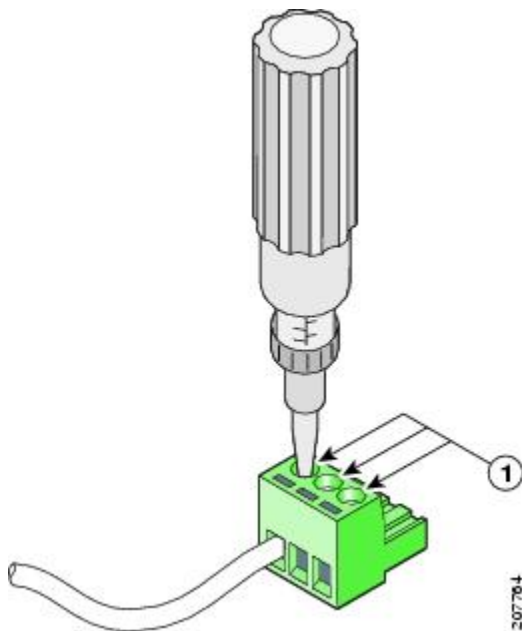
1	Torque is from 0.5 Nm (4.425 lbf/sq in) to 0.6 Nm (5.310 lbf/sq in)

Step 6 Repeat Step 4 through Step 5 for the remaining DC input power source wire and the ground wire. This figure shows the wiring completed for a terminal block plug.

Figure 75: Inserting the DC Power Supply Terminal Block Plug in the Block Header
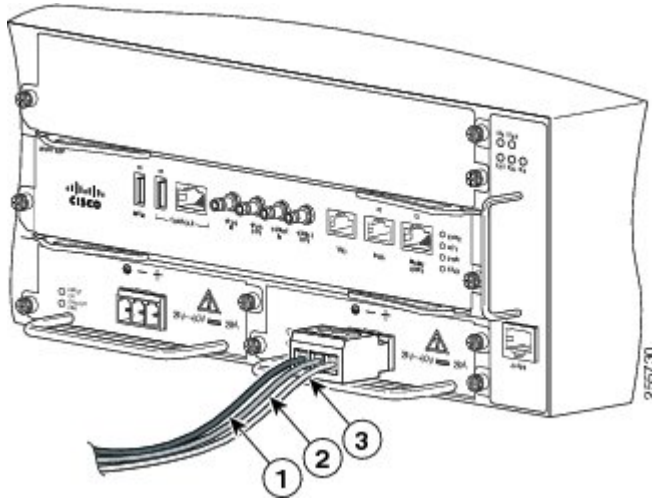
1	DC power supply ground lead wire	3	DC power supply positive (+) lead wire
2	DC power supply negative (–) lead wire		

Caution Secure the wires coming in from the terminal block plug so that they cannot be disturbed by casual contact.

Step 7 Ensure that the terminal block plug is fully seated in the terminal block header on the DC power supply panel. The plug has a locking feature. You should hear a snap or click when it is installed properly.

Step 8 Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire, as shown in the figure.
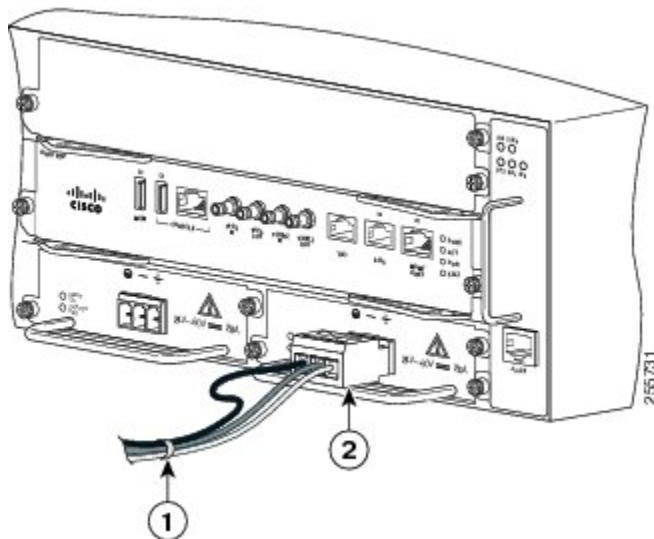
1	Lead wires secured with a tie wrap	2	DC power supply terminal block plug being inserted into terminal block header.

Step 9   Use a tie wrap to secure the wires to the handle. Leave a service loop on the ground wire between the handle and the connector such that it is the last to receive strain if the wires are pulled.

What to do next

If you are installing a redundant DC power supply, repeat these steps for the second power source.

Activating the DC Power Supply

SUMMARY STEPS

1. Remove the tape from the circuit-breaker switch handle, and restore power by moving the circuit-breaker switch handle to the On (|) position.
2. Verify power supply operation by checking if the power supply front panel LEDs are in the following states:

DETAILED STEPS

Step 1   Remove the tape from the circuit-breaker switch handle, and restore power by moving the circuit-breaker switch handle to the On (|) position.

Step 2   Verify power supply operation by checking if the power supply front panel LEDs are in the following states:

  • INPUT OK LED is green.
  • OUTPUT FAIL LED is green.

If the LEDs indicate a power problem, see the Power Supply LEDs, on page 14 section. For troubleshooting information, see the Cisco ASR 901 Series Aggregation Services Router Hardware Installation Guide .

If you are installing a redundant DC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.

If you are installing a redundant DC power supply, repeat these steps for the second power source.

Removing and Replacing the DC Power Supply

This section provides information about removing and replacing the DC power supply in the Cisco ASR 903 Router as a satellite shelf.

Note The Cisco ASR 903 Router satellite shelf power supplies are hot-swappable. If you have installed redundant power supply modules, you can replace a single power supply without interrupting power to the router.

Warning When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046

Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Warning Installation of the equipment must comply with local and national electrical codes. Statement 1074

Follow these steps to remove and replace the DC power supply on the Cisco ASR 903 Router as a satellite shelf:

SUMMARY STEPS

1. Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.
2. Slip on the ESD-preventive wrist strap that was included in the accessory kit.
3. Switch the power supply circuit-breaker switch to the Off (O) position.
4. Pull the terminal block plug connector out of the terminal block head in the power supply.
5. Loosen the captive screws on the DC power supply.

6. Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.
7. Replace the DC power supply within 5 minutes. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

DETAILED STEPS

Step 1 Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.

Step 2 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

Step 3 Switch the power supply circuit-breaker switch to the Off (O) position.

Step 4 Pull the terminal block plug connector out of the terminal block head in the power supply.

Step 5 Loosen the captive screws on the DC power supply.

Step 6 Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.

Step 7 Replace the DC power supply within 5 minutes. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

Installing the AC Power Supply

The following sections describe how to install a AC power supply in the Cisco ASR 903:

Warning This product requires short-circuit (overturned) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Installing the AC Power Supply Module

SUMMARY STEPS

1. Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the Installing the Chassis Ground Connection, on page 127section.
2. If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.
3. Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.
4. Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 lbf/sq in.

DETAILED STEPS

Step 1   Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the Installing the Chassis Ground Connection, on page 127 section.

Step 2   If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

Step 3   Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Figure 77: Installing the AC Power Supply
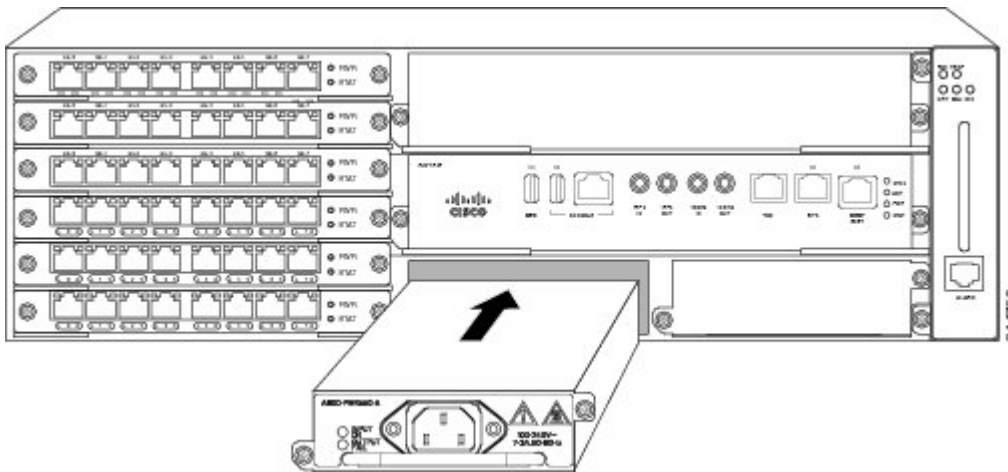
Step 4   Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 lbf/sq in.

Power supply captive installation screws must be tight to ensure protective grounding continuity. Statement 289

Activating the AC Power Supply

SUMMARY STEPS

1. Plug the power cord into the power supply.
2. Connect the other end of the power cord to an AC input power source.
3. Verify power supply operation by checking that the power supply LEDs are in the following states:
4. If the LEDs indicate a power problem, see the Power Supply LEDs, on page 14 section. For troubleshooting information, see the Cisco ASR 901 Series Aggregation Services Router Hardware Installation Guide.
5. If you are installing a redundant power supply, repeat these steps for the second power source.

DETAILED STEPS

Step 1   Plug the power cord into the power supply.

Step 2   Connect the other end of the power cord to an AC input power source.

Step 3   Verify power supply operation by checking that the power supply LEDs are in the following states:

- INPUT OK LED is green.
- OUTPUT FAIL LED is green.

Step 4 If the LEDs indicate a power problem, see the Power Supply LEDs, on page 14 section. For troubleshooting information, see the Cisco ASR 901 Series Aggregation Services Router Hardware Installation Guide.

Step 5 If you are installing a redundant power supply, repeat these steps for the second power source.

If you are installing a redundant AC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.

Removing and Replacing the AC Power Supply

Note The Cisco ASR 903 power supplies are hot-swappable. If you have installed redundant power supply modules, you can replace a single power supply without interrupting power to the router.

Warning When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046

Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Warning Installation of the equipment must comply with local and national electrical codes. Statement 1074

SUMMARY STEPS

1. Disconnect the power cord from the power source. Do not touch the metal prongs on the power cord when it is still connected to the power supply.
2. Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.
3. Loosen the captive installation screws.
4. Grasp the AC power supply with one hand, and slide it part of the way out of the chassis. Place your other hand underneath the power supply, and slide it completely out of the chassis.
5. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

DETAILED STEPS

Step 1   Disconnect the power cord from the power source. Do not touch the metal prongs on the power cord when it is still connected to the power supply.

Step 2   Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.

Step 3   Loosen the captive installation screws.

Step 4   Grasp the AC power supply with one hand, and slide it part of the way out of the chassis. Place your other hand underneath the power supply, and slide it completely out of the chassis.

Step 5   If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

Connecting the Cisco ASR 903 Router to the Network

The following sections describe how to connect cables on the Cisco ASR 903 Router as a satellite shelf:

Connecting Console Cables

These sections describe how to connect to the Cisco ASR 903 Router as a satellite shelf using console cables:

- Connecting to the Serial Port Using Microsoft Windows
- Connecting to the Console Port Using Mac OS X
- Connecting to the Console Port Using Linux
- Installing the Cisco Microsoft Windows USB Device Driver
- Uninstalling the Cisco Microsoft Windows USB Device Driver

Note   You cannot use the USB and RS-232 console ports at the same time; if you insert the USB cable into the router, the RS-232 port is disabled.

Connecting to the Serial Port Using Microsoft Windows

Step 1   Connect the end of the console cable with the RJ-45 connector to the light blue console port on the router. or Connect a USB Type A-to-Type A cable to the USB console port as shown in the figure. If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections.

- "Installing the Cisco Microsoft Windows XP USB Driver" section

- "Installing the Cisco Microsoft Windows 2000 USB Driver" section

- "Installing the Cisco Microsoft Windows Vista USB Driver" section

Note		Install the USB device driver before establishing a physical connection between the router and the PC, by using the USB Console cable plugged into the USB serial port. Otherwise, the connection will fail. For more information, see the Installing the Cisco Microsoft Windows USB Device Driver, on page 153 section.
Note		You cannot use the USB port and the EIA port concurrently. See the Connecting to the Auxiliary Port, on page 156 section. When the USB port is used, it takes priority over the RJ-45 EIA port.
Note		The USB Type A-to-Type A cable is not included with the Cisco ASR 903 Router as a satellite shelf; it is ordered separately.

Step 2   Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.

Step 3   To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal.

This software should be configured with the following parameters:

- 9600 baud
- 8 data bits
- No parity
- 1 stop-bit
- No flow control

What to do next

Figure 78: Connecting the USB Console Cable to the Cisco ASR 903
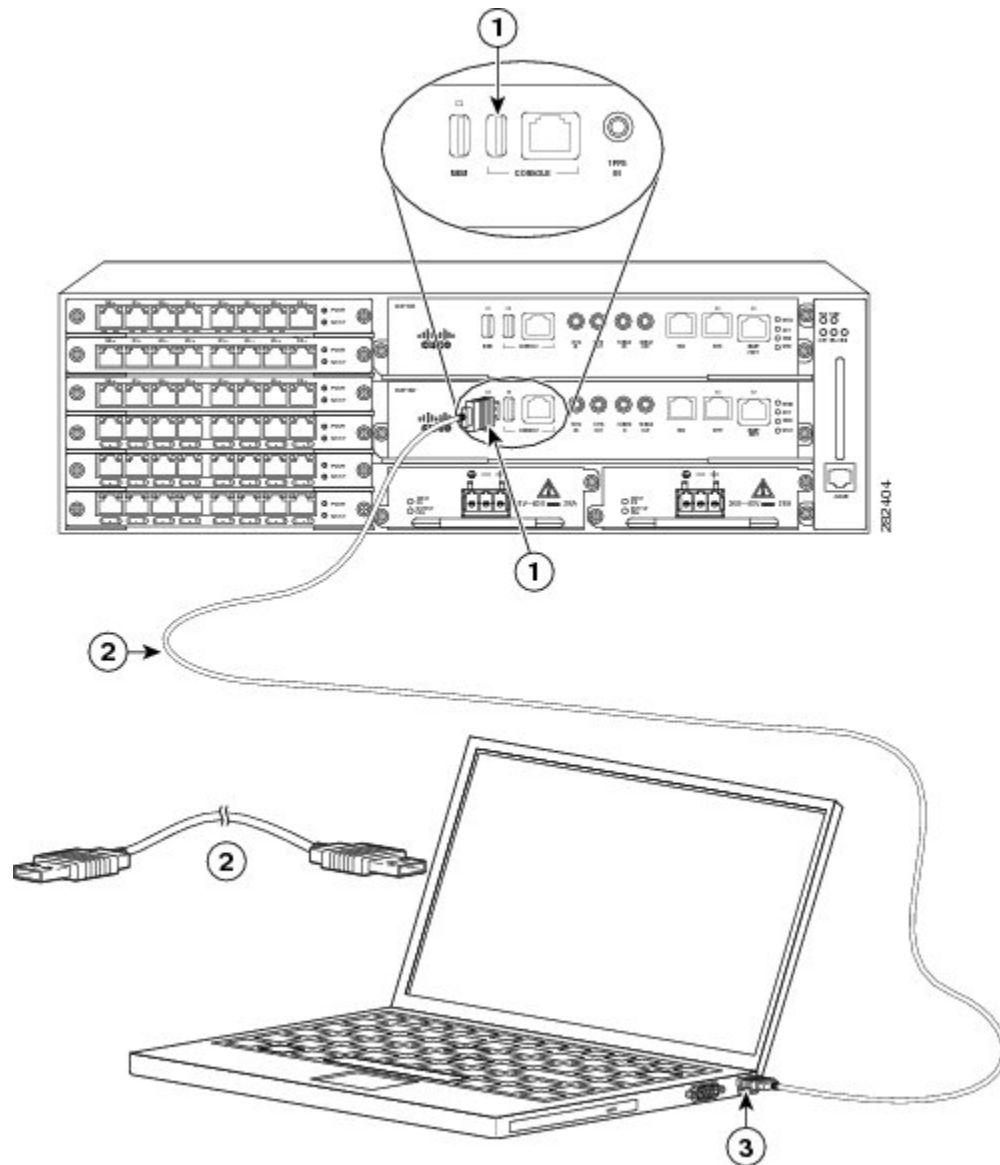
1	USB Type-A console port	2	USB 5-pin mini USB Type-B to USB Typ
3	USB Type-A	—	—

Connecting to the Console Port Using Mac OS X

This procedure describes how to connect a Mac OS X system USB port to the console using the built-in OS X Terminal utility.

SUMMARY STEPS

1. Use the Finder to go to Applications > Utilities > Terminal.
2. Connect the OS X USB port to the router.
3. Enter the following commands to find the OS X USB port number:
4. Connect to the USB port using the following command ending with the router USB port speed:

DETAILED STEPS

Step 1   Use the Finder to go to Applications > Utilities > Terminal.

Step 2   Connect the OS X USB port to the router.

Step 3   Enter the following commands to find the OS X USB port number:

Example:

```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw-  1 root    wheel       9,  66 Apr  1 16:46 tty.usbmodem1a21 DT-macbook:dev user$
```

Step 4   Connect to the USB port using the following command ending with the router USB port speed:

Example:

```
macbook:user$ screen /dev/tty.usbmodem1a21 9600
```

To disconnect the OS X USB console from the terminal window:

Enter Ctrl-a followed by Ctrl-\.

Connecting to the Console Port Using Linux

This procedure shows how to connect a Linux system USB port to the console using the built-in Linux Terminal utility.

SUMMARY STEPS

1. Open the Linux Terminal window.
2. Connect the Linux USB port to the router.
3. Enter the following commands to find the Linux USB port number:
4. Connect to the USB port using the following command ending with the router USB port speed:

DETAILED STEPS

Step 1   Open the Linux Terminal window.

Step 2   Connect the Linux USB port to the router.

Step 3   Enter the following commands to find the Linux USB port number:

Example:

```
root@usb-suse# cd /dev
root@usb-suse# /dev# ls -ltr *ACM*
crw-r--r--   1 root     root     188,   0 Jan 14 18:02 ttyACM0
root@usb-suse# /dev#
```

Step 4 Connect to the USB port using the following command ending with the router USB port speed:

Example:

```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

To disconnect the Linux USB console from the terminal window:

Enter Ctrl-a followed by : then quit.

Installing the Cisco Microsoft Windows USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB serial port on the router.

This section contains the following topics:

- "Installing the Cisco Microsoft Windows XP USB Driver"
- "Installing the Cisco Microsoft Windows 2000 USB Driver"
- "Installing the Cisco Microsoft Windows Vista USB Driver"

Installing the Cisco Microsoft Windows XP USB Driver

Step 1 Obtain the Cisco USB console driver file from the Cisco.com web site and unzip it.

Note You can download the driver file from the Cisco.com site for downloading the switch software.

Step 2 If using 32-bit Windows XP double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows XP double-click the file setup(x64).exe from the Windows_64 folder.

Step 3 The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4 The Ready to Install the Program window appears, Click Install.

Step 5 The InstallShield Wizard Completed window appears. Click Finish.

Step 6 Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears. Following the instructions to complete the installation of the driver.

Step 7 The USB console is ready for use.

Installing the Cisco Microsoft Windows 2000 USB Driver

Step 1 Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com website and unzip it.

Step 2 Double-click the file setup.exe.

Step 3 The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4 The Ready to Install the Program window appears, Click Install.

Step 5   The InstallShield Wizard Completed window appears. Click Finish.

Step 6   Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear. Following the instructions to complete the installation of the driver.

Step 7   The USB console is ready for use.

Installing the Cisco Microsoft Windows Vista USB Driver

Step 1   Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com website and unzip it.

Step 2   If using 32-bit Windows Vista, double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows Vista, double-click the file setup(x64).exe from the Windows_64 folder.

Step 3   The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4   The Ready to Install the Program window appears, Click Install.

   Note   If a User Account Control warning appears, click **Allow - I trust this program** to proceed.

Step 5   The InstallShield Wizard Completed window appears. Click Finish.

Step 6   Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a pop up window stating "Installing device driver software" appears. Following the instructions to complete the installation of the driver.

Step 7   The USB console is ready for use.

Uninstalling the Cisco Microsoft Windows USB Device Driver

- "Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver"
- "Uninstalling the Cisco Microsoft Windows Vista USB Driver"

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

This procedure shows you how to uninstall both the Microsoft Windows XP and 2000 USB driver. The driver can be removed using the Windows Add Remove Programs utility or the setup.exe program.

Using the Add Remove Programs Utility

SUMMARY STEPS

   1. Click Start > Control Panel > Add or Remove **Programs**.
   2. Scroll to Cisco Virtual Com and click Remove.
   3. When the Program Maintenance window appears, select the Remove radio button. Click Next.

DETAILED STEPS

Step 1   Click Start > Control Panel > Add or Remove **Programs**.

   Note   Disconnect the router console terminal before uninstalling the driver.

Step 2   Scroll to Cisco Virtual Com and click Remove.

Step 3   When the Program Maintenance window appears, select the Remove radio button. Click Next.

Using the Setup.exe Program

Disconnect the router console terminal before uninstalling the driver.

SUMMARY STEPS

1. Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows 64-bit. Click Next.
2. The InstallShield Wizard for Cisco Virtual Com appears. Click Next.
3. When the Program Maintenance window appears, select the Remove radio button. Click Next.
4. When the Remove the Program window appears, click Remove.
5. When the InstallShield Wizard Completed window appears click Finish.

DETAILED STEPS

Step 1   Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows 64-bit. Click Next.

Step 2   The InstallShield Wizard for Cisco Virtual Com appears. Click Next.

Step 3   When the Program Maintenance window appears, select the Remove radio button. Click Next.

Step 4   When the Remove the Program window appears, click Remove.

Step 5   When the InstallShield Wizard Completed window appears click Finish.

Uninstalling the Cisco Microsoft Windows Vista USB Driver

Disconnect the router console terminal before uninstalling the driver.

SUMMARY STEPS

1. Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows 64 bit. Click Next.
2. The InstallShield Wizard for Cisco Virtual Com appears. Click Next.
3. When the Program Maintenance window appears, select the Remove radio button. Click Next.
4. When the Remove the Program window appears, click Remove.
5. When the InstallShield Wizard Completed window appears, click Finish.

DETAILED STEPS

Step 1   Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows 64 bit. Click Next.

Step 2   The InstallShield Wizard for Cisco Virtual Com appears. Click Next.

Step 3   When the Program Maintenance window appears, select the Remove radio button. Click Next.

Step 4   When the Remove the Program window appears, click Remove.

Note   If a User Account Control warning appears, click **Allow - I trust this program** to proceed.

Step 5 When the InstallShield Wizard Completed window appears, click Finish.

Connecting to the Auxiliary Port

When a modem is connected to the auxiliary port, a remote user can dial in to the router and configure it. Use a light blue console cable and the DB-9-to-DB-25 connector adapter.

✎

Note The console cable and DB-9-to-DB-25 connector are not included with the Cisco ASR 903 Router as a satellite shelf; they are ordered separately.

To connect a modem to the router, follow these steps:

Step 1 Connect the RJ-45 end of the adapter cable to the black AUX port on the router, as shown in the figure.

Figure 79: Connecting a Modem to the Cisco ASR 903 Router Satellite Shelf
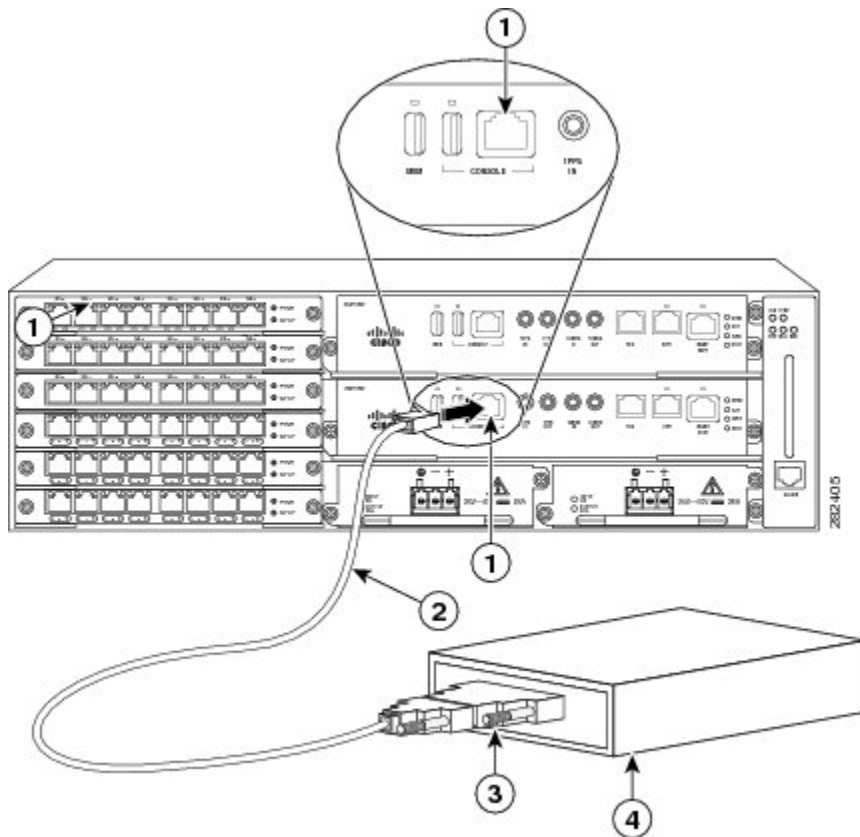
1	RJ-45 AUX port	3	RJ-45 to DB-9
2	DB-9 to DB-25 adapter	4	Modem

Step 2   Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.

Step 3   Connect the DB-25 end of the modem adapter to the modem.

Step 4   Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.

Connecting a Management Ethernet Cable

When using the Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Ethernet Management port is configured to a fixed speed (10 or 100 Mbps) through command-line interface (CLI) commands, the port is forced to MDI mode.

When in a fixed-speed configuration and MDI mode:

  • Use a crossover cable to connect to an MDI port.
  • Use a straight-through cable to connect to an MDI-X port.

Warning   The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7005

Installing and Removing SFP and XFP Modules

The Cisco ASR 903 Router as a satellite shelf supports a variety of SFP and XFP modules, including optical and Ethernet modules. For information on how to install and remove SFP and XFP modules, see the documentation for the SFP or XFP module at:

https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-installation-guides-list.html

For information about inspecting and cleaning fiber-optic connections, see:

https://www.cisco.com/c/en/us/support/docs/optical/synchronous-digital-hierarchy-sdh/51834-cleanfiber2.html

Connecting a USB Flash Device

To connect a USB flash device to the Cisco ASR 903 Router as a satellite shelf, insert the memory stick in the USB port labeled MEM. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

This figure shows the USB port connector on the Cisco ASR 903 Router as a satellite shelf.

Figure 80: Cisco ASR 903 Router Satellite Shelf Flash Token Memory Stick
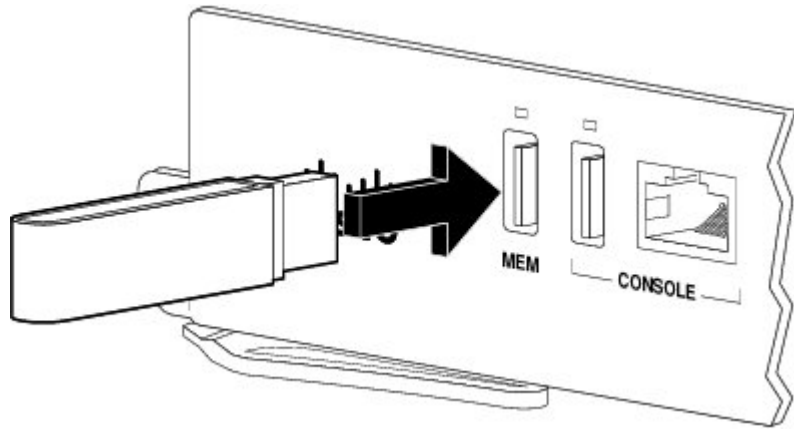
Removing a USB Flash Device

To remove and then replace a USB flash token memory stick from a Cisco ASR 903 Router as a satellite shelf, follow these steps:

SUMMARY STEPS

1. Pull the memory stick from the USB port.
2. To replace a Cisco USB Flash memory stick, simply insert the module into the USB port labeled MEM as shown in the above figure. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

DETAILED STEPS

Step 1   Pull the memory stick from the USB port.

Step 2   To replace a Cisco USB Flash memory stick, simply insert the module into the USB port labeled MEM as shown in the above figure. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

You can insert or remove the memory stick whether the router is powered on or not.

Connecting Ethernet Cables

The Cisco ASR 903 interface modules support RJ-45 or SFP Ethernet ports. For instructions on how to connect cables to Ethernet SFP ports, see Connecting Cables to SFP Modules, on page 159 section.

The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco Systems does not supply Category 5 UTP cables; these cables are available commercially.

Warning The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7005

Follow these steps to connect the cable to a copper Gigabit Ethernet port:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of the cable to the Gigabit Ethernet port on the router.
3. Connect the other end to the BTS patch or demarcation panel at your site.

DETAILED STEPS

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of the cable to the Gigabit Ethernet port on the router.

Step 3 Connect the other end to the BTS patch or demarcation panel at your site.

Connecting Cables to SFP Modules

For information on connecting cables to Cisco optical and Ethernet SFP interfaces, see:

http://www.cisco.com/en/US/partner/products/hw/modules/ps5455/prod_installation_guides_list.html

Connecting the Fan Tray Alarm Port

The fan tray includes an alarm port that maps to 4 dry contact alarm inputs.

The pins on the alarm port are passive signals and can be configured as Normally Open (an alarm generated when current is interrupted) or Normally Closed (an alarm is generated when a circuit is established) alarms. You can configure each alarm input as critical, major, or minor. An alarm triggers alarm LEDs and alarm messages. The relay contacts can be controlled through any appropriate third-party relay controller. The open/close configuration is an option controlled in Cisco IOS software.

Warning The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring. Statement 7005

Only Pins 1, 2, 4, 6, and 8 are available for customer use. The remaining pins are for Cisco manufacturing test, and should not be connected. Use a shielded cable for connection to this port for EMC protection. Table B-21 on page B-28 summarizes the pinouts on the alarm port.

SUMMARY STEPS

    1. Attach an RJ-45 cable to the alarm port.

    2. Attach the other end of the RJ-45 cable to the relay controller.

DETAILED STEPS

Step 1   Attach an RJ-45 cable to the alarm port.

Step 2   Attach the other end of the RJ-45 cable to the relay controller.

For information about how to map alarm inputs to critical, major, and minor alarm conditions, see the *Cisco ASR 903 Software Configuration Guide* .

Installing Optional Chassis Accessories

The Cisco ASR 9000v satellite shelf and ASR901 router have an optional air plenum kit (ASR9000V-901-DEF=) for mounting the router chassis in a 2-post or 4-post adjustable 23-inch rack or a 2-post flat 19-inch rack. The air plenum kit includes:

- One plenum base

- One set of rack-mounting brackets (common for 19-inch and 23-inch racks)

- Two air baffles (left and right), with adjustment plate pre-installed on each baffle

- One air deflector

- Grounding lug

- Four M4 x 6mm flat-head screws

- Twelve M4 x 8mm pan-head screws with washers

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

✎

Note When the air plenum kit is installed with the Cisco ASR 9000v satellite shelf, the maximum system operating temperature is 55 degrees Celsius (131 degrees Fahrenheit). When the air plenum kit is installed with the Cisco ASR 901 router, the maximum system operating temperature is 65 degrees Celsius (149 degrees Fahrenheit). In the event of fan failure, the system can operate at 60 degrees Celsius (140 degrees Fahrenheit) for four hours maximum.

The air plenum kit is mounted in the rack before the Cisco ASR 9000v satellite shelf or ASR901 router is installed. The steps for mounting the air plenum kit in the rack are different, depending on the whether the components of the air plenum kit are pre-assembled before mounting in the rack or assembled after the plenum base is mounted in the rack.

If the components of the air plenum kit are pre-assembled before mounting in the rack, the side baffles and air deflector are attached to the plenum base outside the rack. The plenum assembly is then installed from the rear of the 19-inch rack, or from the front or rear of the 23-inch rack.

If the air plenum kit components are assembled after the plenum is mounted in the rack, the plenum base is first installed from the front (applicable to 19-inch rack). The side baffles and air deflector are then installed in the plenum base after it has been mounted in the rack.

The orientation of the air deflector in the plenum base depends on the type of router being installed.

- For the Cisco ASR9000v satellite shelf, the air deflector is placed in the plenum base with left-front to right-back orientation, with the flanges facing frontwards. See the figure *Orientation of Air Deflector in Plenum Base—Cisco ASR 9000v Satellite Shelf* .

- For the Cisco ASR901 Router, the air deflector is placed in the plenum base with right-front to left-back orientation, with the flanges facing frontwards. See the figure *Orientation of Air Deflector in Plenum Base—Cisco ASR 901 Router*.

Figure 81: Orientation of Air Deflector in Plenum Base—Cisco ASR 9000v Satellite Shelf
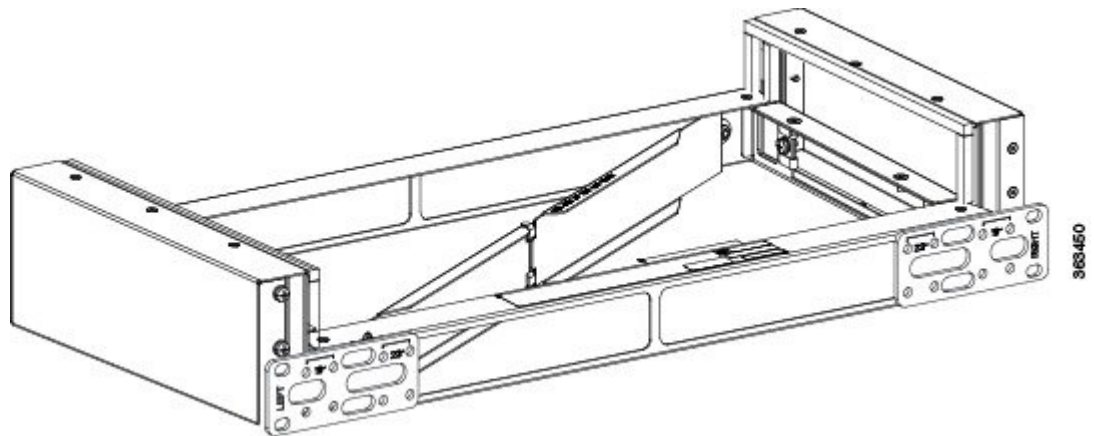
Figure 82: Orientation of Air Deflector in Plenum Base—Cisco ASR 901 Router
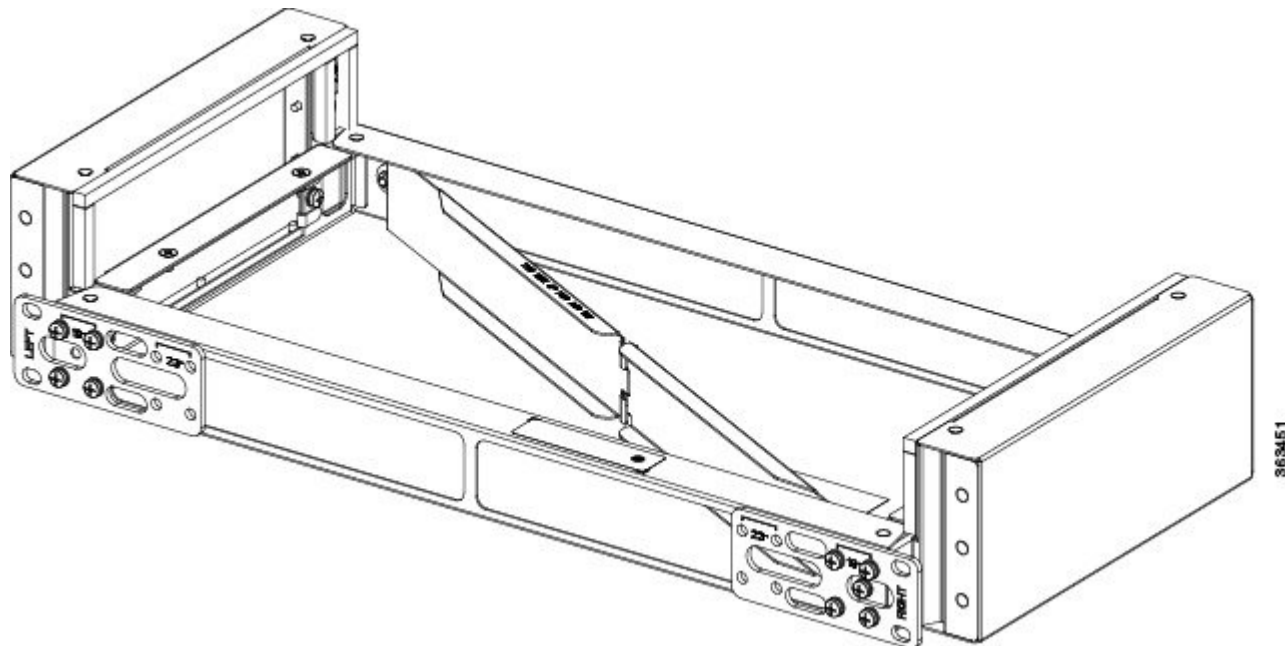
Pre-assembly of Plenum Before Mounting in Rack

Summary of Installation

1. The plenum base is pre-assembled with the air baffles and air deflector outside the rack.
2. The plenum base is inserted from the rear of the 19-inch rack. The plenum can be inserted from the front or rear of the 23-inch rack.
3. The router is installed in the rack.

Follow these steps to pre-assemble the air plenum kit before mounting in the 19-inch or 23-inch rack.

SUMMARY STEPS

1. Prepare the components of the air plenum kit for installation. If you are installing a Cisco ASR 9000v satellite shelf in the rack, remove the adjustment plate and M4 x 8mm pan-head screws from the left and right air baffles and discard them, two screws per adjustment plate.
2. Attach the left and right air baffles to the plenum base with vertical screws, using the four Cisco supplied M4 x 6mm flat-head screws (two per baffle). See this figure.
3. Attach the air deflector to the plenum base using two pan-head M4 x 8mm pan-head screws, as shown in the figure *Attaching Air Deflector to Plenum Base-Cisco ASR 9000v Satellite Shelf Orientation Shown* .
4. If installing from the rear of the 19-inch or 23-inch rack:
5. If installing from the front of the 23-inch rack:
6. Using the Cisco-supplied grounding lug, construct a suitable ground cable of sufficient length. Attach the grounding lug to the rear of the plenum base using two Cisco supplied M4 x 8mm pan-head screws and attach the other end to the grounding source. See the figure *Mounting Plenum Assembly in Rack and Attaching Grounding Lug-Cisco ASR 9000v Satellite Shelf Orientation Shown* .
7. Install the router in the rack. See the and the for more information. This figure shows the Cisco ASR 9000v satellite shelf and air plenum kit installed in the rack.

DETAILED STEPS

Step 1   Prepare the components of the air plenum kit for installation. If you are installing a Cisco ASR 9000v satellite shelf in the rack, remove the adjustment plate and M4 x 8mm pan-head screws from the left and right air baffles and discard them, two screws per adjustment plate.

Figure 83: Removing Adjustment Plate from Air Baffle—ASR9000v Satellite Shelf Only
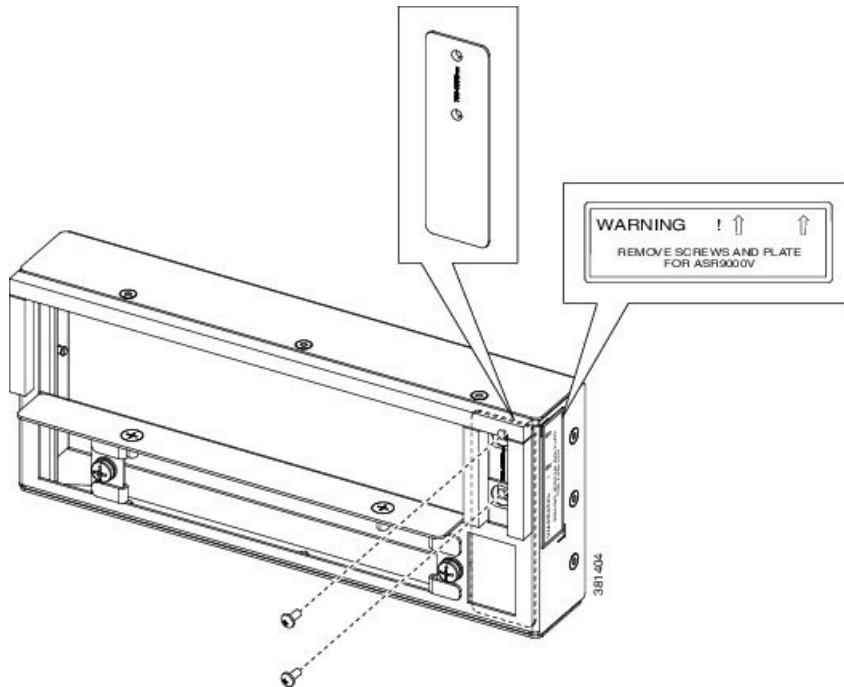
Step 2 Attach the left and right air baffles to the plenum base with vertical screws, using the four Cisco supplied M4 x 6mm flat-head screws (two per baffle). See this figure.

Figure 84: Attaching Air Baffles to Plenum Base—Cisco ASR 9000v Satellite Shelf Orientation Shown
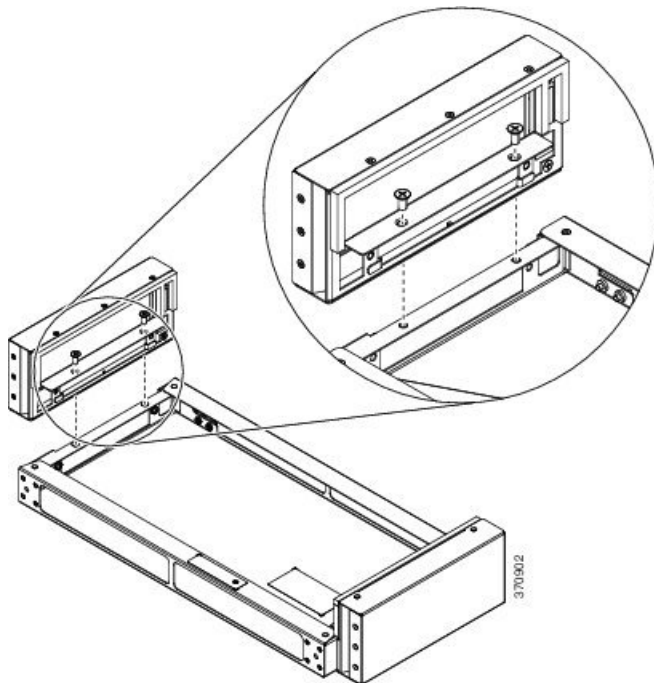
Step 3   Attach the air deflector to the plenum base using two pan-head M4 x 8mm pan-head screws, as shown in the figure
Attaching Air Deflector to Plenum Base-Cisco ASR 9000v Satellite Shelf Orientation Shown .

- For the Cisco ASR9000v satellite shelf, the air deflector is placed in the plenum base with left-front to right-back
  orientation, with the flanges facing frontwards.

- For the Cisco ASR901 Router, the air deflector is placed in the plenum base with right-front to left-back orientation,
  with the flanges facing frontwards.

This figure shows the orientation of the air deflector for the ASR9000v satellite shelf and the Cisco ASR901 Router.

Figure 85: Orientation of Air Deflector in Plenum Base
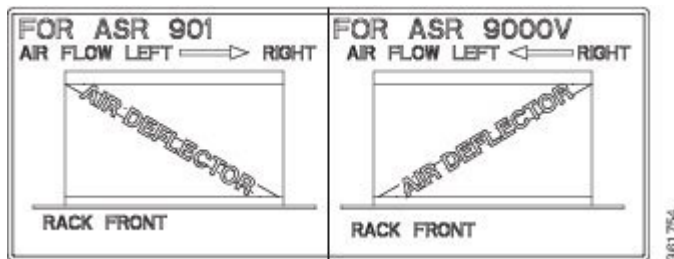
Figure 86: Attaching Air Deflector to Plenum Base—Cisco ASR 9000v Satellite Shelf Orientation Shown
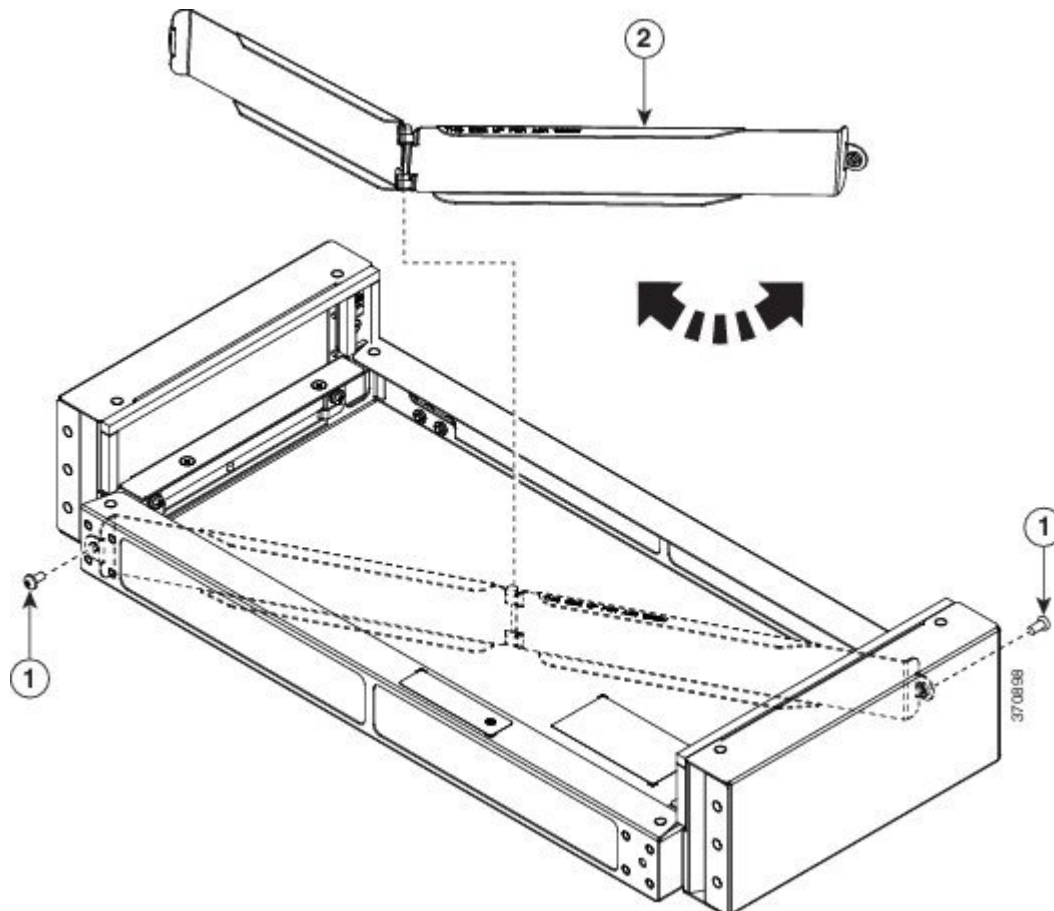
1	Screws attaching air deflector to plenum
2	Air deflector

Step 4 If installing from the rear of the 19-inch or 23-inch rack:

a) Insert the plenum assembly from the rear of the rack.

b) Attach the rack-mounting brackets, shown in the figure *Rack-Mounting Brackets* , to the front of the plenum assembly using eight Cisco supplied M4 x 8mm pan-head screws, four on each mounting bracket.

c) Attach the plenum assembly to the left and right rack rails using customer-supplied rack mounting screws. We recommend using two screws 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. See the figure *Mounting Plenum Assembly in Rack and Attaching Grounding Lug-Cisco ASR 9000v Satellite Shelf Orientation Shown* .

Figure 87: Rack-Mounting Brackets
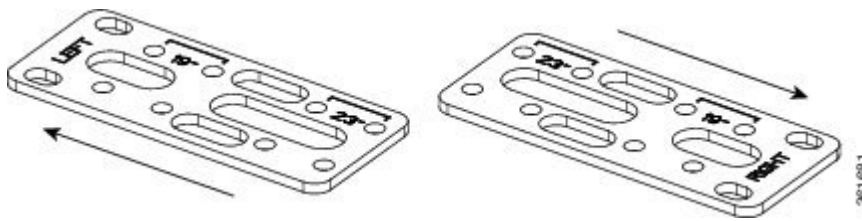
Step 5 If installing from the front of the 23-inch rack:

a) Place the plenum base on a flat and stable surface.

b) Attach the rack-mounting brackets, shown in the figure *Rack-Mounting Brackets* , to the front of the plenum assembly using eight Cisco supplied M4 x 8mm pan-head screws, four on each mounting bracket.

c) Attach the plenum assembly to the left and right rack rails using customer-supplied rack mounting screws. We recommend using two screws 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. See the figure *Mounting Plenum Assembly in Rack and Attaching Grounding Lug-Cisco ASR 9000v Satellite Shelf Orientation Shown* .

Step 6 Using the Cisco-supplied grounding lug, construct a suitable ground cable of sufficient length. Attach the grounding lug to the rear of the plenum base using two Cisco supplied M4 x 8mm pan-head screws and attach the other end to the grounding source. See the figure *Mounting Plenum Assembly in Rack and Attaching Grounding Lug-Cisco ASR 9000v Satellite Shelf Orientation Shown* .

Step 7   Install the router in the rack. See the Installing the Cisco ASR 9000v Satellite Shelf, on page 21 and the Mounting the Cisco ASR 901 Router, on page 85 for more information. This figure shows the Cisco ASR 9000v satellite shelf and air plenum kit installed in the rack.

Note   Before installing the Cisco ASR 9000v satellite shelf or Cisco ASR901 router in the rack, verify that the air deflector is installed in the plenum base in the correct orientation for the specified router.

Figure 88: Air Plenum Assembly and Cisco ASR9000v Satellite Shelf Installed in Rack
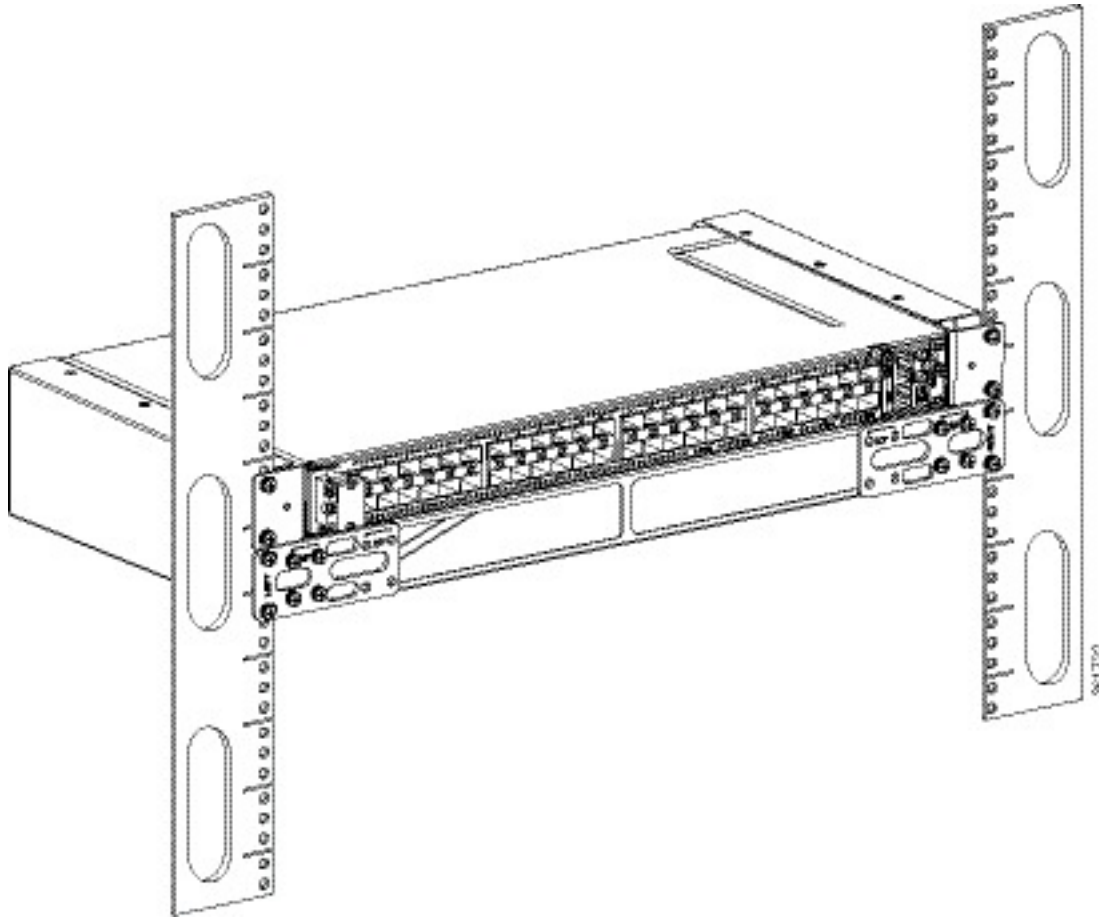
Assembly of Plenum After Mounting in Rack

Summary of Installation

1. The rack-mounting brackets are attached to the plenum base.
2. The plenum base is installed in the 19-inch rack.
3. The air baffles and air deflector are attached to the rack-mounted plenum base. Installation of the air baffles within the rack will require a total of 3 RU clearance to install the air baffles.
4. The router is installed in the rack.

Follow these steps to assemble the air plenum kit after the plenum base is mounted in the 19-inch rack when rack/cabinet clearance prevents pre-assembly.

SUMMARY STEPS

1. Prepare the components of the air plenum kit for installation. If you are installing a Cisco ASR 9000v satellite shelf in the rack, remove the adjustment plate and M4 x 8mm pan-head screws from the left and right air baffles and discard them, two screws per adjustment plate.

2. Attach the rack-mounting brackets to the plenum base using eight Cisco supplied M4 x 8mm pan-head screws, four on each mounting bracket. See this figure.

3. Attach the plenum base to the left and right rack rails using customer-supplied rack mounting screws. We recommend using two screws 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. See this figure.

4. Attach the left and right air baffles to the rack-mounted plenum base using the four Cisco supplied M4 x 6mm flat-head screws (two per baffle). See the figure *Attaching Baffles and Air Deflector to Rack-Mounted Plenum Base—Cisco ASR 9000v Satellite Shelf Orientation Shown.*Use the vertical screws to secure the air baffles to the plenum base. If there is no free space available above the plenum base to install the vertical screws use the horizontal screws to secure the air baffles.

5. Attach the air deflector to the plenum base using two M4 x 8mm pan-head screws. This figure shows the air-deflector orientation for the Cisco ASR9000v satellite shelf.

6. Using the Cisco-supplied grounding lug, construct a suitable ground cable of sufficient length. Attach the grounding lug to the rear of the plenum base using two Cisco supplied M4 x 8mm pan-head screws and attach the other end to the grounding source. See this figure.

7. Install the router in the rack. See the Installing the Cisco ASR 9000v Satellite Shelf, on page 21 and the Mounting the Cisco ASR 901 Router, on page 85 for more information. This figure shows the Cisco ASR901 router and air plenum kit installed in the rack.

DETAILED STEPS

Step 1   Prepare the components of the air plenum kit for installation. If you are installing a Cisco ASR 9000v satellite shelf in the rack, remove the adjustment plate and M4 x 8mm pan-head screws from the left and right air baffles and discard them, two screws per adjustment plate.

Step 2   Attach the rack-mounting brackets to the plenum base using eight Cisco supplied M4 x 8mm pan-head screws, four on each mounting bracket. See this figure.

Figure 89: Rack-Mounting Brackets
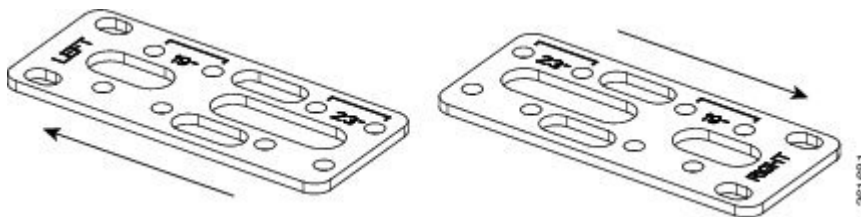
Step 3   Attach the plenum base to the left and right rack rails using customer-supplied rack mounting screws. We recommend using two screws per side. These screws can vary in size and type depending on the rack that you use. Torque the screws to the weight specified for your particular rack. See this figure.

Figure 90: Installing the Plenum Base in the Rack
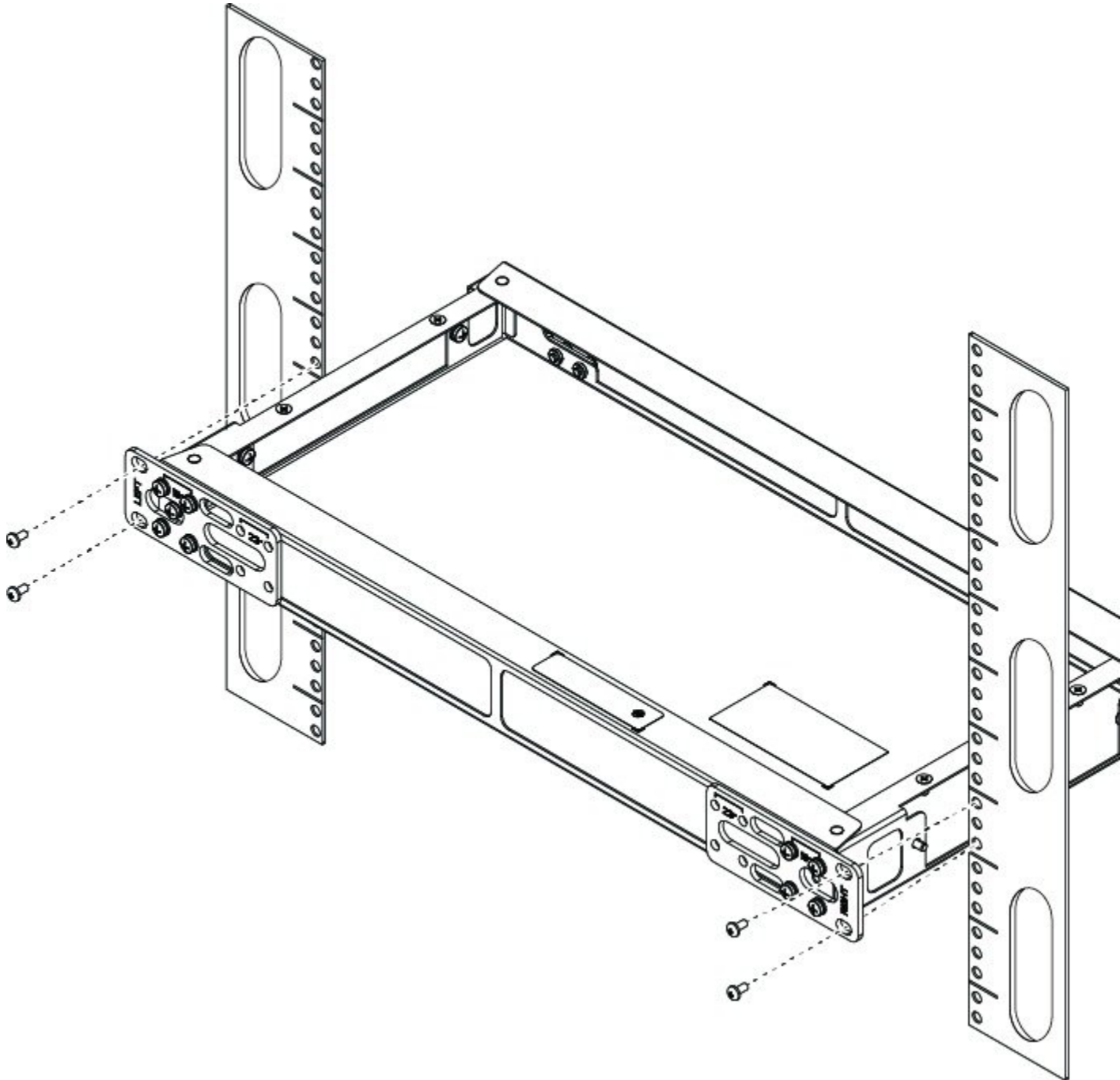
Step 4   Attach the left and right air baffles to the rack-mounted plenum base using the four Cisco supplied M4 x 6mm flat-head screws (two per baffle). See the figure *Attaching Baffles and Air Deflector to Rack-Mounted Plenum Base—Cisco ASR 9000v Satellite Shelf Orientation Shown*.Use the vertical screws to secure the air baffles to the plenum base. If there is no free space available above the plenum base to install the vertical screws use the horizontal screws to secure the air baffles.

Step 5   Attach the air deflector to the plenum base using two M4 x 8mm pan-head screws. This figure shows the air-deflector orientation for the Cisco ASR9000v satellite shelf.

- For the Cisco ASR9000v satellite shelf, the air deflector is placed in the plenum base with left-front to right-back orientation, with the flanges facing frontwards.

- For the Cisco ASR901 Router, the air deflector is placed in the plenum base with right-front to left-back orientation, with the flanges facing frontwards.

Figure 91: \Attaching Baffles and Air Deflector to Rack-Mounted Plenum Base—Cisco ASR 9000v Satellite Shelf Orientation Shown
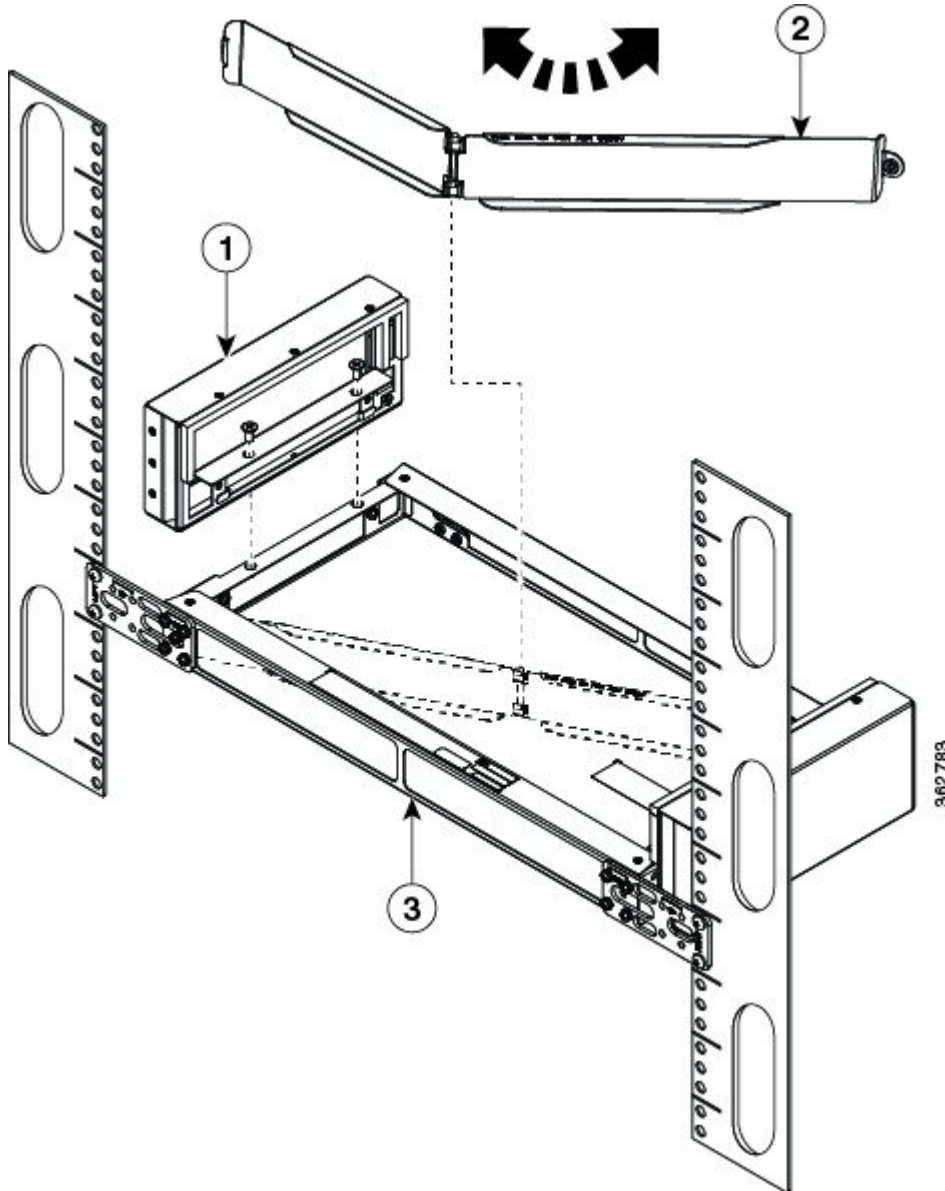
1	Air baffle	3	Plenum base
2	Air deflector		

This figure shows the orientation of the air deflector for the Cisco ASR9000v satellite shelf and the Cisco ASR901 Router.

Figure 92: Orientation of Air Deflector in Plenum Base
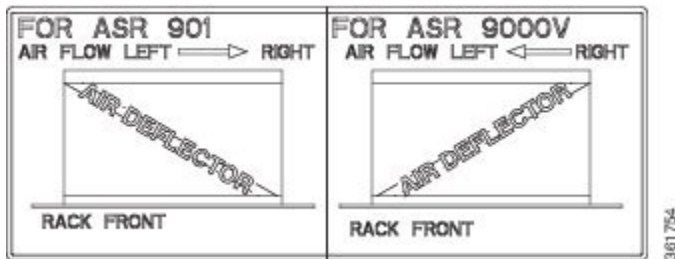
Step 6   Using the Cisco-supplied grounding lug, construct a suitable ground cable of sufficient length. Attach the grounding lug to the rear of the plenum base using two Cisco supplied M4 x 8mm pan-head screws and attach the other end to the grounding source. See this figure.

*Figure 93: Attaching Grounding Lug to Plenum Assembly—Cisco ASR 9000v Satellite Shelf Orientation Shown*
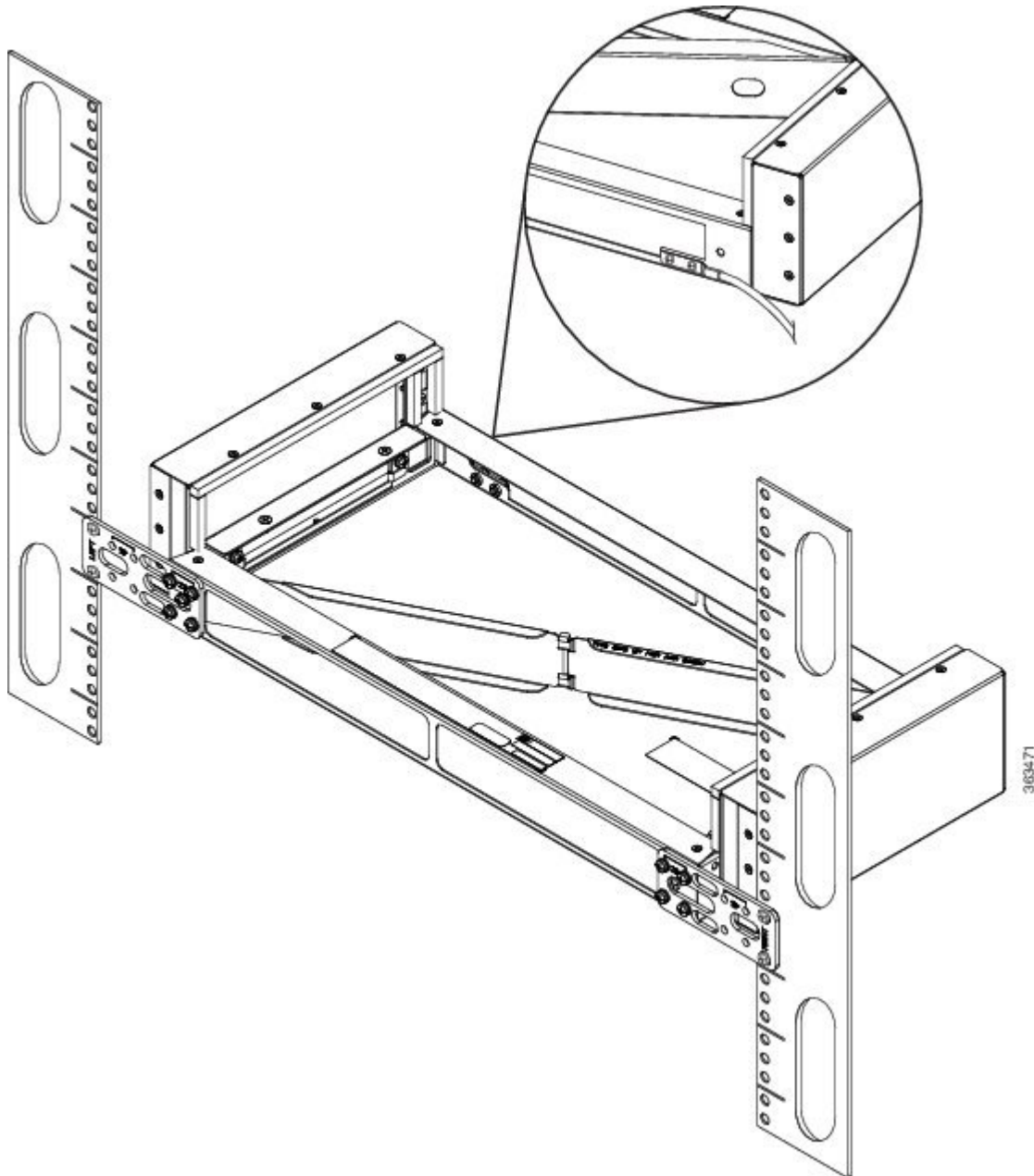
Step 7   Install the router in the rack. See the Installing the Cisco ASR 9000v Satellite Shelf, on page 21 and the Mounting the Cisco ASR 901 Router, on page 85 for more information. This figure shows the Cisco ASR901 router and air plenum kit installed in the rack.

Note   Before installing the Cisco ASR 9000v satellite shelf or Cisco ASR901 router in the rack, verify that the air deflector is installed in the plenum base in the correct orientation for the specified router.

Figure 94: Air Plenum Kit and Cisco ASR 901 Router Installed in Rack
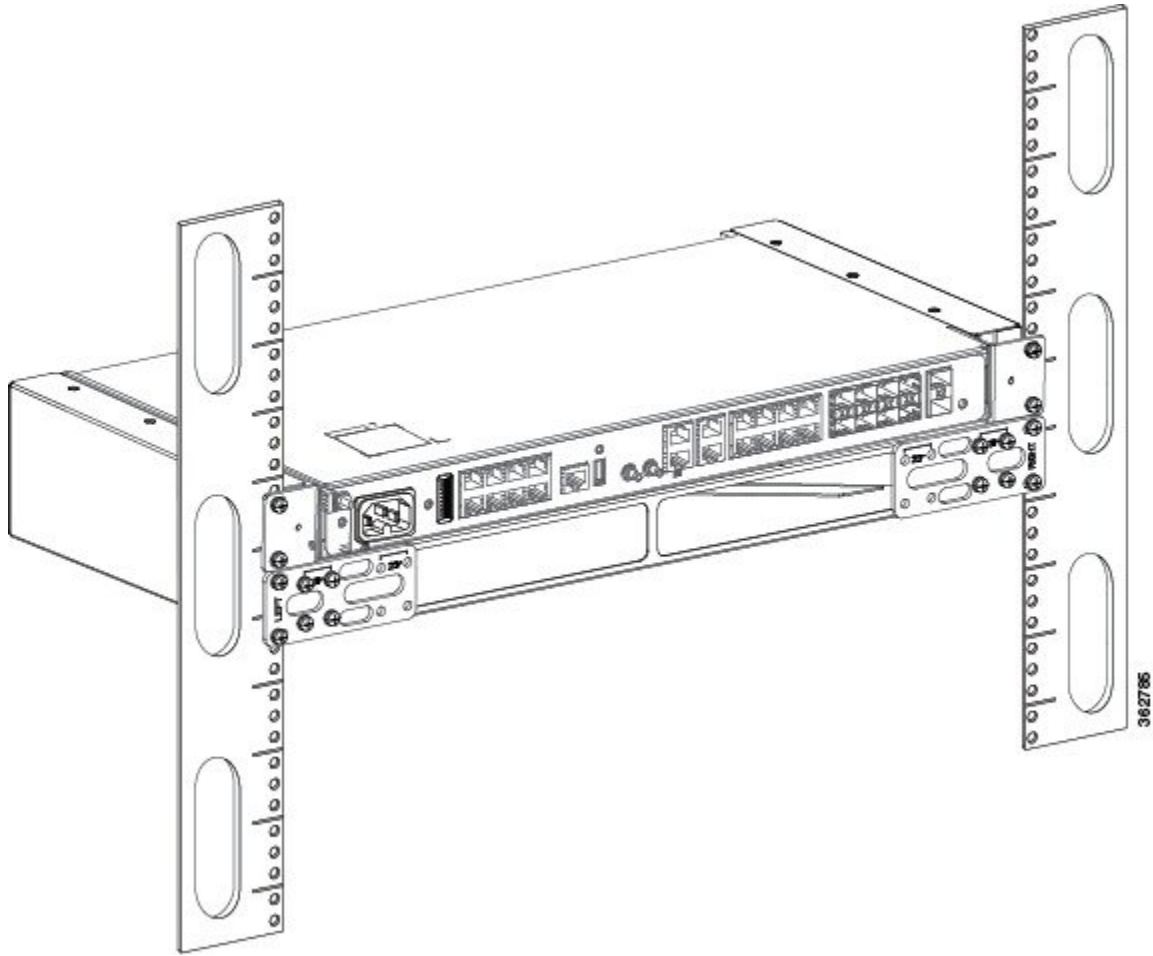
Technical Specifications and Product IDs

This appendix lists specifications for the following routers:

Cisco ASR 9000v Satellite Shelf

This section contains product names, product IDs, and hardware specifications for the Cisco ASR 9000v satellite shelf.

Cisco ASR 9000v Satellite Shelf Product IDs

Table 16: Cisco ASR 9000v Satellite Shelf System Product IDs

Product ID	Description
ASR-9000v-AC	44-Port GE + 4-Port 10-GE ASR 9000v, AC Power
ASR-9000v-24-A	44-Port GE + 4-Port 10-GE ASR 9000v, +24 V DC Power ANSI Chassis
ASR-9000v-DC-A	44-Port GE + 4-Port 10-GE ASR 9000v, DC Power ANSI Chassis
ASR-9000v-DC-E	44-Port GE + 4-Port 10-GE ASR 9000v, DC Power ETSI Chassis
A9KV-V2-AC	44-Port GE + 4-Port 10-GE ASR 9000v Version 2, AC Power
A9KV-V2-DC-A	44-Port GE + 4-Port 10-GE ASR 9000v Version 2, DC Power ANSI Chassis
A9KV-V2-DC-E	44-Port GE + 4-Port 10-GE ASR 9000v Version 2, DC Power ETSI Chassis
A9K-NVSAT1-LIC(=)	ASR-9000 nV Host License for up to 1 nV Clients
A9K-NVSAT5-LIC(=)	ASR-9000 nV Host License for up to 5 nV Clients
A9K-NVSAT20-LIC(=)	ASR-9000 nV Host License for up to 20 nV Clients
ASR-9000v-FAN	ASR-9000v Fan Tray with Filter

Product ID	Description
A9KV-V2-FAN	ASR-9000v Version 2 Fan Tray with Filter

Cisco ASR 9000v Satellite Shelf System Specifications

This section provides the specifications for timing, power, and environmental specifications, and shelf dimensions of the Cisco ASR 9000v satellite shelf system.

The GPS (Global Positioning System) interface (1-PPS and 10-MHz) specifications are listed in this table.

Table 17: GPS (Global Positioning System) Interface (1PPS and 10MHz) of the Cisco ASR 9000v Satellite Shelf System

	10-MHz Specification	**1-PPS Specification**
Waveform	Sine wave	Pulse
Frequency	10 MHz	1 PPS
Amplitude	> 1 V LVTTL Compatible	> 1 V LVTTL Compatible
Impedance	50 Ohms	50 Ohms

The pinout of the TOD (Time of Day) RJ-45 port is listed in the tale below.

Table 18: TOD/1PPS RS422 Interface— RJ-45 Pinout of the Cisco ASR 9000v Satellite Shelf System

Pin	Signal Name	Description
1	1PPS_N	1PPS RS422 output signal
2	1PPS_P	1PPS RS422 output signal
3	NC	No Connect
4	GND	—
5	GND	—
6	NC	No Connect
7	TOD_P	Time of Day RS422 output
8	TOD_N	Time of Day RS422 output

System Power for the Cisco ASR 9000v Satellite Shelf

Cisco ASR 9000v Fan Tray

Table 19: Cisco ASR 9000v Satellite Shelf Fan Tray Power Specifications

Shelf	Input Voltage	Power Consumption	Power Terminals	Fuse Rating
Cisco ASR 9000v satellite shelf with AC power module for ANSI and ETSI standards	100V to 240V AC depending on the standards in various countries; 50/60 Hz nominal (range: 47 to 63 Hz)	100 VAC 2.4 A; 240 VAC 1A	One AC single phase with 3- pole (line L, Neutral N, and Protective Earth PE) input connector.	Must not exceed 10 A or 15 A, depending on the standards in various countries.
Cisco ASR 9000v satellite shelf with 24V DC power module for ANSI standard	Voltages –20 VDC and –28.3 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is –24 VDC.	24 VDC 10A	Single terminal block with four poles— –24V and RET for power terminals A and B.	Must not exceed 15 A.
Cisco ASR 9000v satellite shelf with 48 V DC power module for ANSI standard	Voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is –48 VDC. Functionality is guaranteed at –40 VDC input voltage, according to GR-1089, Issue 5.	48 VDC 5 A	Single terminal block with four poles— –48V and RET for power terminals A and B.	Must not exceed 10 A.
Cisco ASR 9000v satellite shelf with 48 V DC power module for ETSI standard	Voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is –48 VDC.	48 VDC 5 A	DSUB 2 poles.	Must not exceed 10 A.

Table 20: Fan Tray Power Requirements

Fan Tray	Watts	Amps
12 V supplied by the Cisco ASR 9000v satellite shelf	36	3

Cisco ASR 9000v Satellite Shelf Physical Dimensions

Table 21: Physical Dimensions of the Cisco ASR 9000v Satellite Shelf System

Shelf	Physical Dimensions							
	Measurement in inches				Measurement in mm			
	Height	Width	Depth	Weight in Kg	Height	Width	Depth	Weight in Kg

Shelf	Physical Dimensions							
Cisco ASR 9000v Satellite Shelf	1.7	19 or 23 with mounting ears attached for ANSI rack configuration 21 with mounting ears attached for ETSI rack configuration	9.1	With AC power module: 4.06 kg With DC power module: 4.22 kg	43.1	482.6 or 584.2 with mounting ears attached for ANSI rack configuration 533.4 mm with mounting ears attached for ETSI rack configuration	231.1	With AC power module: 4.06 kg With DC power module: 4.22 kg

Cisco ASR 9000v Satellite Shelf Operating Temperature and Humidity

- Operating Temperature: –5 to 55 degrees Celsius for AC power supply; –40 to 65 degrees Celsius for DC power supply.

- Operating Humidity: 5 to 85 percent, noncondensing; functionality is guaranteed up to 5 to 95 percent, noncondensing.

Cisco ASR 9000v Satellite Shelf Switching Capacity

Table 22: Switching Capacity of the Cisco ASR 9000v Satellite Shelf System

Shelf	Interface	Switching Capacity
Cisco ASR 9000v Satellite Shelf	44 GE 10/100/1000 Mbps SFP ports	44 GB
	4 10-GE SFP+ ports	

Cisco ASR 9000v Satellite Shelf GBIC, SFP, SFP+, and XFP Compatibility

Refer to the Transceiver Module Group (TMG) Compatibility Matrix for information on transceiver compatibility of the Cisco ASR 9000v satellite shelf system.

Cisco ASR 901 as a Satellite Shelf

This section contains hardware specifications for the Cisco ASR 901 as a satellite shelf.

Cisco ASR 901 System Specifications

Table 23: Cisco ASR 901 Router System Specifications

Description	Specification
Dimensions (H x W x D)	1.7 x 17.4 x 8.25 in. (4.37 x 44.2 x 21.0 cm) 1 RU (rack unit) in a 19-in (48.3-cm) rack
Weight	7 lb (3.1 kg)
Console and Auxiliary Ports	RJ-45 connector
Operating Temperature	Operating temperature range is –40 to +65°C (–40 to 149°F)
Non-Operational Temperature	Temperature: –40 to 70 °C (–40 to 21.1°F)
Operating Humidity	10 to 90% RH (non-condensing)
Non-Operational Humidity	Up to 93% RH
Operating Altitude	13,800 ft (4206 m)
Operating Vibration	0.15 G, 10 to 500 Hz/100 minutes per axis
Non-Operational Vibration	0.8 G, 10 to 500 Hz/30 minutes per axis
Operating Acoustics	60 dB
Airflow	Side to side

Cisco ASR 901 Power Specifications

This table lists the DC power supply specifications for the Cisco ASR 901 router.

Table 24: Cisco ASR 901 Router Power Supply Specifications

Specification	Value
DC power supply input voltage	–24/–72 VDC
Maximum input current	3 A
Wire gauge for DC input power connections	16 AWG
Power dissipation	60 W

The Cisco ASR 901 router uses two 3-pin connectors (part number 27-2030-01) for input to the power supply. The terminal block is part of the accessory kit (part number 53-3085-01/53-3295-0), which ships with the Cisco ASR 901 router.

The ground wire connects to a 2-hole lug, which connects to the corresponding mounting point.

With the connector installed in the chassis, the pins numbered from top to bottom are 1, 2, and 3, respectively.

This table lists the pinout configurations for the connector, based on the power source.

Table 25: Power Supply Connector Pinouts (–24/–72 VDC Application)

Pin	Connector A
1	VDC (–24 to –72)
2	RTN
3	Chassis Ground

Pin	Connector B
1	VDC (–24 to –72)
2	RTN
3	Chassis Ground

You can use connector A or B or both.

Cisco ASR 901 Environmental Monitoring Temperature Sensor

The Cisco ASR 901 router has a temperature sensor to detect overtemperature conditions inside the chassis. The overtemperature detection trips at 70°C. This condition is reported to the processor as an interrupt, and the software generates the appropriate alarms. If the router reaches a temperature of 85°C, the power supply cycles itself to prevent the router from exceeding the maximum temperature while being powered up.

Cisco ASR 901 Router Interface Numbering

Each network interface on a Cisco ASR 901 router is identified by a slot number and a port number, explained in this sequence:

- Logical slot numbers starts from 0 for all built-in interfaces. The numbering format is **interface type Slot number/interface number**. Interface (port) numbers begin at logical 0 for each interface type.
- Logical interface numbering for the built-in Ethernet ports runs from g0/0 through g0/3, the combo ports run from g0/4 to g0/7, and the SFP ports run from g0/8 through g0/11. The GE ports are numbered bottom to top, left to right.

Table 26: Cisco ASR 901 Router Interface Labels

Interface	Number	Location	Label
RJ-45 jacks for copper Ethernet ports	8	Onboard	100/1000 ETHERNET
SFP connector for optical GE ports	8	Onboard	Fiber ETHERNET
RJ-45 connector for the console	1	Onboard	CON/AUX
RJ-45 jack for the BITS interface	1	Onboard	BITS
RJ-45 jack for the Time-of-Day interface	1	Onboard	TOD

Interface	Number	Location	Label
1-PPS mini-coax timing connector	1	Onboard	1PPS
10-MHz mini-coax timing connector	1	Onboard	10MHZ
Power connector	1	Onboard	Power Connector

Cisco ASR 901 Cable Specifications

If you prefer to build your own cables, this section provides cable specifications for the Cisco ASR 901 router.

Gigabit Ethernet Connector Pinouts

This section illustrates the Gigabit Ethernet RJ-45 connector and lists its pinout and signal descriptions. Note that the RJ-45 ports are capable of operating in both 100BaseT and 1000BaseT modes.

This figure shows the RJ-45 connector and port, and the *RJ-45 Connector Pinouts* table lists the connector pinouts and signals.

Figure 95: RJ-45 Connector and Port
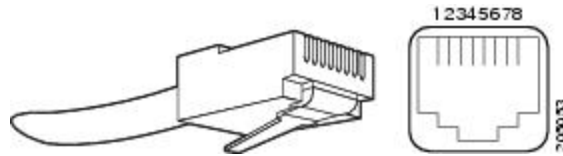
Table 27: RJ-45 Connector Pinouts

Pin	FE Signal	GE Signal
1	TX data+	TX A+
2	TX data–	TX A–
3	RX data+	RX B+
4	Not used	TX C+
5	Not used	TX C–
6	RX data–	RX B–
7	Not used	RX D+
8	Not used	RX D–

SFP Port Pinouts and Cable Specifications

For information about SFP modules supported by the Cisco ASR 901 router, including pinouts, see the *Cisco Interfaces and Modules* support section on Cisco.com.

Note   Pins not listed in the tables in this appendix are not connected.

T1/E1 Port Pinouts

This figure shows the RJ-48C connector used by the T1/E1 ports on the TDM interface module on the Cisco ASR 901 router.

Figure 96: RJ-48C Connector
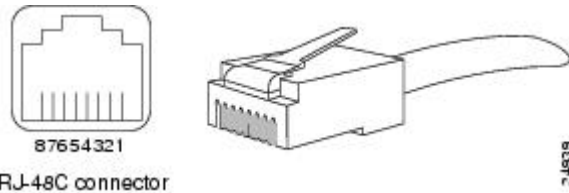
This figure shows the RJ-48C connector wiring for the T1/E1 cable.

Figure 97: RJ-48-to-RJ-48 T1/E1 Cable Wiring
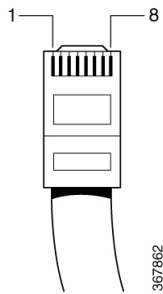
Note   We recommend using a shielded cable for RJ-48C connectors.

This table shows the pinout configuration for the RJ-48C connectors on the Cisco ASR 901 router for both the shielded and unsaddled cables for either T1 or E1. This table shows the pinout configuration for the RJ-45 connectors on the TDM interface module on the Cisco ASR 901 router.

Table 28: T1/E1 Port Pinout for the Cisco ASR 901 Router

Pin	Signal Name	Direction	Description
1	RX Tip	Input	Receive Tip
2	RX Ring	Input	Receive Ring
3	Not Used		
4	TX Tip	Output	Transmit Tip
5	TX Ring	Output	Transmit Ring

Pin	Signal Name	Direction	Description
6	Not Used		
7	Not Used		
8	Not Used		

Console Port Signals and Pinouts

The Cisco ASR 901 router ships with a console cable kit, which contains the cable and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software). The console cable kit includes the following items:

- RJ-45-to-RJ-45 rollover cable

- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)

- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)

To connect a modem, you need to order an auxiliary cable.

Use the thin, flat, RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL) to connect the console port to a PC running terminal emulation software. This figure shows how to connect the console port to a PC. The *Console Port Pinouts* table lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL).

Figure 98: Connecting the Console Port to a PC
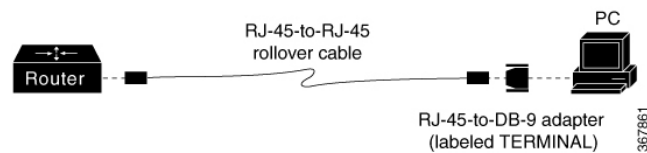
This table lists the Console port pinouts for the Cisco ASR 901 router.

Table 29: Console Port Pinouts

Pin	Signal Name	HP Pins	Direction	Description
1	RTS	UART_RTS1	Output	Request to send
2	DTR	NC		
3	TXD	UART_SOUT1	Output	Transmit data
4	RI	GND		Ring indicator
5	GND	GND		
6	RXD	UART_SIN1	Input	Receive data
7	DSR/DCD	NC	Input	Data set ready/data carrier detect

Pin	Signal Name	HP Pins	Direction	Description
8	CTS	UART_CTS1	Input	Clear to send

This table describes the pinouts RJ-45-to-RJ-45 and RJ-45-to-DB-9 rollover cables.

Table 30: Console Port Signaling and Cabling Using a DB-9 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter (Connected to Rollover Cable)	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	Signal
RTS	1[1]	8	8	CTS
DTR	2	7	6	DSR/DCD
TxD	3	6	2	RxD
GND/RI	4	5	5	GND
GND	5	4	5	GND/RI
RxD	6	3	3	TxD
DSR/DCD	7	2	4	DTR
CTS	81	1	7	RTS

[1] Pin 1 is connected internally to pin 8.

This table lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL).

Table 31: Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)[2]	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1[3]	8	5	CTS
DTR	2	7	6	DSR/DCD
TxD	3	6	3	RxD
GND/RI	4	5	7	GND
GND	5	4	7	GND/RI

Console Port (DTE)[2]	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
RxD	6	3	2	TxD
DSR/DCD	7	2	20	DTR
CTS	82	1	4	RTS

[2] You can use the same cabling to connect a console to the auxiliary port.
[3] Pin 1 is connected internally to pin 8.

BITS Port Pinouts

This table list the pinouts for the BITS interface RJ-45 port on the Cisco ASR 901 router.

Table 32: BITS Pinouts for the Cisco ASR 901 Router

Pin	Signal Name	Direction	Description
1	RX ring	Input	Receive ring
2	RX tip	Input	Receive tip (T1/E1)
3	Not connected		
4	TX ring	Output	Transmit ring
5	TX tip	Output/input	Transmit tip (T1/E1)
6	Not connected		
7	Not connected		
8	Not connected		

Time of Day Pinouts

This table lists the pinouts for the Time of Day RJ-45 interface on the Cisco ASR 901 router.

Table 33: Time of Day RJ-45 Interface Pinout

Pin	Signal Name	Direction	Description
1	Not connected		
2	Not connected		
3	Not connected		
4	Ground		
5	Ground		

Pin	Signal Name	Direction	Description
6	Not connected		
7	TOD_N	Output/Input	Time of Day RS422 differential input or output
8	TOD_P	Output/Input	Time of Day RS422 differential input or output

GPS Port Pinouts

The Cisco ASR 901 router has a 10-MHz and a 1-PPS GPS port that allow you to configure input or output clocking with a GPS device. This table summarizes the pinouts for the 10-MHz and 1-PPS interfaces.

Note For pinouts related to ToD and 1 PPS using the BITS interface, see Console Port Signals and Pinouts, on page 183.

Table 34: GPS Port Pinouts for the Cisco ASR 901 Router

	10 MHz	1 PPS
Waveform	Input: Sine wave Output: Square wave	Input: Pulse shape Output: Pulse shape
Amplitude	Input: > 1.7 volt p-p(+8 to +10 dBm) Output: > 2.4 volts TTL compatible	Input: > 2.4 volts TTL compatible Output: > 2.4 volts TTL compatible
Impedance	50 ohms	50 ohms
Pulse Width	50% duty cycle	26 microseconds
Rise Time	Input: AC coupled Output: 5 nanoseconds	40 nanoseconds

The 1-PPS interface type is Series 1.0 / 2.3, 50 ohms.

For instructions on how to configure the 10-MHz and 1-PPS ports, see the http://www.cisco.com/c/en/us/td/docs/wireless/asr_901/Configuration/Guide/b_asr901-scg/b_asr901-scg_preface_00.html Cisco ASR 901 Router Mobile Wireless Software Configuration Guide .

Alarm Port Pinouts

This table lists the pinouts for the alarm port (RJ-45) on the Cisco ASR 901 router.

Table 35: Alarm Port Pinout

Pin	Signal Name	Description
1	Alarm input 1	
2	Alarm input 2	

Pin	Signal Name	Description
3	Not connected	
4	Alarm input 3	
5	Alarm input 4	
6	Not connected	
7	Not connected	
8	Not connected	

Management Ethernet Port Pinouts

This table lists the pinouts for the management Ethernet port (RJ-45) on the Cisco ASR 901 router.

Table 36: Management Ethernet Pinout

Pin	Signal Name
1	RxD_P
2	RxD_N
3	TxD_P
4	Not connected
5	Not connected
6	TxD_N
7	Not connected
8	Not connected

Cisco ASR 903 as a Satellite Shelf

Cisco ASR 903 System Specifications

This table summarizes the system specifications and environmental requirements for the Cisco ASR 901.

Table 37: Cisco ASR 901 System Specifications

Dimensions (Height x Width x Depth)	5.22 x17.44 x 10.565 in. (132.588 x 442.976 x 268.351 mm)
	Note This measurement includes handles from the power supply, fan tray, and interface modules installed in the chassis.

Weight	27.117 lb (12.3 kg)
	Note This weight includes a redundant RSP and power supply.
Operating Temperature	The Cisco ASR 901 supports the following temperature ranges with the DC power supply: • –60 to 4000 meters: –40 to 104ºF(–40 to 40ºC) • –60 to 1800 meters: –40 to 149ºF(–40 to 65ºC) The Cisco ASR 901 supports the following temperature ranges with the AC power supply: • –60 to 4000 meters: 32 to 104ºF (0 to 40ºC) • –60 to 1800 meters: 23 to 140ºF(–5 to 60ºC)
Nonoperating Temperature	–40ºF to 185ºF (–40ºC to +85ºC) storage temperature
Operating Humidity	5 to 95% operating noncondensing relative humidity
Operating Altitude	–60-m to 1800-m operating altitude for full operating temperature range; up to 4000 m at up to 40ºC.
Nonoperating Altitude	4572-m storage altitude
Vibration	1.0 G from 1.0 to 150 Hz
Shock	30 G half sine 6 ms and 11 ms
Nonoperating Vibration	Random: 1.15 gRMS 3 to 200 Hz, 30 minutes/axis Sine: 10 to 500 Hz @ 0.8 G peak / 5 sweep cycles/axis
Operating Acoustics	Less than 55 dBa @ 27ºC

ASR 903 Connector and Cable Specifications

The following sections describe the pinouts for the Cisco ASR 903 Router satellite shelf interfaces:

Alarm Port Pinout

Table 38: External Alarm Input Pinout

Pin	Signal Name	Description
1	ALARM0_IN	Alarm input 0
2	ALARM1_IN	Alarm input 1
3	Not connected	

Pin	Signal Name	Description
4	ALARM2_IN	Alarm input 2
5	ALARM3_IN	Alarm input 3
6	Not connected	
7	Not connected	
8	COMMON	Alarm common

Console/Aux RJ-45 RS-232 Serial Port Pinout

Table 39: Console/Aux RJ-45 RS-232 Serial Port

Pin	Signal Name	Direction	Description
1	RTS	Output	Request to send
2	DTR	Output	Data terminal ready (always on).
3	TXD	Output	Transmit data
4	RI		Ring indicator
5	GND		
6	RXD	Input	Receive data
7	DSR/DCD	Input	Data set ready/data carrier detect
8	CTS	Input	Clear to send

Management Ethernet Port Pinout

Table 40: Management Ethernet Port Pinout

Pin	Signal Name
1	TRP0+
2	TRP0-
3	TRP1+
4	TRP2+
5	TRP2-

Pin	Signal Name
6	TRP1-
7	TRP3+
8	TRP3-

USB Console Port Pinout

Table 41: Single USB Console Port

Pin	Signal Name	Description
A1	Vcc	+5 VDC (500 mA)
A2	D-	Data -
A3	D+	Data +
A4	Gnd	Ground

Note The USB console port +5 VDC is input and operates as an USB peripheral device.

USB Flash/MEM Port Pinout

Table 42: Single USB Flash/MEM Port

Pin	Signal Name	Description
A1	Vcc	+5VDC (500mA)
A2	D–	Data –
A3	D+	Data +
A4	Gnd	Ground

Note A USB TYPE-A receptacle is used.

Note   The USB flash/MEM port +5 VDC is output. We provide power for USB flash/MEM, and it operates as a USB host device.

Fiber-Optic Specifications

The specification for optical fiber transmission defines two types of fiber: single-mode and multimode. Within the single-mode category, three transmission types are defined: short reach, intermediate reach, and long reach. Within the multimode category, only short reach is available. For information about optical SFP modules, see the documentation for the SFP module at:

https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-installation-guides-list.html

APPENDIX **B**

Site Log

Use the site log to provide a record of actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that those who performs tasks have access to it. Use the installation checklist to verify the steps in the installation and maintenance of your router. Site log entries might include the following:

-

Site Log

- Installation progress—Make a copy of the Cisco ASR 903 Router as a satellite shelf installation checklist, and insert it into the site log. Make entries as you complete each task.
- Upgrade, removal, and maintenance procedures—Use the site log as a record of ongoing router maintenance and expansion history. Each time a task is performed on the Cisco ASR 903 Router as a satellite shelf, update the site log to reflect the following:

  - Removal or replacement of interface modules, fan tray, power supplies, or RSPs
  - Configuration changes
  - Maintenance schedules and requirements
  - Maintenance procedures performed
  - Intermittent problems
  - Comments and notes

This table shows a sample site log. Make copies of the sample or design your own site log to meet the needs of your site and equipment.

Table 43: Site Log

Date	Description of Action Performed or Symptom Observed	Initials

Date	Description of Action Performed or Symptom Observed	Initials