

Cisco ASR-920-12SZ-A and Cisco ASR-920-12SZ-D Aggregation Services Router Hardware Installation Guide

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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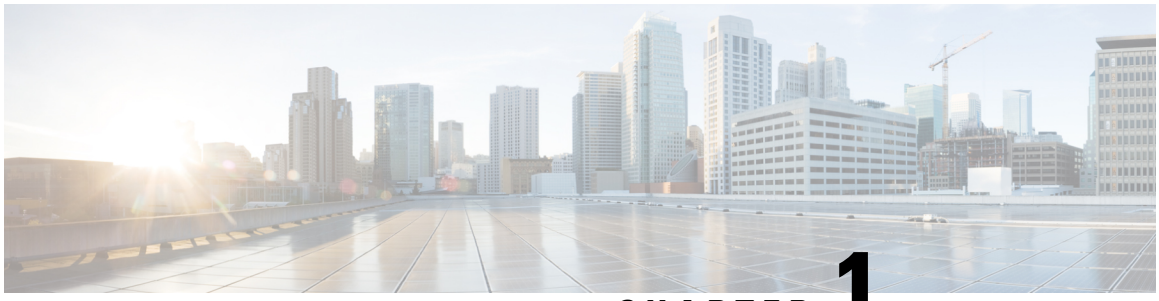
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CHAPTER 1

Safety Warnings

This handout topic lists the safety warnings necessary for handling this product. Before you install or service the chassis, review these safety warnings to avoid injuring yourself or damaging the equipment.

For a complete list of translated safety warnings, see the Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Aggregation Services Router document.

The safety warnings are grouped under the following sections:

- Standard Warning Statements, on page 1
- Safety guidelines for personal safety and equipment protection, on page 2
- Safety Precautions for Module Installation and Removal, on page 3
- Safety with Electricity, on page 3
- Power Supply Considerations, on page 6
- Preventing ESD Damage, on page 7

Standard Warning Statements

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. 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 158°F (70°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

Warning Suitable for mounting on and over a concrete or other non-combustible surface only. Statement 345

Safety guidelines for personal safety and equipment protection

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

- Before moving the system, always disconnect all 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 where you or others can 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.



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 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. For a DC installation, ensure that the branch circuit breaker is rated a maximum 15A for DC systems. For AC systems, 15A for voltages greater than 200Vac; 20A for voltages below 127Vac. Statement 1005

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

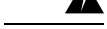
Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ45 connectors. Use caution when connecting cables. Statement 1021

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



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 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 that is powered by electricity, follow these guidelines:

- Locate the room's emergency power-off switch. If an electrical accident occurs, you know where to quickly turn off the power.
- Before starting work on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Disconnect all power when:
  - Working on or near power supplies
  - Installing or removing a device 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 and you are uninjured:
  - Use caution to avoid injuring yourself.
  - Turn off power to the device.
  - 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 pulsing or external cardiac compressions; then take appropriate action.

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

- When installing or modifying telephone lines, use caution.
- Never install telephone jacks in wet locations unless the jack is designed to handle such locations.
- Never install telephone wiring during a lightning storm.

Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). If necessary, install a power conditioner.

Power Connection Guidelines

This section provides guidelines for connecting the device 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.

Prevent 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 such as the Cisco ASR 920 Series Router, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

Determining power requirements is useful for planning the power distribution system needed to support the router.

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

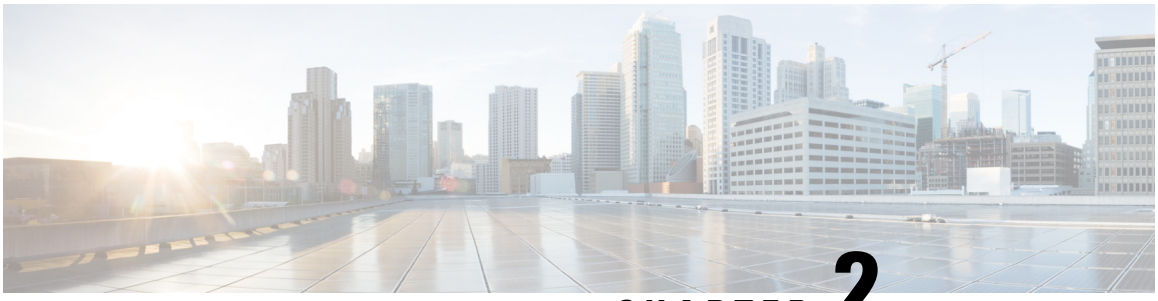
Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD may occur when electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- 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.



CHAPTER 2

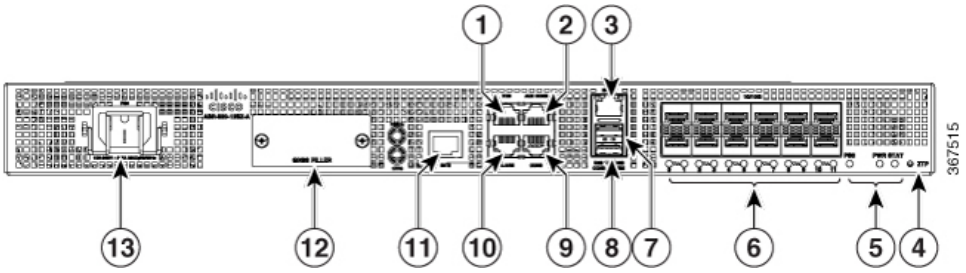
Overview

The Cisco ASR-920-12SZ routers are routers for the mobile backhaul for 5G markets. These 5G-ready routers meet the ITU G.8273.2 Class B Timing specifications and provide better accuracy using the precision timing protocol (PTP) for phase delivery.

The two models in this category are:

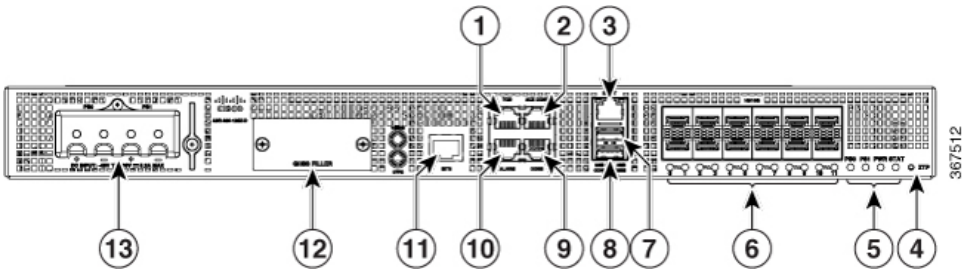
- **Cisco ASR-920-12SZ-A** with a single fixed AC power supply, 12 1/10GE SFP interfaces, Timing (1PPS/10MHz/ToD) interfaces, and pluggable a GNSS module.

Figure 1: Cisco ASR-920-12SZ-A Front Panel View



- **Cisco ASR-920-12SZ-D** with dual fixed DC power supplies, 12 1/10GE SFP interfaces, Timing (1PPS/10MHz/ToD) interfaces, and a pluggable GNSS module.

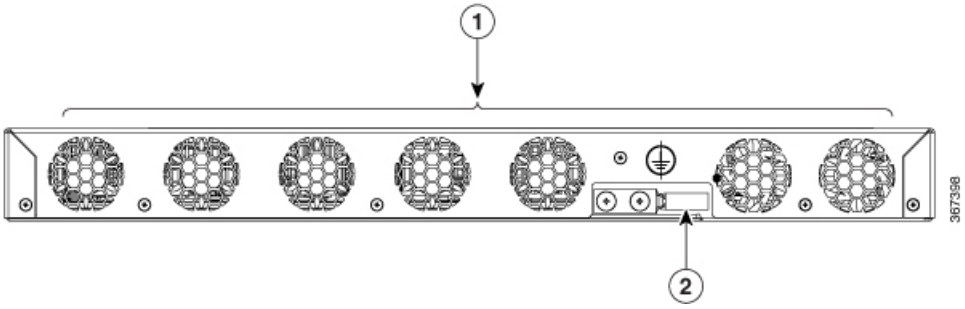
Figure 2: Cisco ASR-920-12SZ-D Front Panel View



1	Time of Day (TOD)	2	Auxiliary Console (AUX CONS)
3	Management port (MGMT)	4	ZTP

5	LEDs for power supply (PS*x*), board power (PWR) and system status STAT)	6	Dual rate SFP ports (1G/10G)
7	USB Memory (USB MEM)	8	USB Console (USB CONS)
9	Console	10	Alarm
11	BITS	12	GNSS Module
13	Power Supply	—	—

Figure 3: Cisco ASR-920-12SZ Rear Panel View



1	Fan Modules	2	Grounding lug

For details on features and specifications, see the *Cisco ASR 920 Series Aggregation Services Class B Compliance Routers: High-Port-Density Models* datasheet.

- Power Supply, on page 10
- GNSS Module, on page 11
- Network Timing Interfaces, on page 11
- Management Interfaces, on page 11
- Management Port, on page 12
- Dual Rate Ports—1GE/10GE SFP+ Ports, on page 12
- LED Indicators, on page 13
- Fan Module, on page 15
- Licensing the Router, on page 15

Power Supply

The Cisco ASR-920-12SZ-A router has one fixed power supply module for AC input. The Cisco ASR-920-12SZ-D router has dual fixed redundant power supply modules for DC input.

The Cisco ASR-920-12SZ-A router support AC and DC power supplies in a 1+1 redundant configuration.

One AC and one DC power supply in the same router is also a supported configuration.

GNSS Module

The GNSS module (PID=A920-CM-GNSS) provides the time-of-day (ToD), 1PPS, and 10MHz network synchronization signals. The GNSS module is *not* hot swappable.

Network Timing Interfaces

- 1PPS—1PPS input for GPS Synchronization. This connector on the front panel can provide 1PPS output as well from Cisco ASR-920-12SZ router. The input or output direction can be configured using software.
- 10MHZ—10MHz input for GPS Synchronization. This connector, present on the front panel, can also provide 1PPS output from the Cisco ASR-920-12SZ router. The input or output direction can be configured using IOS-XE software.
- BITS—The BITS interfaces support clock recovery from either a T1 at 1.544 MHz or an E1 at 2.048 MHz, configurable by software. BITS interface is provided through a standard RJ-48 connector on the front panel.
- ToD—The time-of-day interface can output the ToD in a format configurable by software. However, this interface can be configured as an input interface also. In this case, the router can read the ToD information from the external GPS unit.

  ToD interface is provided through a standard RJ-48 connector on the front panel.

Management Interfaces

Alarm

The router supports four dry contact alarm inputs through an RJ-45 jack on the front panel.

- Normally Open—indicates that no current flows through the alarm circuit and the alarm is generated when the current is flowing.

Each alarm input can be provisioned as critical, major, or minor.

Console

The RS232 console port provides transmission (Tx), reception (Rx), and ground (Gnd).

Auxiliary Console

The Auxiliary Console port provides transmission (Tx), reception (Rx), and ground (Gnd).

USB Console

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to ROMMON, Cisco IOS-XE, and diagnostics. While it uses the Type-A connector, it operates as a USB peripheral only for connection to an external host computer. This interface requires the use of a Type-A to Type-A connector instead of a standard USB cable.

Note Use of the USB console is mutually exclusive of the RS232 console port. This interface requires the use of a Type-A to Type-A USB cable.

USB Memory

A single USB 2.0 Type-A receptacle on the front panel of the router allows external USB mass storage devices, such as standard USB flash drives. This interface is used to load images, load or store configurations, write logs, and so on.

Note More than 8 GB is not supported in ROMMON mode.

Management Port

A single management copper ENET port supporting 10/100/1000 operation is provided on the front panel. It uses a standard RJ-45 jack.

Dual Rate Ports—1GE/10GE SFP+ Ports

The Gigabit Ethernet SFP ports support the following features:

- 100BASE-FX and 1000Base-X SFP modules.
- Digital optical monitoring as specified by the SFP.
- Any mix of SFPs is supported unless specifically noted.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.
- Synchronous ENET operation that provides its recovered receive clock as an input clock source for the SETS and uses the system-wide reference clock to derive its transmit clock.

Note Copper-based SFPs do not support synchronous ENET operations.

LED Indicators

Power Supply LEDs—There is one fixed power supply LED (PS0) on the ASR-920-12SZ-A and two fixed power supply LEDs (PS0 and PS1) on the ASR-920-12SZ-D router.

Table 1: Power Supply LEDs

Power Supply LED (PS0 and PS1)	Power Supply Condition
Off	No valid AC or DC input is detected.
Green	12 Volt output is ok.
Red	12 Volt output failure (caused due to power supply switched off, a fault condition, or in case of a dual DC feed, the absence of an input feed)

System Power LED—The PWR LED provide indication of power on the board status.

Table 2: System Power LED

System Power LED	System Power Condition
Off	No input power is connected.
Green	Power on board is ok.
Red	Board is powered off by ADM.
Blinking Red	0.5 second blinking red suggests the system is off due to external factors, such as overheated system, multiple fan failures, or user-initiation.
Amber	Reserved

Status LED—During power-up state, this LED provides booting status and report errors.

Table 3: Status LED

Status LED	System Status
Off	FPGA is being configured. **Note** Permanently off indicates the FPGA configuration has failed.
Blinking Green	Secure boot FPGA validation and ROMMON validation are successful.
Blinking Red	Secure boot FPGA validation error.
Green	IOS booted up, no alarms, operating normally.

Status LED	System Status
Amber	Any one of: minor alarm, synchronization in holdover, or free-running mode.
Red	Any major or critical alarm (high temperature reported for any sensor) or multiple fan failures.
Blinking Green and Red alternately	Short press ZTP is initiated and this status continues until ZTP is initiated.

GNSS LED—The LED is present on the GNSS module.

Table 4: GNSS LED

GNSS LED	GNSS Condition
Off	GNSS is not configured or GNSS is shut down.
Green	GNSS is in normal state; self survey is complete
Orange	GNSS is in powerup state; GNSS is not tracking any satellite.
Amber	Auto holdover
Blinking green	Learning state is normal, self survey is in progress.

Management Port LED

The LED for the 10/100/1000 Management port is integrated on the connector itself. There are two LEDs in the connector—the LED on the left indicates the Link/Activity status and the LED on the right is non-functional.

Note The CPU management port LED on the right is non-functional and hence doesn't indicate any port status.

Table 5: Management Port LED

Management Port LED		Management Port Condition
Left LED	Green	Link up in 1000 Mbps
	Blinking green	Activity in 1000 Mbps
	Amber/Orange	Link up in 100/10 Mbps
	Blinking Amber/Orange	Activity in 100/10 Mbps
	Off	Link down

SFP+ LEDs

Table 6: SFP+ LEDs

SFP+ LED	SFP+ Condition
Green	Link up in 1G or 10G.
Orange	Loss of signal, fault, or link down.
Blinking green	Activity in 10G mode.
Off	SFP module is not supported.

Fan Module

There are seven fixed fans that provide front-to-back airflow. The system is designed to operate at its maximum operating temperature of 70º C. It is designed to operate at 65º C in case of failure of a single fan, for a maximum of four hours.

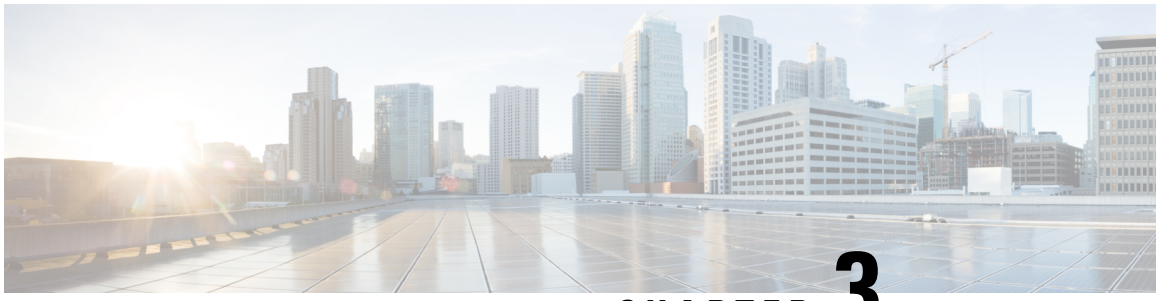
Licensing the Router

The Cisco ASR-920-12SZ routers support the following licenses:

- Port Licensing—Port Upgrade license is available as a "Pay as you Grow" model.
- 10G upgrade license

Note The Cisco ASR-920-12SZ routers do not support 1G port upgrade licenses.

- Timing license (1588)—Timing license is required if the router is used as a master clock.
- Advanced Metro IP Access (Default)
- Metro IP Access
- Metro Access
- Cisco Smart Licensing—Smart Licensing is usage-based licensing where devices register with the Cisco Secure server.



CHAPTER 3

Prepare for Installation

Before you install the router, you must prepare your site for the installation.

Preparing your site involves these tasks:

- Site Planning, on page 17
- Receive the Device, on page 24

Site Planning

The sections describe how to plan for the installation of the Cisco ASR 920 Series Router.

General Precautions

Observe the following general precautions when using and working with your Cisco ASR 920 Router:

- Keep your system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cable carefully. Route system cables and the power supply cable and plug so that they are not stepped on or tripped over. Be sure that nothing else rests on your 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 damage of system components.

Site Planning Checklist

Use the following checklist to carry out all site planning tasks:

- The site meets environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the chassis.
- The floor space that the chassis occupies can support the weight of the system.

- Electrical service to the site complies with the safety with electricity requirements.
- The electrical circuit servicing the chassis complies with the power supply requirements.
- Console port wiring and cabling limitations have been considered in accordance to TIA/EIA-232F.
- The chassis Ethernet cabling distances are within prescribed limits.
- The equipment rack where the chassis is to be installed complies with prescribed requirements.
- The following factors have been carefully considered when selecting rack: location, safety, ease of maintenance, and proper airflow.

Site Selection Guidelines

The device requires specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the device.

The device is designed to meet the industry EMC, safety, and environmental standards.

Environmental Requirements

Environmental monitoring of the chassis protects the system and components from damage due to excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, ensure that the environmental characteristics continue to be met.

For an outside plant installation (cell site cabinet, hut, and so on), you require to protect the chassis against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements. We recommend that you install the unit in a fully sealed enclosure or cabinet. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telcordia GR487. Temperature must be maintained within –40ºC to 70ºC.

Place the device inside a space that is protected from direct weather and environmental stresses by an enclosure.

Ensure the operating climate as defined by Class 2 of GR-3108-CORE for premium variants.

- –40°C (-40°F) and 70°C (158°F)
- 5 and 85% RH

Ensure the operating climate as defined by Class 1 of GR-3108-CORE for base variants.

- –5°C (23°F) and 50°C (122°F)
- < 15 to 85% RH

Physical Characteristics

To set the device at its proper location, be familiar with its physical characteristics.

Airflow Guidelines

Cool air is circulated through the chassis by fans that are located along the back of the device.

The internal fans maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents and circulating that air through the chassis.

The direction of airflow is from front-to-back.

To ensure adequate airflow through the equipment rack, we recommend that you always maintain a minimum clearance distance as mentioned in the following specifications.

- Front clearance—5 inches (12.7 centimeters)
- Rear clearance—3.93 inches (10 centimeters)

Note the following points:

- When installing chassis in a back-to-back position with another device, ensure a minimum of 3.93 inches (10 centimeters) airflow clearance between them. Also, ensure that the device behind the chassis is not installed in a way that it blows air into the chassis.
- An over-temperature condition may occur within the rack, if airflow through the rack and the device is restricted, or if the air that is drawn into the rack is warm.
- Ensure that the site is dust free. Dust tends to clog the device fans, reducing the flow of cooling air through the equipment rack and the devices that occupy it, thus increasing the risk of an over-temperature condition.
- Enclosed racks must have adequate ventilation. Because each device generates heat, ensure that the racks are not congested. An enclosed rack must have louvered sides and a fan to provide cool air. Heat that is generated by the equipment near the bottom of the rack may be drawn upward into the intake ports of the equipment above.
- When mounting a chassis on an open rack, ensure that the rack frame does not block the exhaust fans.
- When a rack-installed equipment fails, especially equipment on an enclosed rack, if possible try operating the equipment by itself. Power off all other equipment on the rack (and in adjacent racks) to give the device maximum cooling air and clean power.
- Avoid installing the chassis in a location in which the chassis air intake vents may draw in the exhaust air from an adjacent equipment. Consider how the air flows through the device; the airflow direction is from front to back, with ambient air drawn in from the vents located on the sides of the chassis.



Caution When mounting the device on any type of rack equipment, ensure that the temperature of inlet air to the device does not exceed the specified operating temperature limits of the product.

Airflow Guidelines for Site Planning

Device	Feature	Maximum System Airflow (CFM) at Maximum System Temperature
ASR-920-12SZ-A	12 x 1/10GE SFP, AC Model	105
ASR-920-12SZ-D	12 x 1/10GE SFP, DC Model	

Airflow Guidelines for ETSI Rack Installation

When you install a device on a 2 or 4-post rack, the front and rear doors of the cabinet must be removed. We recommended that you always maintain a minimum clearance distance as mentioned the following.

- Front clearance—5 inches (12.7 centimeters)
- Rear clearance—3.93 inches (10 centimeters)

To mount the chassis in a 4-post enclosed cabinet, ensure a minimum of 3.93 inches (10 centimeters) of clearance on each side of the chassis.

Floor Loading Considerations

Ensure that the floor under the rack supporting the chassis is able to support the combined weight of the rack and all the other installed equipment.

For additional information about floor loading requirements, see the GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection document.

Site Power Guidelines

The chassis 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 chassis:

- The redundant power option provides a second, identical power supply to ensure uninterrupted power supply.
- Connect each power supply to a separate input power source. Otherwise, it results in total power failure to the system due to a fault in the external wiring or a tripped circuit breaker.
- To prevent loss of input power, ensure that the maximum load on each circuit 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're receiving clean power. If necessary, install a power conditioner.
- Provide proper grounding to avoid personal injury and damage to the equipment due to power surges or lightning striking power lines. The chassis ground must be attached to a central office or other interior ground system.

Note The chassis installation must comply with all the applicable codes, and is approved for use with only copper conductors. The ground bond-fastening hardware must be compatible and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with a 6-AWG gauge wire copper ground conductor.

Caution This product requires an external surge protection device for both AC and DC power feeds to the equipment. For a DC power feed, the surge protective device (SPD) must handle common mode and differential mode surge as per the local standards.

Caution The AC PSU requires external surge protection devices (SPD) for installations, where an electrical surge is higher than 2KV common mode and higher than 2KV differential mode. Failure to do so may result in permanent damage to the router. Following are the applicable router variants:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS
- N540X-16Z4G8Q2C-A
- N540X-12Z16G-SYS-A
- N540-28Z4C-SYS-A
- N540X-16Z8Q2C-A
- N540-12Z20G-SYS-A

Caution The DC PSU requires external surge protection devices (SPD) for installations, where an electrical surge is higher than 2KV common mode and higher than 1KV differential mode. Failure to do so may result in permanent damage to the product. Following are the applicable router variants:

- N540-24Z8Q2C-SYS
- N540X-ACC-SYS
- N540-ACC-SYS
- N540X-16Z4G8Q2C-D
- N540X-12Z16G-SYS-D
- N540X-16Z8Q2C-D

Following are the applicable router variants that require external surge protection devices (SPD), where an electrical surge is higher than 1KV common mode and higher than 1KV differential mode:

- N540-12Z20G-SYS-D
- N540-28Z4C-SYS-D

Electrical Circuit Requirements

Each chassis requires a dedicated electrical circuit. If you equip the device with dual-power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The chassis supports both DC source or an AC source. Ensure that equipment grounding is present and observe power-strip ratings. Make sure that the total ampere rating of all the products plugged into the power strip does not exceed 80% of the rating.

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the chassis, consider the type of cable that is required for each component and 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 that you need, such as transceivers, hubs, switches, modems, channel service units (CSU), or data service units (DSU).

Before you install the chassis, have on hand all additional external equipment and cables. 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 that are referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline when planning your network connections *before* installing the chassis.

If wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the possibility of a lightning strike in your vicinity. The electromagnetic pulse due to 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 chassis 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 that are specified in the IEEE RS-232 standard. The available baud rate is 115200 bauds.

Interference Considerations

When wires are run for any significant distance, there is a risk of receiving stray signals on the wires as interference. If interference signals are strong, it results in data errors or equipment damage.

The following sections describe the sources of interference and how to minimize their effects on the chassis.

Electromagnetic Interference

All the equipment that is 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 utilities.

Strong EMI can destroy the signal drivers and receivers in the chassis. It can 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.

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 a 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 may encounter a lightning strike on the chassis.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors and damage or destroy electronic equipment. For such problems, you must consult with RFI and EMI experts to ensure adequate electrical surge suppression and shielding of signal cables in your operating environment.



Warning This product requires surge protection as part of the building installation. To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, an external surge protective device (SPD) is required at the AC or DC power service equipment.

Rack-Mounting Guidelines

The following sections provide guidelines for selecting racks and precautions for mounting the chassis on a rack:

Precautions for Rack-Mounting

Follow these rack-mount guidelines to ensure your safety:

- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components on the rack.
- Do not step on or stand on any component or system when servicing other systems or components on a rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the chassis.

Rack Selection Guidelines

Ensure the 2 or 4-post, 19 inches (48.3 centimeters) or 23 inches (58.42 centimeters) rack that you select complies with the Electronic Industries Association (EIA) standard for equipment racks (EIA-310-D). 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 temperature of the inlet air to the chassis does not exceed the specified operating temperature of the chassis.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inches (46.50 centimeters) ± 0.06 inch (± 0.15 centimeter). The rack-mounting hardware included with the chassis is suitable for most 19 inches (48.3 centimeters) equipment racks.

Install the chassis on a rack with the following features:

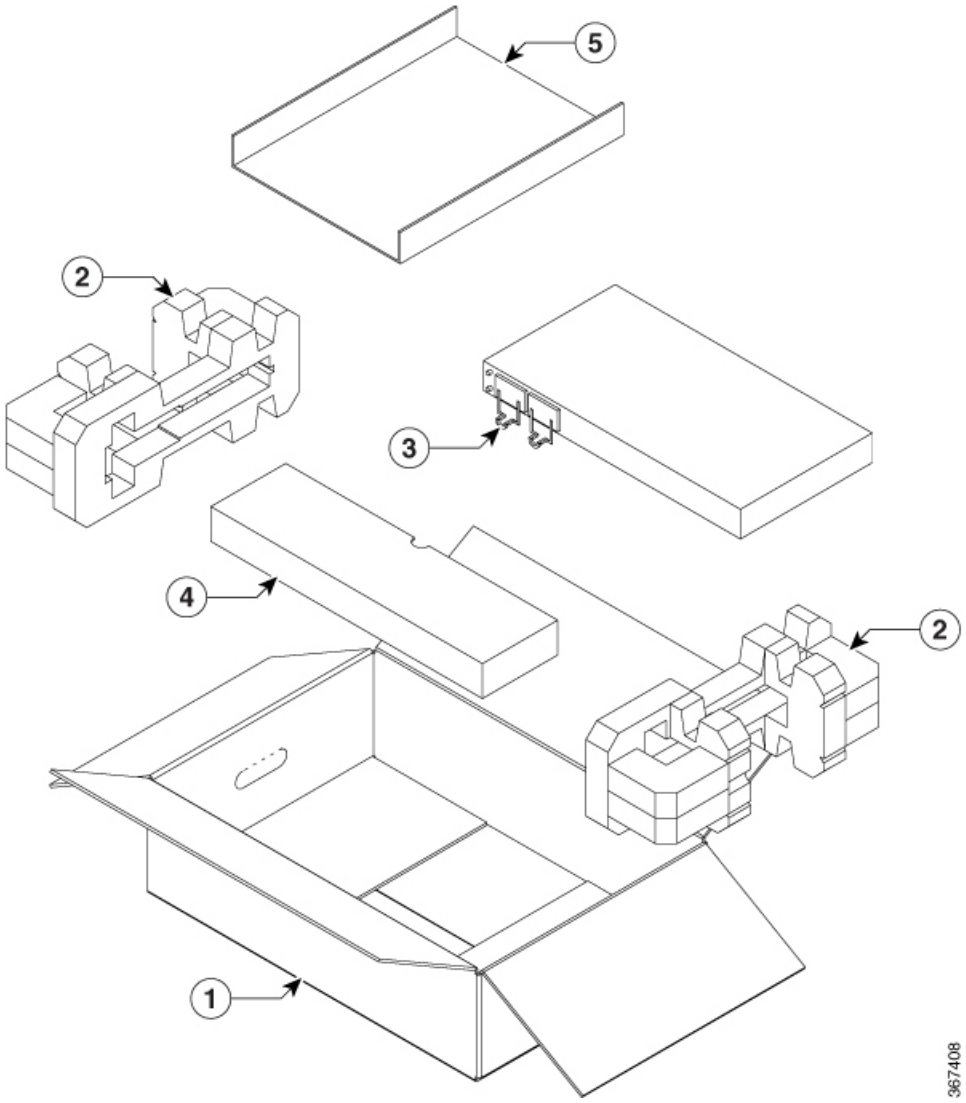
- NEBS-compliant, 19 inches (48.3 centimeters) rack or 23 inches (58.42 centimeters).
- EIA or European Telecommunications Standards Institute (ETSI) hole patterns in the mounting rails. The required mounting hardware is shipped with the chassis. If the rack on which you plan to install the chassis has 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.

Do not install the device on an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain the acceptable operating temperature. If you use an enclosed rack, ensure that the airflow requirements are maintained as discussed in the Airflow Guidelines section.

Receive the Device

Each device is shipped in a container that is strapped to a pallet.

Figure 4: The Router Packaged for Shipping



Label	Description	Label	Description
1	Outside carton for accessories	4	Packing carton
2	Assembly packaging material	5	Accessories tray
3	Router	—	—

Unpack and Verify Shipped Contents

Procedure

Step 1 Inspect the shipping container for any shipping damage. If there is obvious physical damage, contact your Cisco service representative, else continue with the remaining steps.

Step 2 Unpack the device.

Step 3 Inspect the device.

Step 4 Use the following table to verify the contents of the container. Do not discard the shipping container. You will need the container in the future if you move or ship the device.

What to do next

Table 7: Default Shipping Container Contents

Component	Description
Device	Cisco ASR-920-12SZ-A or Cisco ASR-920-12SZ-D (as ordered)
ESD, wrist strap (disposable)	One disposable wrist strap (optional)
Documentation	Cisco ASR 920 Series Router Pointer Card
Optional equipment	Check the container for the following optional equipment: • Power cord if ASR-920-12SZ-A is shipped. • Lugs if a ASR-920-12SZ-D is shipped. **Note** If you do not specify the type of power cable, US power cable for the AC device variant is supplied.

Note Most Cisco documentation is available online. The chassis Pointer Card that is shipped with your Cisco ASR 920 Series Router contains links and information to other online documentation.

Note If the product is not in use, store the device in the initial packaged condition or in an ESD PE sealed bag with silica gel.

Table 8: Accessories Kit As Ordered With Your Router

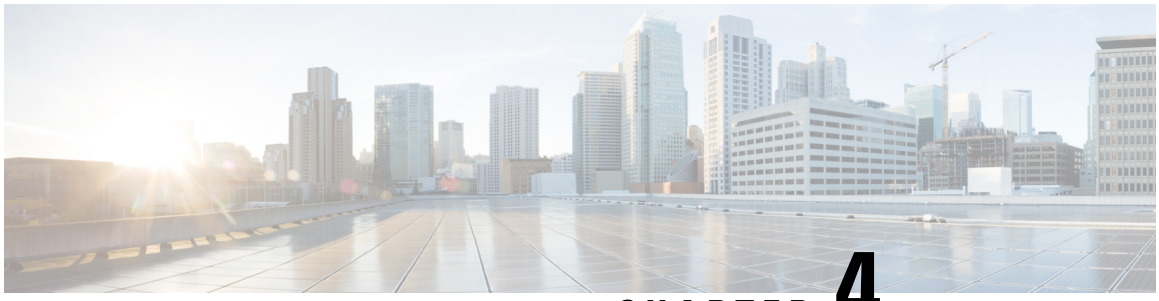
Category	Product Identifier (PID)
19 inch Rack Accessory	A920-RCKMT-19-HA OR A920-RCKMT-19-HD

Category	Product Identifier (PID)
23 inch Rack Accessory	A920-RCKMT-23-HA OR A920-RCKMT-23-HD
ETSI Rack Accessory	A920-RCKMT-ETSI-HA or A920-RCKMT-ETSI-HD
Wall Mount Accessory	A920-WALLMT-H
Cable Bracket Accessory	A920-CBL-BRKT-H

Tools and Equipment

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

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- #12-24 pan-head screws to secure the device to the equipment rack.
- Cables for connecting to network ports (based on the configuration)
- Ethernet hub, switch, or PC with a network interface card for connecting to the Ethernet ports
- Console terminal that is configured for 9600 baud, 8 data bits, no parity, no flow control, and 1 stop bit.
- Console cable for connecting to the console port
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30-pound force per square inch (0.02-kilograms force per square millimeter (kgf/mm2)) of pressure.
- Crimping tool as specified by the ground lug manufacturer
- Wire-stripping tools for stripping both 6 and 14-AWG wires
- Tape measure and level
- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 inch-pounds (1.69 newton meters) of torque for attaching the ground wire to the device.



CHAPTER 4

Install the Router

Before you begin this task, ensure that you have read and understood the safety warnings in the Standard Warning Statements section of the Safety Warnings handout topic.

Installing the Cisco ASR-920-12SZ Router involves these tasks:

- Rack Compatibility, on page 29
- Set up Device on Rack or Wall, on page 31
- Ground the Device, on page 40
- Connect Power Cables, on page 41
- Connect Gigabit Ethernet Ports, on page 45
- Connect Chassis to Network, on page 49

Rack Compatibility

We recommend that you follow these rack specifications.

Rack Types

Figure 5: Rack specification EIA (19 inches and 23 inches)

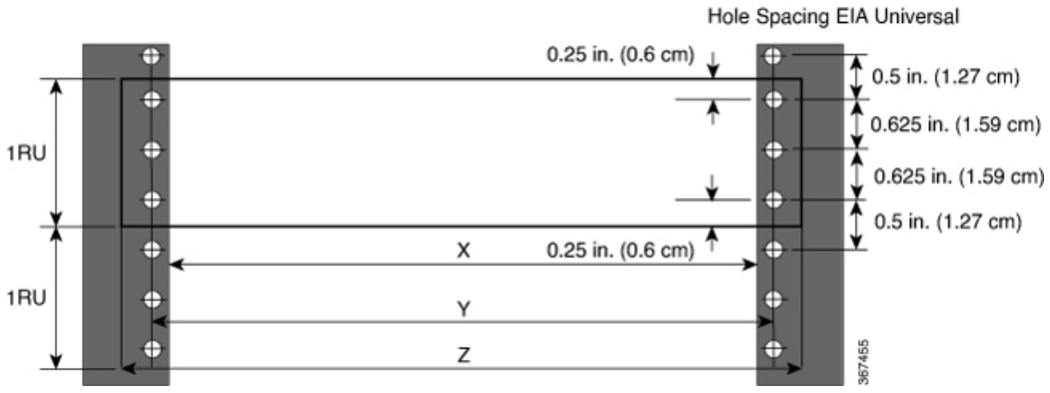
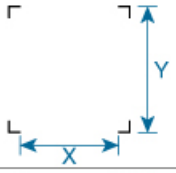
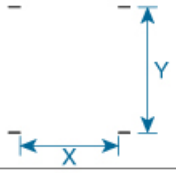
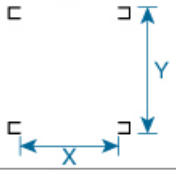


Table 9: Rack specification EIA (19 inches and 23 inches)

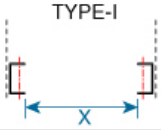
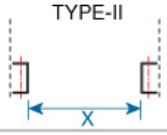
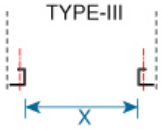
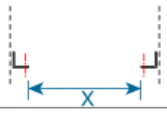
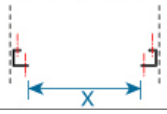
Post Type	Rack Type	Rack Front Opening (X)	Rack Mounting Hole Centre-Centre (Y)	Mounting Flange Dimension (Z)
4 Post	19 inches (48.3 centimeters)	450.8mm (17.75”)	465mm (18.312”)	482.6mm (19”)
2 Post				
4 Post	23 inches (58.4 centimeters)	552.45mm (21.75”)	566.7mm (22.312”)	584.2mm (23”)
2 Post				

Figure 6: Four Post Rack Type

4 – Post Type (Hole EIA Universal)		Width Available (X)	Compatibility
All 23” Type rack		552.45mm (21.75”)	Yes
All ETSI rack (21” rack)		500.0mm (19.68”)	Yes
19” Type rack L-Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type Racks Flat-Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type racks C- Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No

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Figure 7: Two Post Rack Type

2 – Post Type (Hole EIA Universal)	X – 19" Rack	Compatibility	X-23" Rack	Compatibility
TYPE-I 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
TYPE-II 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
TYPE-III 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
L-TYPE 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
Uneven-TYPE 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes

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Set up Device on Rack or Wall

You can choose to either set up the Cisco ASR 920 Router on a rack or wall mount it.

Rack Mount

You can choose to either set up the router in a horizontal or a vertical mounting position on the rack.

Install Rack Brackets

The device is shipped with rack mounting brackets that are to be secured on the sides of the device.

Procedure

Step 1 Remove the rack mounting brackets from the accessory kit and position them beside the device.

Note
You can install the brackets at any of the three positions that are shown in the following figures.

Figure 8: Attaching Mounting Brackets to Router for a 19-Inch EIA Rack (Front Position)

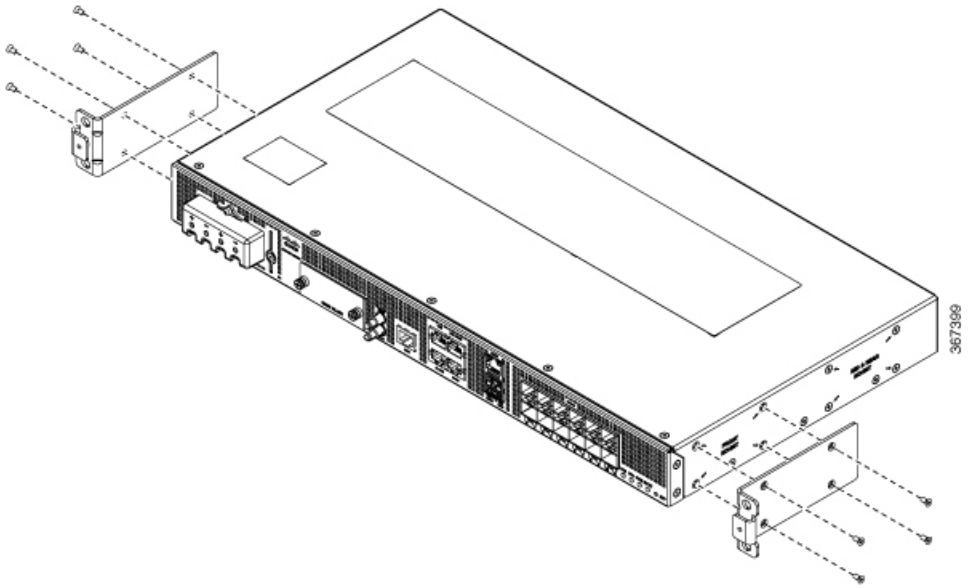


Figure 9: Attaching Mounting Brackets to Router for a 19-Inch EIA Rack (Middle Position)

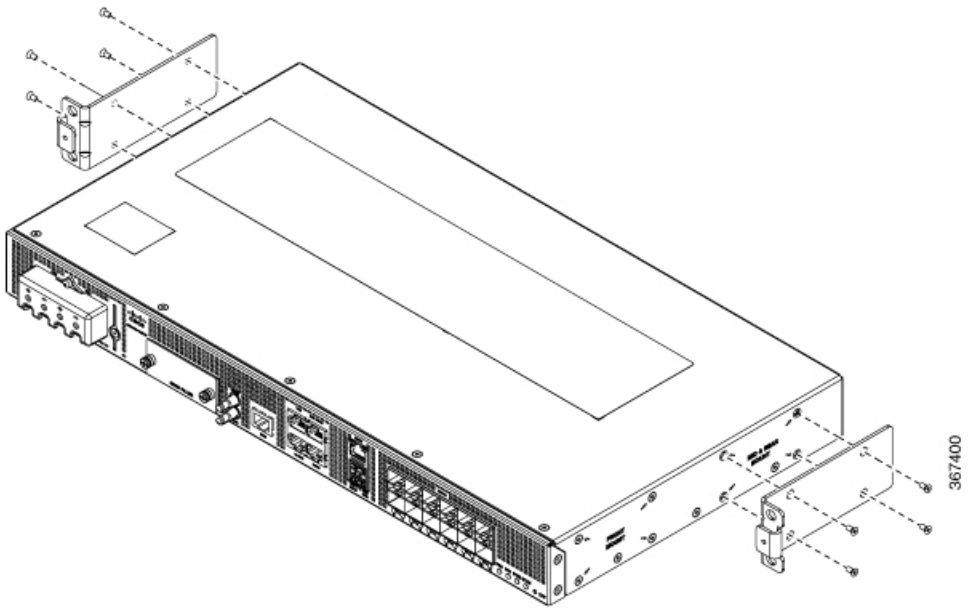
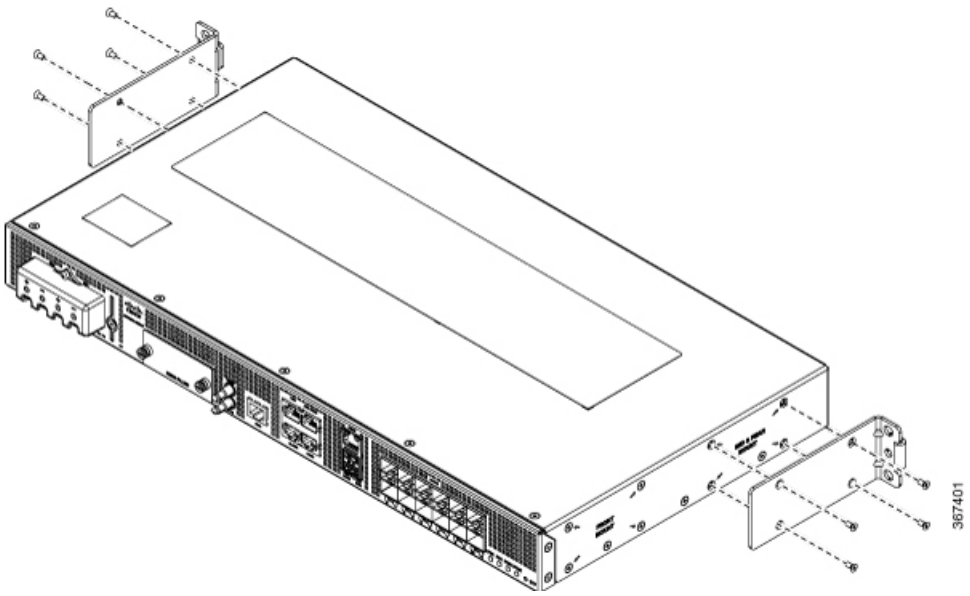


Figure 10: Attaching Mounting Brackets to Router for a 19-Inch EIA Rack (Rear Position)



Note
Depending on the rack on which you are installing the chassis, you may need to install either front, mid, or rear mount brackets only.

Step 2 Secure the bracket to the router with the recommended maximum torque of 10 inch-pounds (1.1 newton meters).

Set Up Device on Rack

Note Ensure adequate clearance when mounting the device on a rack.

Note Install cable guides before installing the device in a 19 inches (48.3 centimeters) EIA rack.

Procedure

Step 1 Position the device on the rack, and use the images as a guide to set up the device.

Figure 11: Set Up Device on 19-inch Rack (Front Mount)

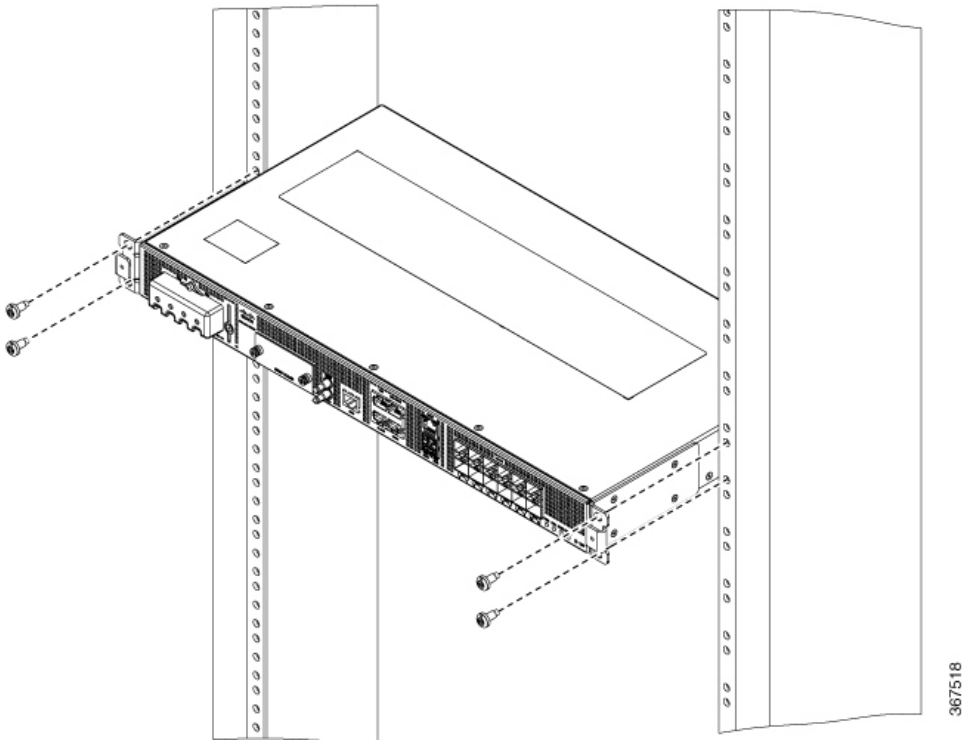


Figure 12: Set Up Device on 19-inch Rack (Mid Mount)

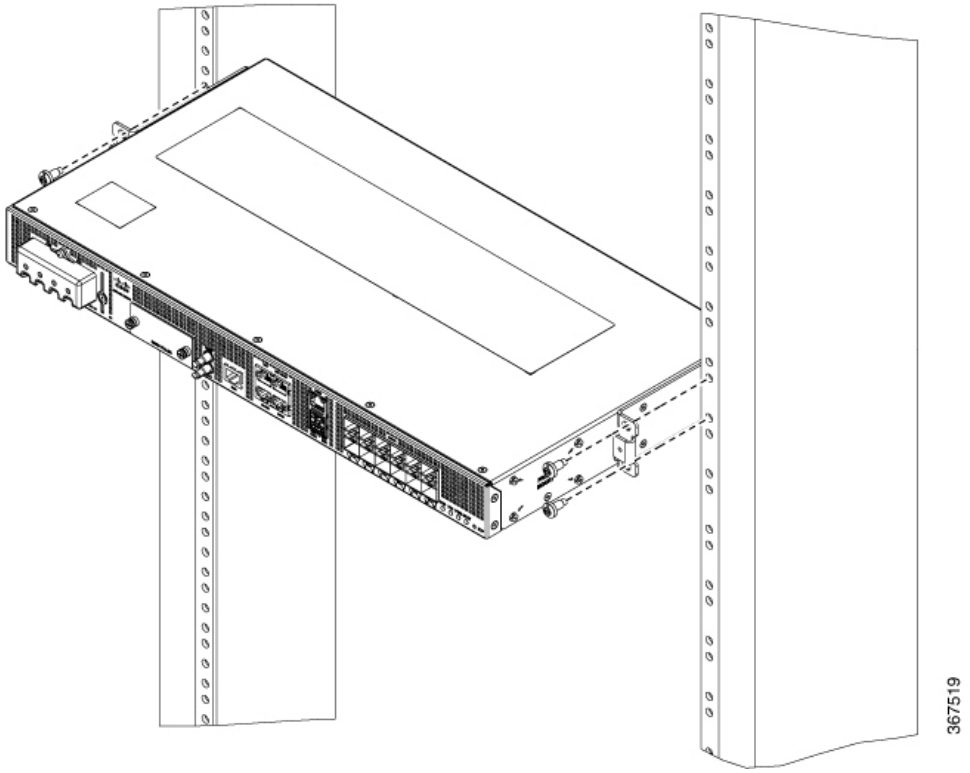


Figure 13: Set Up Device on 19-inch Rack (Rear Mount)

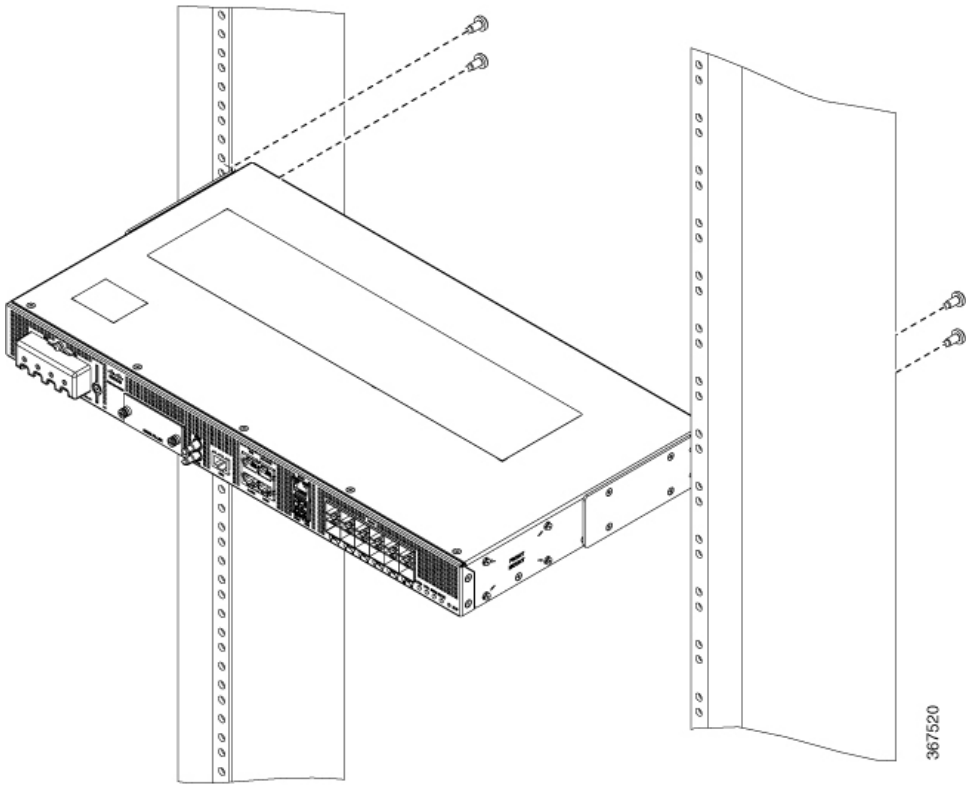


Figure 14: Set Up Device on 21-inch Rack (Front Mount)

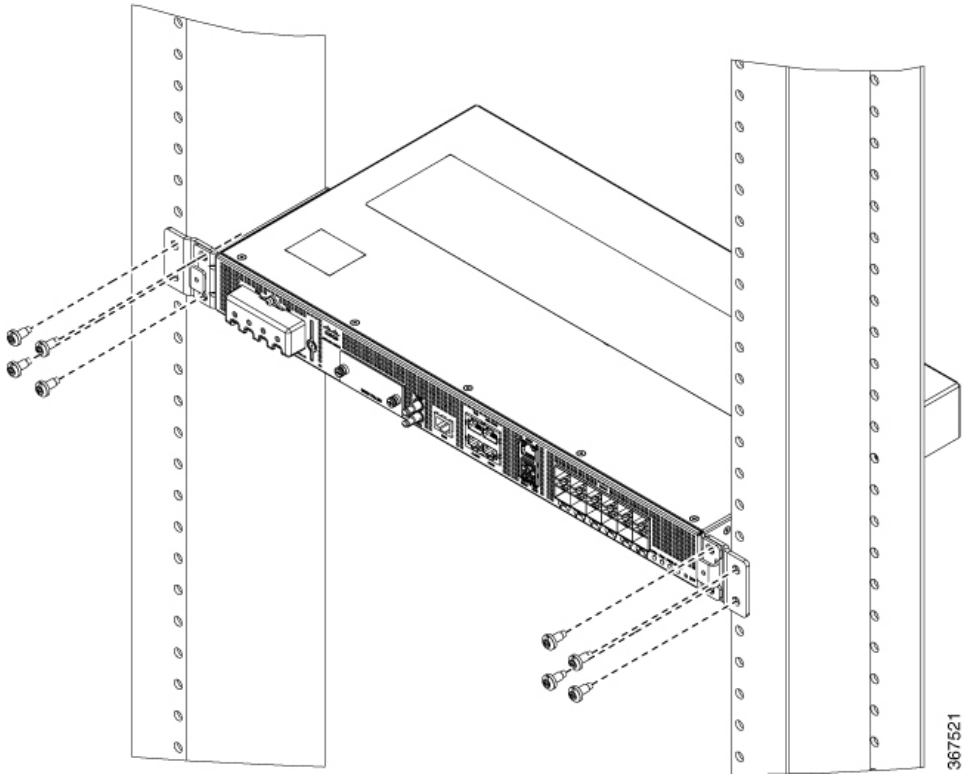
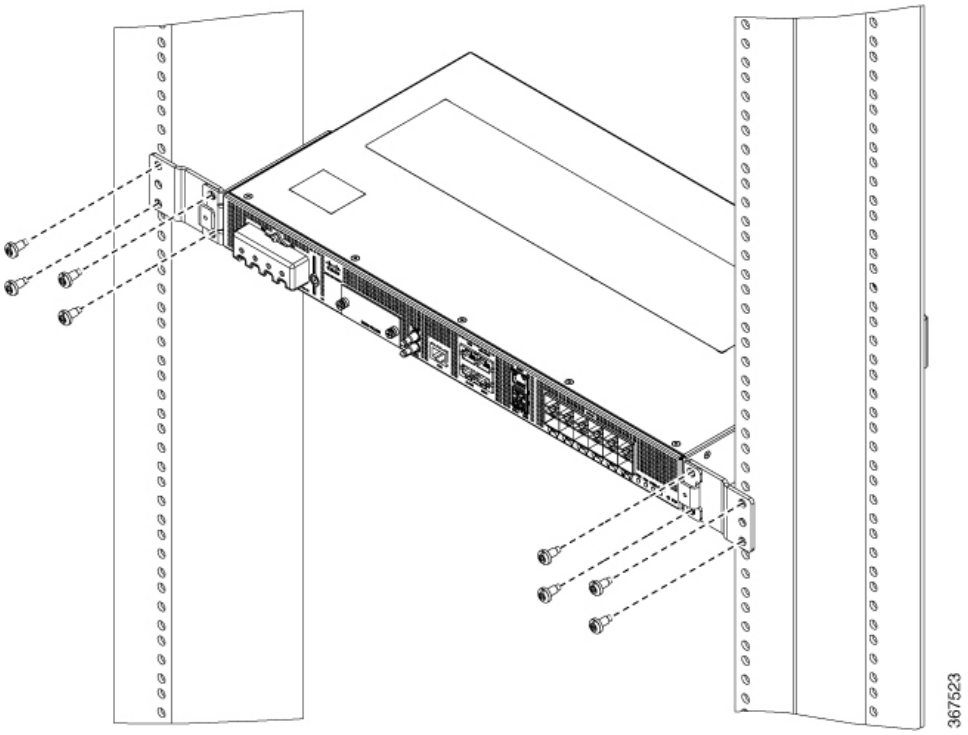


Figure 15: Set Up Device on 23-inch Rack (Front Mount)



Step 2 Use a tape measure and level to verify that the device is installed straight and on level.

Attach the Cable Guides

Note Always assemble the cable guides before installing the chassis on the rack.

Note Ensure that the cable guide is mounted in the orientation as shown in the following images.

Procedure

Step 1 Position the cable guide-right against the front of the chassis and align the two screw holes, as shown in the figure.

Figure 16: Front Mount Device with Cable Guide on 19-Inch Rack

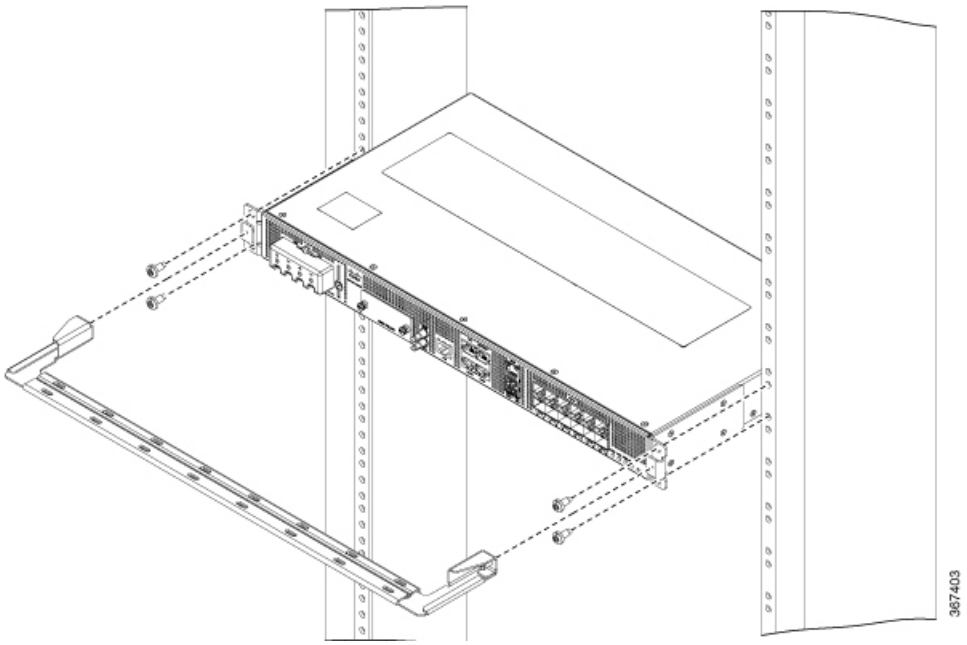


Figure 17: Mid Mount Device with Cable Guide on 19-Inch Rack

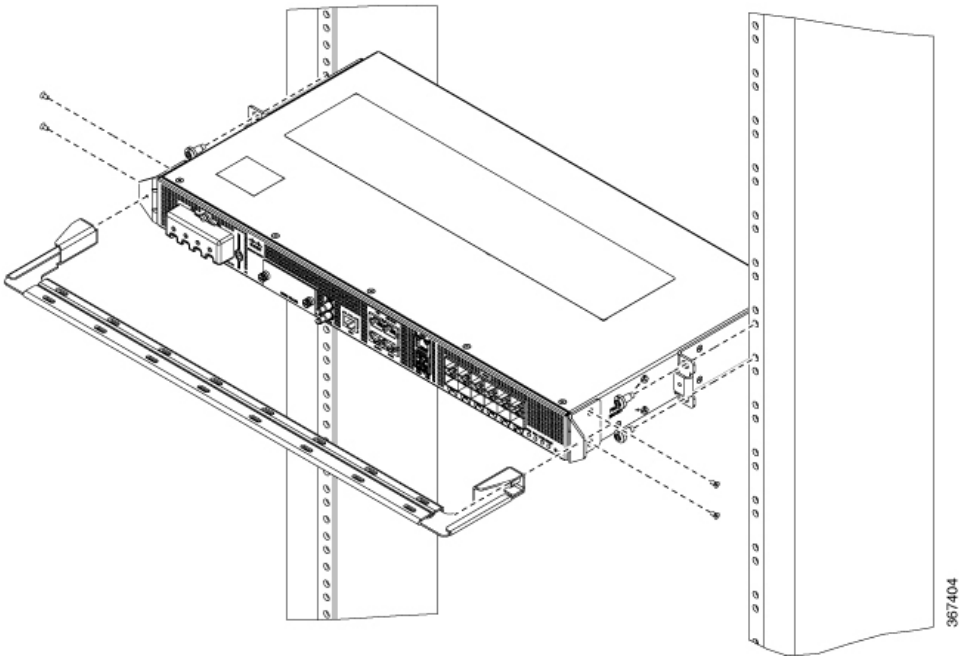


Figure 18: Rear Mount Device with Cable Guide on 19-Inch Rack

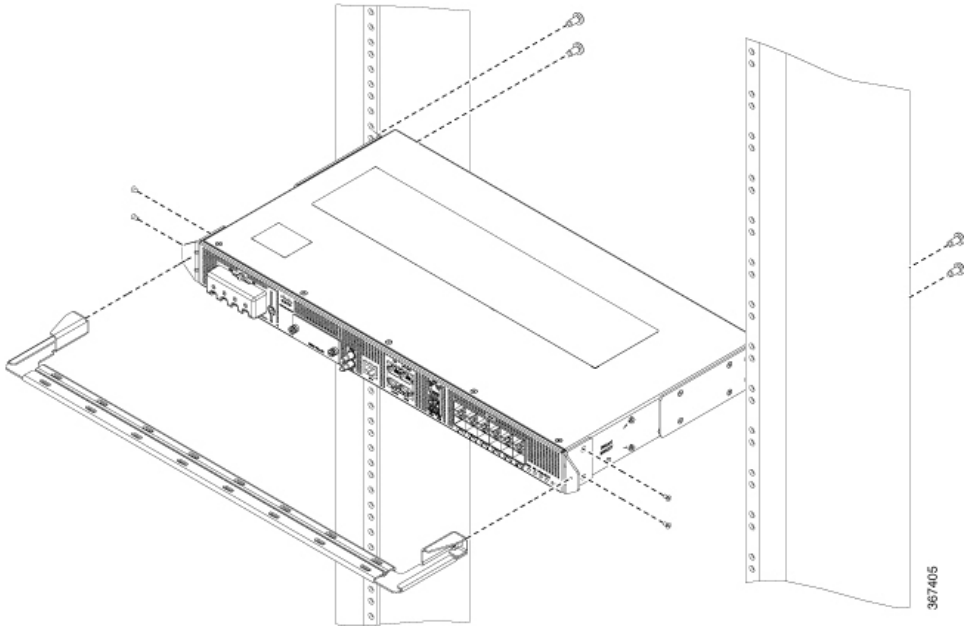


Figure 19: Front Mount Device with Cable Guide on 21-Inch Rack

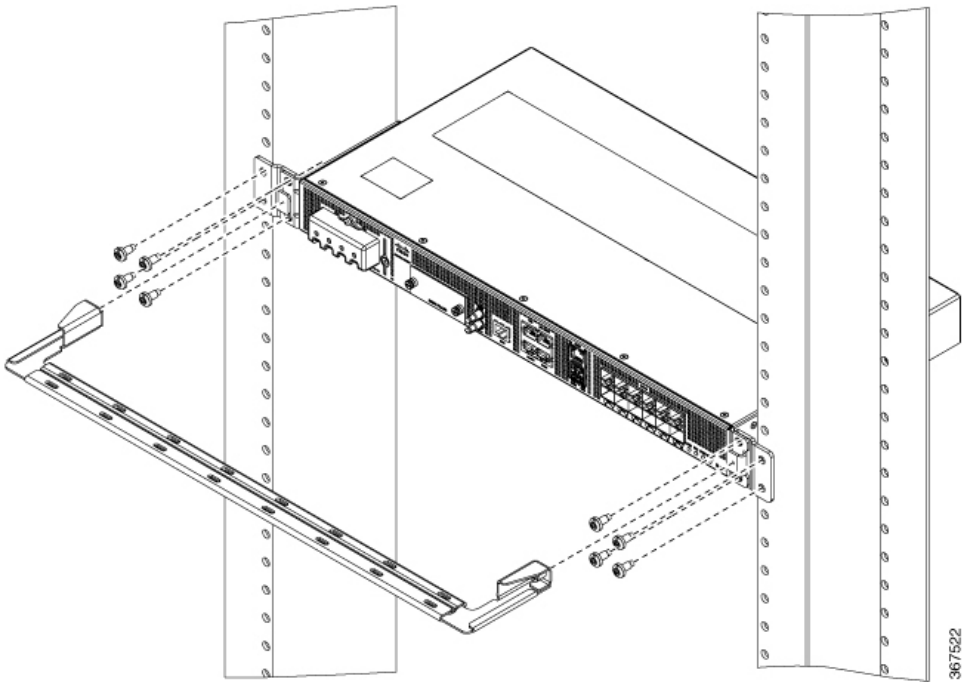
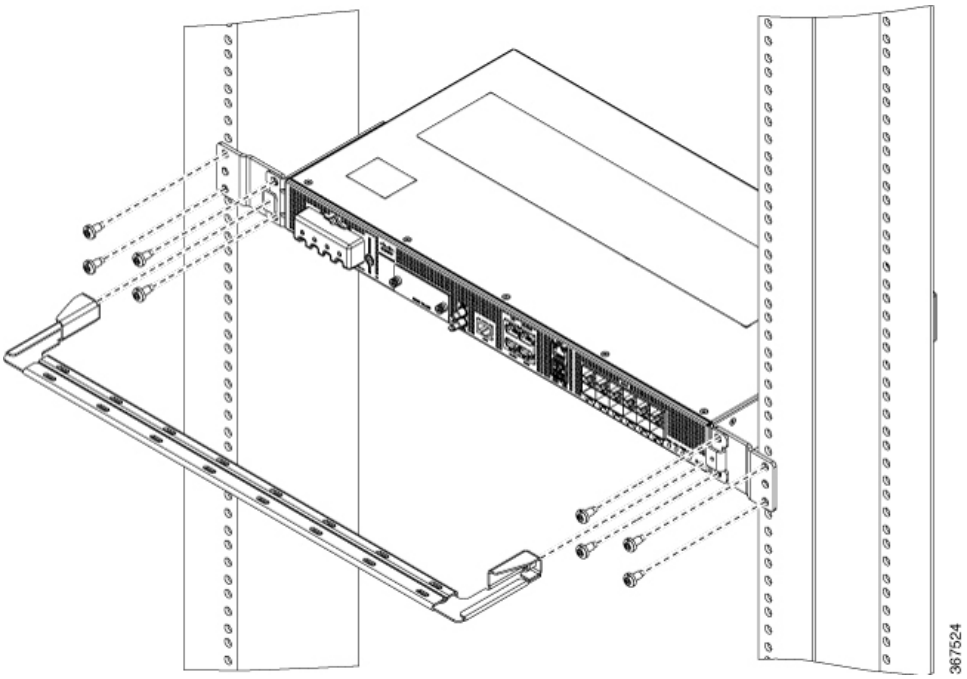


Figure 20: Front Mount Device with Cable Guide on 23-Inch Rack



Step 2 Secure the cable guides with the two M6x12mm screws that are supplied with the cable kit. The recommended maximum torque is 26 inch-pounds (3 newton meters).

Wall Mount

Install the wall mounting brackets and cable guides on to the chassis before you mount the chassis on the wall.

Install Wall Brackets

The device is shipped with wall mounting brackets that must be secured on the sides of the device.

Procedure

Step 1 Remove the wall mounting brackets from the accessory kit and position them beside the device.

Step 2 Secure the bracket to the device with the recommended maximum torque of 10 inch-pounds (1.1 newton meters).

Wall Mount the Device

Note Install cable guides before mounting the device on the wall.

Procedure

Step 1 Position the cable guide against the front of the device, and align the four screw holes as shown in the figure.

Step 2 Use a tape measure and level to verify that the device is installed straight and on level.

Step 3 Secure the cable guides with four M6x12mm screws. The recommended maximum torque is 26 inch-pounds (3 newton meters).

Step 4 Position the device vertically on the wall.

Ground the Device

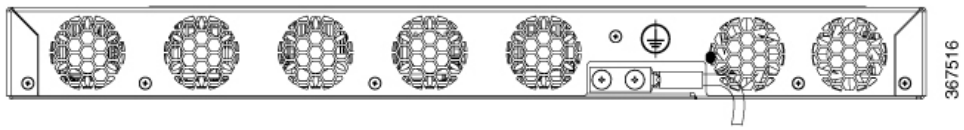
Before you begin this task, ensure that you have read and understood the safety warnings in the Preventing ESD Damage section of the Safety Warnings handout topic.

Before you connect the power or turn on the power to the device, you must provide an adequate device ground (earth) connection to your device.

This section describes how to ground the device. The grounding lug location is on the back panel of the device.

Tip Ensure that the grounding lug wire does not cover the fan opening.

Figure 21: Attach a Ground Lug to the Rear of the Device



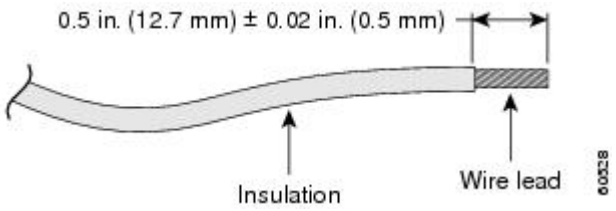
Caution To prevent personal injury or damage to the chassis, before making connections to the device, ensure that you disconnect the power at the circuit breaker.

Verify your carrier's requirements for grounding. This unit must be installed in a restrictive access location and must be permanently grounded to a minimum 6-AWG copper ground wire.

Procedure

Step 1 If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch (12.7 millimeters) ± 0.02 inch (± 0.5 millimeters).

Figure 22: Stripping a Ground Wire



Step 2 Slide the open end of the 2-hole ground lug over the exposed area of the ground wire.

Step 3 Using a crimping tool (the one specified by the ground lug manufacturer), crimp the ground lug to the ground wire.

Step 4 Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the device with the 2 pan-head Phillips head screws.

Step 5 Connect the other end of the ground wire to a suitable grounding point at your site.

Connect Power Cables

Before you begin this task, ensure that you have read and understood the safety warnings in the Safety with Electricity section of the Safety Warnings handout topic.

The Cisco ASR-920-12SZ Routers support either AC or DC power supplies. Based on your device and the supported power supply, attach the AC and the DC power cables.

Attach AC Power Cables

Note This task is applicable only on the Cisco ASR-920-12SZ-A Router.

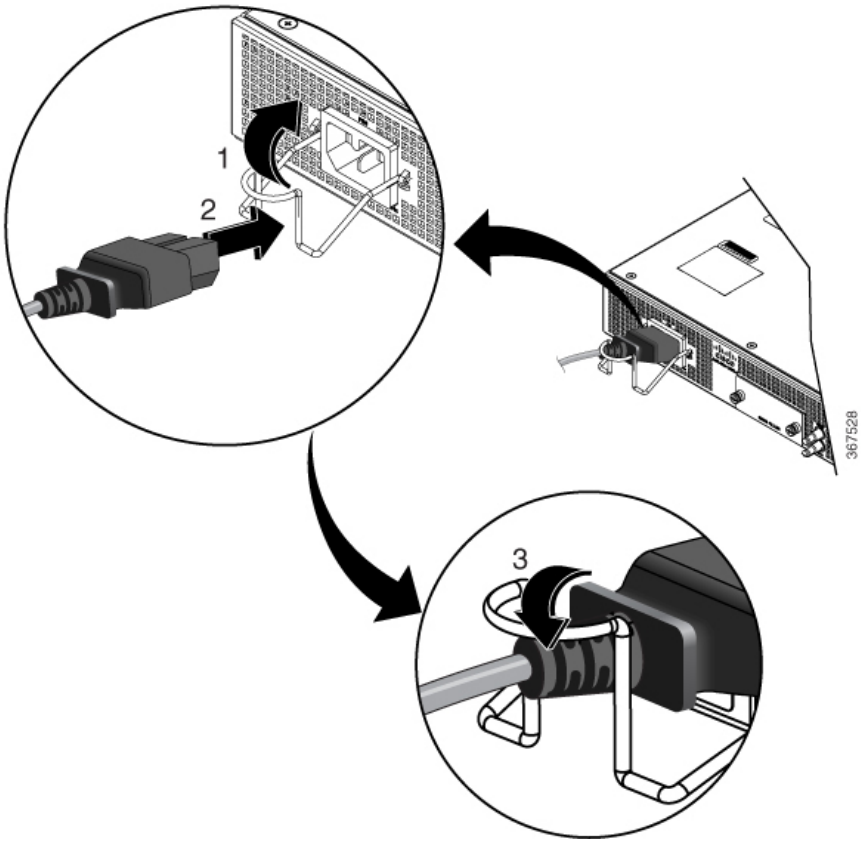
Procedure

Step 1 Lift the power retainer.

Step 2 Plug in the power cord into the power supply unit.

Step 3 Push the power retainer cord towards the power supply cord to lock it in place as shown in the following figure.

Figure 23: Lift and Lock the Power Retainer Cord



Step 4 Connect the other end of the power cord to an AC-input power source.

Step 5 Verify the power supply operation by ascertaining that the front panel power supply LED (PS0) is green.

Step 6 If the LED indicates a power problem, see the *LED Indicators* section in the *Overview* chapter.

Service AC Power Supply

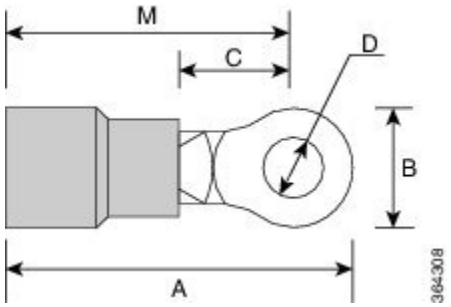
Caution While servicing the AC power supply, disconnect the power cord from the power source. Do not touch the metal prongs of the power retainer cord when it is still connected to the power supply.

Attach DC Power Cables

Note When installing DC power supply cables, use 14 AWG, 90°C wires. Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 15 A.

Note The DC connector or terminal block has an inbuilt screw and cage nut to which a torque of 1.3 to 1.8 newton meters may be applied.

Figure 24: DC Connector with Inbuilt Screw

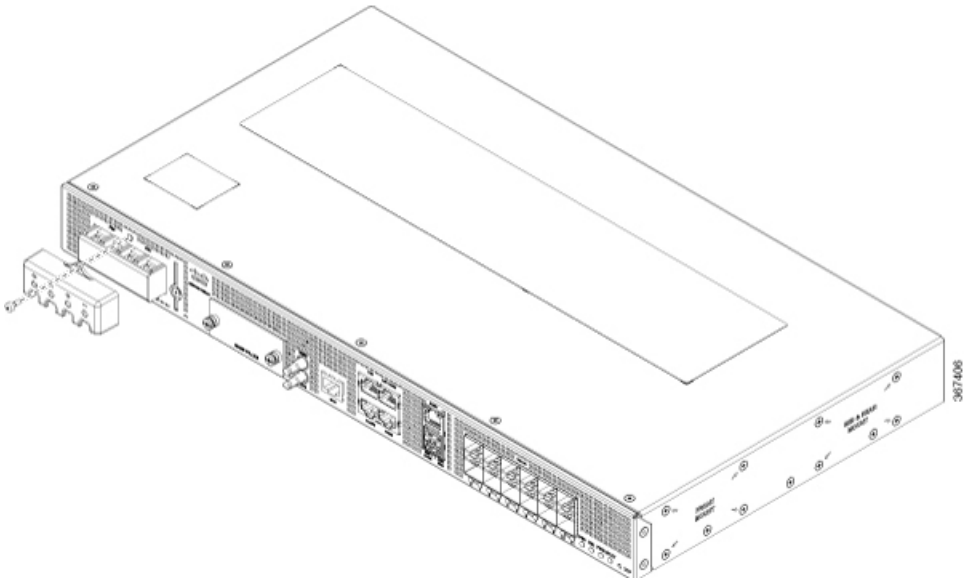


A	0.97 inch (2.4 centimeters)	C	0.27 inch (0.68 centimeter)
B	0.31 inch (0.78 centimeter)	M	0.81 inch (2 centimeters)

Procedure

Step 1 Open the DC power supply guard as shown in following figure.

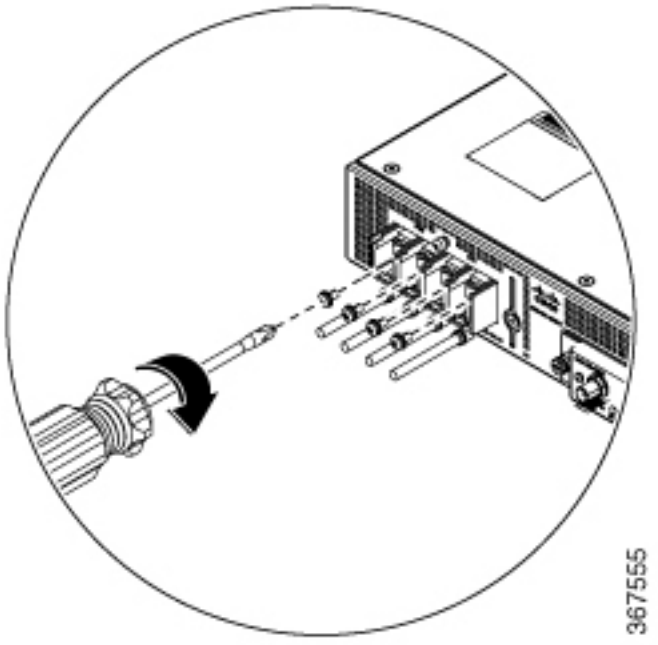
Figure 25: DC Power Supply Guard



Step 2 Lift the flap and attach the DC supply wires to the designated screws.

Note
Ensure that you follow the polarity marking on the chassis.

Figure 26: Attach the Wires to the DC Power Supply



Step 3 Re-insert the DC power supply guard.

Activate DC Power Supply

Procedure

Step 1 Remove the tape from the circuit-breaker device handle, and restore power by moving the circuit-breaker device handle to the On (|) position.

Step 2 Verify the power supply operation by ascertaining that the power supply LEDs (PS0 or PS1) on the front panel are green.

Step 3 If the LEDs indicate a power problem, see the *LED Indicators* section in the *Overview* chapter.

Step 4 If you are also connecting a redundant DC power supply, repeat these steps for the second power source.

Note
When you connect a redundant DC power supply, ensure that each power supply is connected to a separate power source. This prevents power loss during a failure.

Service the DC Power Supply

Before you begin

Switch off the circuit breaker in your equipment area. As an extra precaution, tape the circuit-breaker switch in the Off position.

Procedure

Step 1 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

Step 2 Switch the power supply circuit-breaker switch on the chassis to the Off (O) position.

Step 3 Pull the terminal block plug connector out of the terminal block head in the power supply.

Connect Gigabit Ethernet Ports

Gigabit Ethernet (GE) ports can be connected to other devices using either fiber optic or copper cables. The choice depends on whether the communication distance between your devices is long or short.

If you choose fiber optic cables, connect suitable Small Form-factor Pluggable (SFP) modules. The device supports various SFP and SFP+ modules, including optical and Ethernet modules. For information on how to install and remove SFP and SFP+ modules, see the documentation for the SFP or SFP+ module at: Cisco SFP and SFP+ Transceiver Module Installation Notes. Select the port on the device where you insert the SFP module.

If you choose copper cables, connect to an RJ-45 connector.

The device 10/100/1000 ports configure themselves to operate at the speed of devices to which they are connected. By default, autonegotiation is enabled in the chassis. You can manually set the speed and the duplex parameters. If the device to which the ports are connected does not autonegotiate, low performance or no linkage may result.

To maximize performance, choose one of these methods for configuring the GE ports:

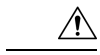
- Have ports autonegotiate both speed and duplex parameters.
- Set speed and duplex parameters on both ends of the connection.

Use the **mdix auto** command in the interface configuration mode to enable an automatic media-dependent interface with crossover detection. After you enable the automatic media-dependent interface, the device detects the required cable type for copper Ethernet connections and configures the interface accordingly. Then, use either a crossover or a straight-through cable for connecting to a copper 10/100/1000 port. If the **mdix auto** command fails to enable the interface, connect the cable through SFP modules.

Connect SFP Modules

Before you begin this task, ensure that you have read and understood the safety warnings in the *Safety Precautions for Module Installation and Removal* section of the *Safety Warnings* chapter.

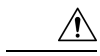
Use only Cisco SFP modules on a Cisco device. Each SFP module has an internal serial EEPROM that is encoded with security information. This encoding provides a way for Cisco to identify and validate that the SFP modules meet the requirements of the device.



Caution We recommend that you wait for 30 seconds between the removal and insertion of an SFP module from the device. The wait period allows the transceiver software to initialize and synchronize with the device. Changing an SFP before this wait period could result in transceiver initialization issues that disable the SFP.

This section provides procedures for installing and connecting SFP modules. Also, it provides the procedure for removing SFP modules.

Install SFP Modules

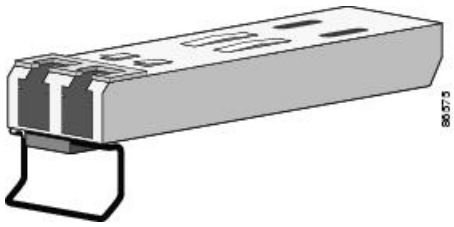


Caution We strongly recommend that you do not install (or remove) an SFP module with its cables connected because of the potential damage that may be caused to the cables, the cable connector, or the optical interfaces in the SFP modules. Disconnect all cables before removing or installing an SFP module.

Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules unless necessary.

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

Figure 27: SFP Module with Bale-Clasp Latch



Some SFP modules identify the top side of the module with send (TX) and receive (RX) has markings or arrows that show the direction of the connection. If the SFP module that you are using has such markings, use them to identify the top of the module.

Procedure

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

Step 2 Align the SFP module at the front of the slot opening.

Step 3 Insert the SFP module into the slot until the connector on the module snaps into place at the rear of the slot.

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. Store the dust plugs for later use.

Step 4 Insert the appropriate cable connector into the SFP module:

- For fiber-optic SFP modules, insert the LC cable.
- For copper 1000BASE-T SFP modules, insert the RJ-45 cable.

Remove SFP Modules

Follow these steps to remove an SFP module when it is necessary.

Procedure

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.

Step 3 Unlock and remove the SFP module.

If the module has a bale-clasp latch, pull the bale down and out to eject the module. If the bale-clasp latch is obstructed, use a small, flat-blade screwdriver or any other narrow instrument to open the bale-clasp latch.

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.

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.

Connect Fiber Optic SFP Modules

⚠

Caution Do not remove the rubber plugs from the SFP module port or 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.

Procedure

Step 1 Remove the rubber plugs from the module port and fiber optic cable, and store them for future use.

Step 2 Insert one end of the fiber optic cable into the SFP module port.

Step 3 Insert the other end into a fiber optic connector at a target device.

Step 4 Observe the port's LED status.

The LED turns green when the device and the target device establish a link.

If the LED is off, check whether the target device is turned on, or whether there is any failure in the target device.

Step 5 If necessary, reconfigure and restart the device or target device.

Connect RJ-45 Connector

Procedure

Step 1 To connect to workstations, servers, and devices, connect a straight-through cable to an RJ-45 connector at the front panel.

When connecting to devices or repeaters, use a crossover cable.

Step 2 Connect the other end of the cable to an RJ-45 connector at the other device. The port's LED turns on when both the device and the connected device have established a link.

If the port LED does not turn on, check whether the device at the other end is turned on or whether there is any failure.

Note
On user network interface (UNI) ports, the port LED turns green after the link is established.

Step 3 Reconfigure and reboot the connected device if necessary.

Step 4 Repeat Steps 1 to 3 for each device that is to be connected.

Connect Chassis to Network

Note Connect only SELV services to all the device ports.

Connecting Console Cables

This section describes how to connect to the Cisco ASR 920 Router using console cables:

Connecting to the USB Serial Port Using Microsoft Windows

This procedure shows how to connect to the USB serial port using Microsoft Windows.

Note Install the USB device driver before establishing a physical connection between the router and the PC, by plugging the USB console cable into the USB serial port. Otherwise, the connection fails. For more information, see the *Installing the Cisco USB Device Driver* section.

Procedure

Step 1 Connect a USB Type A-to-Type A cable to the USB console port, as shown in 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 USB Device Driver
- Uninstalling the Cisco USB Device Driver

Note
You cannot use the USB port and the EIA port concurrently. When the USB port is used, it takes priority over the EIA port.

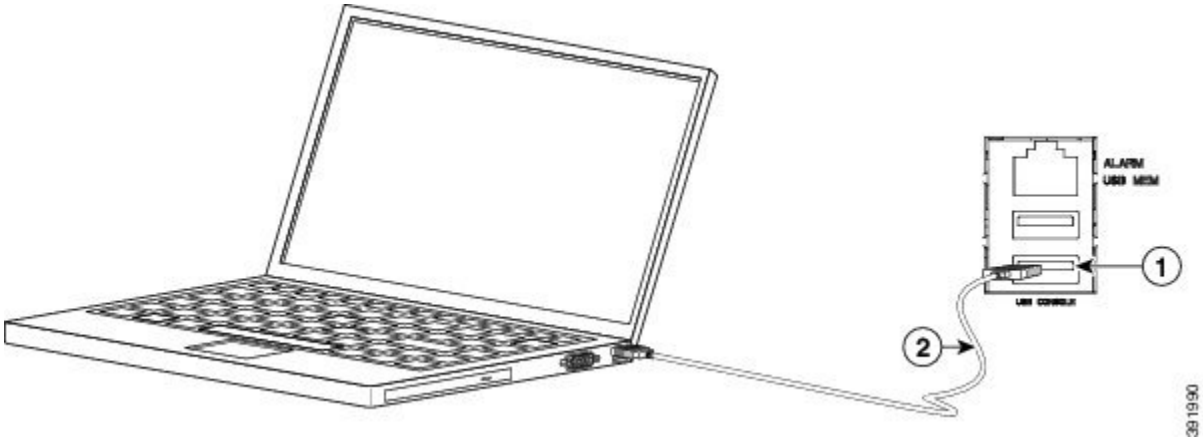
Step 2 Connect the USB Type A cable to the PC.

Step 3 To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal. Configure the software with the following parameters:

- 9600 baud
- 8 data bits
- no parity
- 1 stop-bit

- no flow control

Figure 28: Connecting the USB Console Cable to the Cisco ASR 920 Router



Label	Cable	Label	Cable
1	USB Type-A console port	2	USB USB Type-A to USB Type-A console cable

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.

Procedure

Step 1 Use the Finder to choose 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   19,   6 Dec  9 16:25 /dev/tty.usbmodem1411
crw-rw-rw-  1 root  wheel   19,   7 Dec  9 16:25 /dev/cu.usbmodem1411DT-macbook:dev user$
```

Step 4 Connect to the USB port with the following command followed by the router USB port speed:

Example:

```
macbook:user$ screen /dev/tty.usbmodem1411 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.

Procedure

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 with the following command, followed by 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 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 procedure describes how to install the Microsoft Windows USB device driver in Microsoft Windows XP / Windows Vista / Windows 2000 / Windows 7 / Windows 8. Download the driver for your router model from the Tools and Resources Download Software site, USB Console Software category.

Note To Download the driver, you must have a valid service contract associated to your Cisco.com profile.

Procedure

Step 1 Unzip the file asr-9xx_usbconsole_drivers.zip.

Step 2 Double-click xrusbser_ver2100_installer.exe in the XR21x141x-Win-DriversOnly-Vers2.1.0.0/EXE folder. Installation Wizard GUI is displayed.

Step 3 Click Next. The InstallShield Wizard Completed window is displayed.

Step 4 Click Finish.

Step 5 Connect the USB cable to the PC and router USB console ports. Follow the on-screen instructions to complete the installation of the driver.

Step 6 XR21V1401 USB UART Device driver successfully installed message is displayed.

The USB console is ready for use.

Uninstalling the Cisco USB Device Driver

This procedure describes how to uninstall the Microsoft Windows USB device driver in Microsoft Windows XP / Windows Vista / Windows 2000 / Windows 7 / Windows 8.

Note Disconnect the router console terminal before uninstalling the driver.

Procedure

Step 1 Choose Start > Control Panel > Add or Remove Programs (Uninstall a program).

Step 2 Scroll to Windows Driver Package - Exar corporation (xrusbser) Ports and click Remove. The Program Maintenance window is displayed.

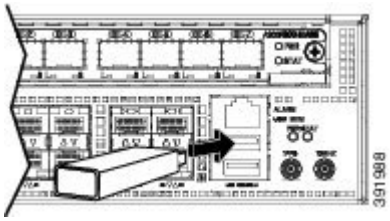
Step 3 Click Yes to uninstall the driver.

Connecting a USB Flash Device

To connect a USB flash device to the Cisco ASR 920 Router, insert the memory stick in the USB port labeled USB MEM. The flash memory module can be inserted only one way, and can be inserted or removed regardless of whether the router is powered up or not.

The following figure shows the USB port connector on the Cisco ASR 920 Router.

Figure 29: Cisco ASR 920 Router Flash Token Memory Stick



Removing a USB Flash Device

To remove and replace a USB flash token memory stick from and into a Cisco ASR 920 Router, follow these steps:

Note If the USB flash device is abruptly removed, the constant sync operations of the file system in progress fail due to the USB device removal. These errors occur with ext2 or ext3 or ext4 file systems and are not seen with fat32 file system. This is a default behavior on any Linux platform.

The following error messages are displayed when you remove the USB device:

```
*Jun 24 10:29:45.766: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:45.878: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.012: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.013: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
```

Procedure

Step 1 Execute the **eject usb0:** command before removing the USB from the router.

Example:

```
rommon 2 > eject usb0
rommon 2 >
```

If you do not run this command before removing the USB, the following error message is displayed:

```
rommon 2 > dir usb0:
  usb_stor_BBB_comdat:usb_bulk_msg error
  failed to send CBW status 34
  RESET:stall
  usb_stor_BBB_comdat:usb_bulk_msg error
  failed to send CBW status 34
  RESET:stall
  usb_stor_BBB_comdat:usb_bulk_msg error
```

Step 2 Pull the memory stick from the USB port.

Step 3 To replace the Cisco USB flash memory stick, simply insert the module into the USB port labeled USB MEM, as shown in figure. The flash memory module can be inserted only one way, and can be inserted or removed regardless of whether the router is powered up or not.

This completes the USB flash memory installation procedure.

Install GNSS Module

- GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, additional surge protection is required if an outdoor antenna is connected. The Lightning Protector must be able to provide a low clamping voltage (less than 600V).
- A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to Protective Earth (PE).

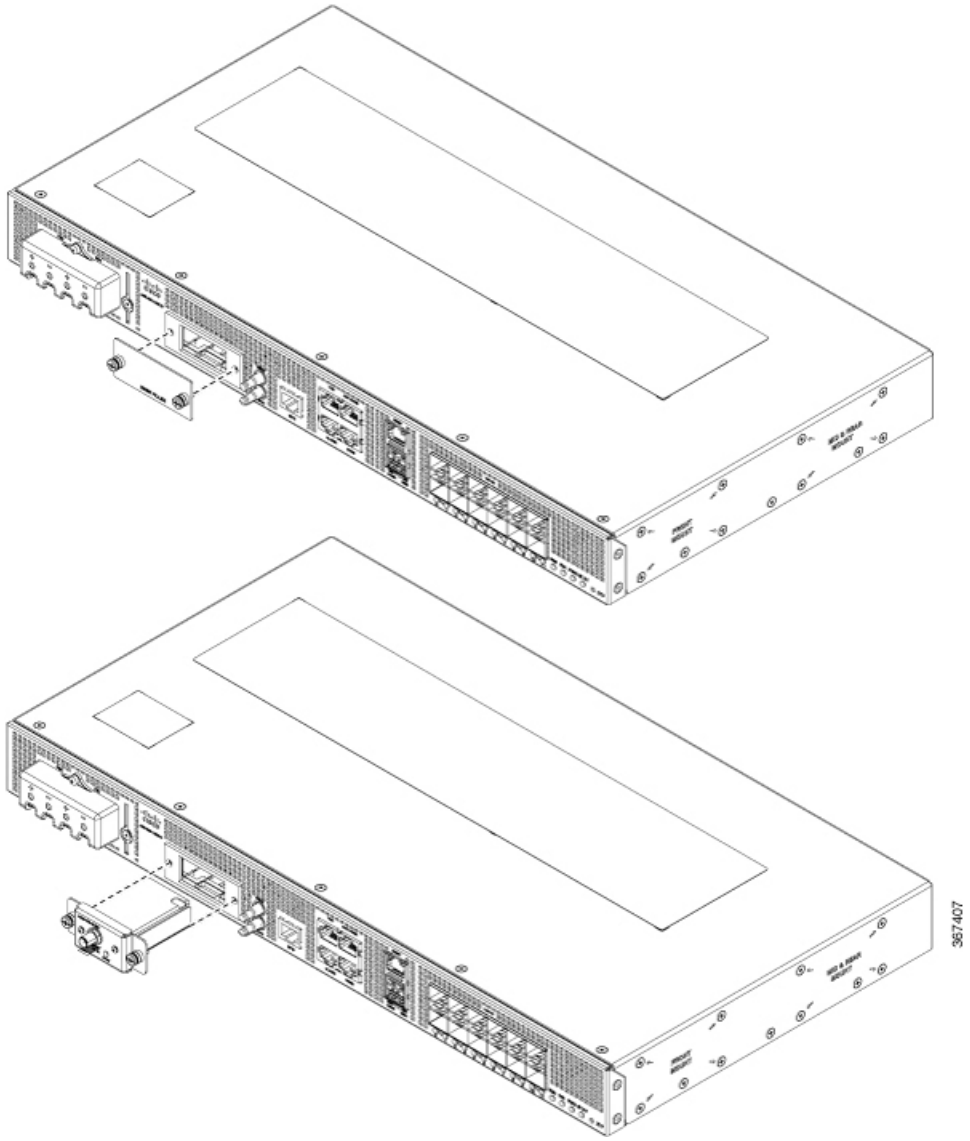
- Surge arrestors must support DC pass and must be suitable for the GPS frequency range (1.575GHz) with low attenuation.

Procedure

Step 1 Remove the GNSS blank as shown in the following figure.

Step 2 Ensure that the GNSS module (A920-CM-GNSS) is upright. Insert the GNSS module parallel to the top cover of the chassis to ensure that the module is in contact with the GNSS connector on the motherboard.

Figure 30: Installing GNSS Module



Step 3 Insert the GNSS module into the GNSS slot till the module is seated firmly.

Step 4 Secure the GNSS module with two screws that are supplied with the accessory kit. The recommended maximum torque is of 10 inch-pounds (1.1 newton meters).

Connecting Timing Cables

The sections describe how to connect timing cables to the Cisco ASR 920 Router:

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the ToD ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. 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.

Connecting a Cable to the BITS Interface

The following steps describe how to connect a cable to the router's BITS port:

Procedure

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of the cable to the BITS port using a straight-through, shielded RJ48C-to-RJ48C cable.

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

Step 4 Turn on the power to the router.

For information about the BITS port pinouts, see the *Troubleshooting* section.

Connecting Cables to the GPS Interface

The sections describe how to connect cables from the Cisco ASR 920 Router to a GPS unit for input or output timing of frequency:

Note When installing the cables to the RSP, we recommend that you leave a service loop of extra cable to enable fan tray removal.

Connecting a Cable to the Input 10-Mhz or 1-PPS Interface

Procedure

Step 1 Connect one end of a shielded mini-coax cable to the GPS unit.

Step 2 Connect the other end of the shielded mini-coax cable to the 10-Mhz or 1-PPS port on the RSP of the Cisco ASR 920 Router.

Connecting a Cable to the Output 10-Mhz or 1-PPS Interface

Procedure

Step 1 Connect one end of a shielded mini-coax cable to the Slave unit.

Step 2 Connect the other end of the shielded mini-coax cable to the 10-Mhz or 1-PPS port on the RSP of the Cisco ASR 920 Router.

Connecting a Cable to the ToD Interface

Procedure

Step 1 Connect one end of a straight-through Ethernet cable to the GPS unit.

Step 2 Connect the other end of the straight-through Ethernet cable to the ToD or 1-PPS port on the RSP of the Cisco ASR 920 Router.

Note
For instructions on how to configure clocking, see the *Cisco ASR 920 Series Aggregation Services Routers Configuration Guide*.

Connect to EIA Console Port



Note The serial console cable kit is not included with the device; it must be ordered separately.

Procedure

Step 1 Connect the RJ-45 cable to the EIA Console port.

Step 2 Connect the DB-9 end of the console cable to the DB-9 end of the terminal.

Step 3 To communicate with the device, start a terminal emulator application, such as Microsoft Windows Hyper-Terminal. Configure the software with the following parameters:

- 9600 baud
- 8 data bits
- No parity
- 1 stop-bit
- No flow control

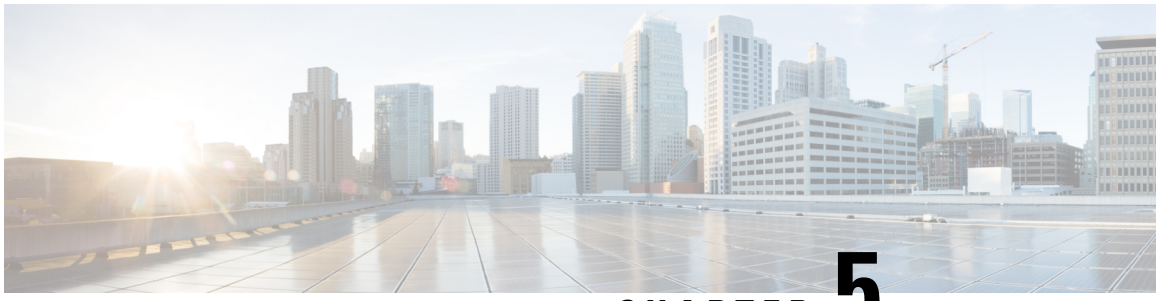
Connect a Management Ethernet Cable

When using the Ethernet Management port in the default mode (speed-auto and duplex-auto), the port operates in the auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature, and senses a crossover or straight-through cable and adapts to it.

However, the Ethernet Management port may be configured to a fixed speed (10, 100, or 1000 Mbps) through command-line interface (CLI) commands. In such a case, the port is forced to operate in the MDI mode.

When in a fixed-speed configuration and MDI mode, use:

- a crossover cable to connect to an MDI port
- a straight-through cable to connect to an MDI-X port



CHAPTER 5

Configure the Device

Before you begin this task, ensure that you have read and understood the safety warnings in the Standard Warning Statements section of the Safety Warnings handout topic.

Configuring the Cisco ASR 920 Router involves these tasks:

- Power up the Device, on page 59
- Configure Device at Startup, on page 60
- Safely Power Down the Device, on page 63

Power up the Device

After installing your device and connecting cables, start the device with these steps:

Caution Do not press any keys on the keyboard until the messages stop appearing, and the PWR LED becomes solid green. Any key that is pressed during this time is interpreted as a command to be executed when the messages stop. That action results in getting the device to power off and start over. It takes a few minutes for the messages to stop appearing.

Procedure

Step 1 Switch on the power supply.

Step 2 Observe the system LEDs to monitor the initialization process.

When the system boot is complete (the process takes a few seconds), the device begins to initialize. After the device has booted, the green PWR LED comes and stays on.

Verify the Front Panel LEDs

The front-panel indicator LEDs provide power, activity, and status information useful during bootup. For more detailed information about the LEDs, see the *LED Indicators* section.

Verify the Hardware Configuration

To display and verify the hardware features, enter the following commands:

Table 10: Hardware Commands

Command	Description
show version	Displays the following information: • system hardware version • software version installed • configuration file names and source • boot image • DRAM space • NVRAM space • flash memory space
show diag slot	Displays IDPROM information for the assemblies in the device.

Check Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS-XE software with the hardware installed on your Cisco ASR 920 Router, Cisco maintains the **Software Research** tool on Cisco.com. The tool provides the minimum Cisco IOS-XE requirements for individual hardware modules and components.

Note To access this tool, you must have a Cisco.com login account.

To access the **Software Research** tool:

1. Go to http://software.cisco.com/selection/research.html.
2. In the **Search by Product** tab, type *ASR 920*.
3. The Cisco Suggested Release versions are displayed.

Configure Device at Startup

This section explains how to create a basic running configuration for your device.

Note Acquire the correct network addresses from your system administrator or consult your network plan before you create the basic running configuration.

Before continuing the configuration process, check the current state of the device by entering the **show version** command. This command displays the Cisco IOS software release that is available on the device.

For information on modifying the configuration you create, see the Cisco IOS Master Command List, All Releases.

To configure a device from the console, you must connect a terminal or terminal server to the console port on the device. To configure the device using the management Ethernet port, you must have the device's IP address.

Access the CLI Using the Console

Procedure

Step 1 When your system is booting, enter *no* at the prompt.

Example:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2 Press Return to enter the user EXEC mode.

The following prompt is displayed:

```
Router>
```

Step 3 From the user EXEC mode, enter the enable command:

```
Router> enable
```

Step 4 At the password prompt, enter your system password (if a password has not been set on your system, you can skip this step.)

```
Password: enablepass
```

When your password is accepted, the privileged EXEC mode prompt is displayed:

```
Router#
```

You now have access to the CLI in privileged EXEC mode. You can enter necessary commands to complete required tasks.

Step 5 To exit the console session, enter the quit command:

```
Router# quit
```

Configure Global Parameters

When you first start the setup program, configure certain global parameters that are used for controlling system-wide settings. Perform the following steps to enter the global parameters:

Procedure

Step 1 Connect a console terminal to the console port, and then boot the device.

Note
The following is only an example of the output display; prompts may vary.

When this information appears, it means that you have successfully booted your device:

Example:

```
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
.
.
.
--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: yes

Press RETURN to get started!
```

Step 2 The first sections of the configuration script appear only at an initial system startup. On subsequent uses, the script begins with a System Configuration Dialog as shown below. When prompted to enter the initial configuration dialog, enter *yes*.

```
Would you like to enter the initial configuration dialog? [yes/no] yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.

Basic management setup configures only enough connectivity for management of the system, extended
setup will ask you to configure each interface on the system.
```

The basic management setup configures enough connectivity for managing the system; the extended setup prompts you to configure each interface on the system.

Check the Running Configuration Settings

To view the value of the settings you have entered, enter the following command in privileged EXEC mode:

```
device# show running-config
```

To review the changes you have made to the configuration, enter the following command in EXEC mode and copy run-start stored in the NVRAM.

```
device# show startup-config
```

Save the Running Configuration to NVRAM

To store the configuration or changes to your startup configuration in NVRAM, enter the following command at the prompt:

```
device# copy running-config startup-config
```

This command saves the configuration settings that you create in the device using the configuration mode and the setup facility. If the save action fails, you lose your configuration, and it is not available during your next reload.

Safely Power Down the Device

This section explains how to shut down the device. We recommend that before turning off all power to the device, you issue the **reload** command. Running this command ensures that, the operating system cleans up all file systems. After the reload operation is complete, the device can be powered down safely.

To power down the device safely:

Procedure

Step 1 Slip on the ESD-preventive wrist strap included in the accessory kit.

Step 2 Enter the **reload** command.

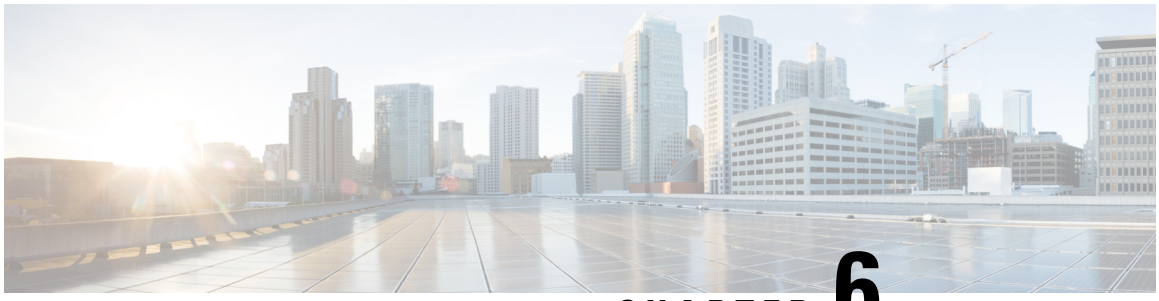
Step 3 Click the **Enter** key when prompted to confirm.

Step 4 Wait for the system bootstrap message before powering down the system:

Step 5 Remove power cables, if any, from the device:

- For power supplies with a circuit breaker switch, position the switch to the 'Off' (O) position.
- For power supplies with a standby switch, place the standby switch in the 'Standby' position.

After powering down the device, wait for a minimum of 30 seconds before powering it on again.



CHAPTER 6

Troubleshooting Aids

Certain troubleshooting aids of the Cisco ASR 920 Router enable you to perform these tasks that assist the troubleshooting process:

- Verify Pinout, on page 65
- Check Optical Fiber Specifications, on page 69
- Check Alarm Conditions, on page 69
- Check LED Indicators, on page 69

Verify Pinout

Pinouts provide input signal (to the device) and output signal (from the device) information. Bits (BITS) port, GPS Port (1PPS and 10MHz), USB Console (CONSOLE) port, Time-of-Day (TOD) port, Alarm (ALARM) port, USB (USB CON and USB MEM) port, and Management Ethernet (MGMT) port pinout information is provided in the following sections.

BITS Port Pinouts

The following table summarizes the BITS port pinouts.

Table 11: BITS Port Pinouts

Pin	Signal Name	Direction	Description
1	RX Ring	Input	Receive Ring
2	RX Tip	Input	Receive Tip
3	—	—	Not used
4	TX Ring	Output	TX Ring
5	TX Tip	Output	TX Tip
6	—	—	Not used

Pin	Signal Name	Direction	Description
7	—	—	Not used
8	—	—	Not used

GPS Port Pinouts

The following table summarizes the GPS port pinouts.

Note The 10 Mhz and 1 PPS interfaces can be configured as input or output using Cisco IOS CLI commands. For more information, see the *Cisco ASR 920 Series Aggregation Services Router Configuration Guide*.

Table 12: GPS Port Pinout

	10 Mhz (input and output)	1PPS (input and output)
Waveform	Input—Sine wave Output—Sine or 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

Time-of-Day Port Pinouts

The following table summarizes the ToD/1-PPS port pinouts.

Table 13: RJ-45 1PPS/ToD Port Pinouts

Pin	Signal Name	Direction	Description
1	RESERVED	Output	Do Not Connect
2	RESERVED	Input	Do Not Connect
3	1PPS_N	Output or Input	1PPS RS422 signal

Pin	Signal Name	Direction	Description
4	GND	—	—
5	GND	—	—
6	1PPS_P	Output or Input	1PPS RS422 signal
7	TOD_N	Output or Input	Time-of-Day character
8	TOD_P	Output or Input	Time-of-Day character

Alarm Port Pinouts

The following table summarizes the external alarm input pinouts.

Table 14: External Alarm Input Pinouts

Pin	Signal Name	Description
1	ALARM0_IN	Alarm input 0
2	ALARM1_IN	Alarm input 1
3	—	No connect
4	ALARM2_IN	Alarm input 2
5	ALARM3_IN	Alarm input 3
6	—	No connect
7	—	No connect
8	COMMON	Alarm common

Management Ethernet Port Pinouts

The following table summarizes the Management Ethernet port pinouts.

Table 15: Fan Alarm Port Pinout

Pin	Signal Name
1	TRP0+

Pin	Signal Name
2	TRP0-
3	TRP1+
4	TRP2+
5	TRP2-
6	TRP1-
7	TRP3+
8	TRP3-

USB Console Port Pinouts

The following table summarizes the USB console port pinouts.

Table 16: Single USB Console Port Pinouts

Pin	Signal Name	Description
A1	Vcc	+5VDC
A2	D-	Data -
A3	D+	Data +
A4	Gnd	Ground



Note The USB console port +5VDC is input, and operates as an USB peripheral device.

USB MEM Port Pinouts

The following table summarizes the USB MEM port pinouts.

Table 17: Single USB MEM Port Pinouts

Pin	Signal Name	Description
A1	Vcc	+5VDC (500mA)
A2	D-	Data -

Pin	Signal Name	Description
A3	D+	Data +
A4	Gnd	Ground

Note USB TYPE-A receptacle is used.

Note The USB MEM port +5VDC is output. Cisco ASR 920 Router provides power for USB MEM port. This port operates as a USB host device.

Check Optical Fiber 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:

http://www.cisco.com/en/US/partner/products/hw/modules/ps5455/prod_installation_guides_list.html .

Check Alarm Conditions

The following table summarizes the meaning of the alarm conditions on the Cisco ASR 920 Router.

Table 18: Alarm Condition Summary

Alarm Type	Alarm Meaning
Critical	Port in down state. Environmental sensor threshold exceeded critical level (voltage, temperature)
Major	Environmental sensor threshold exceeded major level (voltage, temperature)
Info	Port administratively shut down.

Check LED Indicators

For more information about the LEDs and their description, see the *LED Indicators* section in the *Overview* chapter.