# Hardware Installation Guide for Cisco 8010 Series Routers

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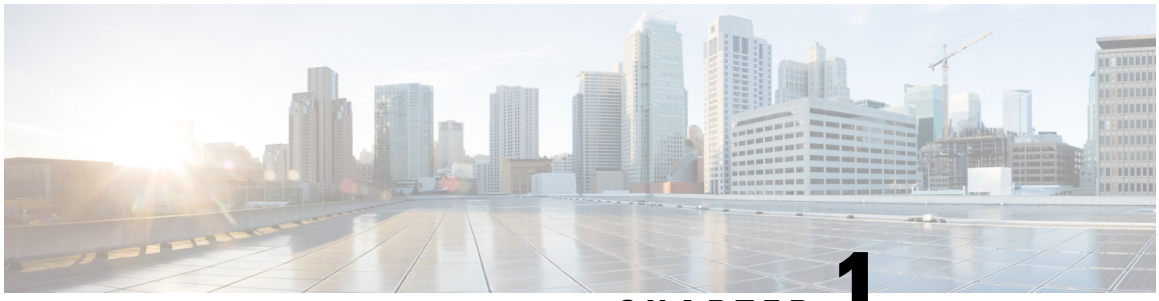

CHAPTER 1

# Cisco Router Overview

The Cisco 8011-4G24Y4H-I Large Density Router is temperature-hardened, fixed port, one rack unit form-factor router. The router enables as a CSG (Cell Site Gateway) or pre-aggregation router.

This router is intended for indoor and outdoor applications. While installing in outdoor environment, we recommend you to have an IP65 sealed cabinet with heat exchanger complying with Telcordia GR487. For more information on cabinet selection, see Cabinet Selection Guidelines.

For more information about the router features and benefits, see the *Cisco 8010 Series Large Density Fixed Routers Datassheet*.


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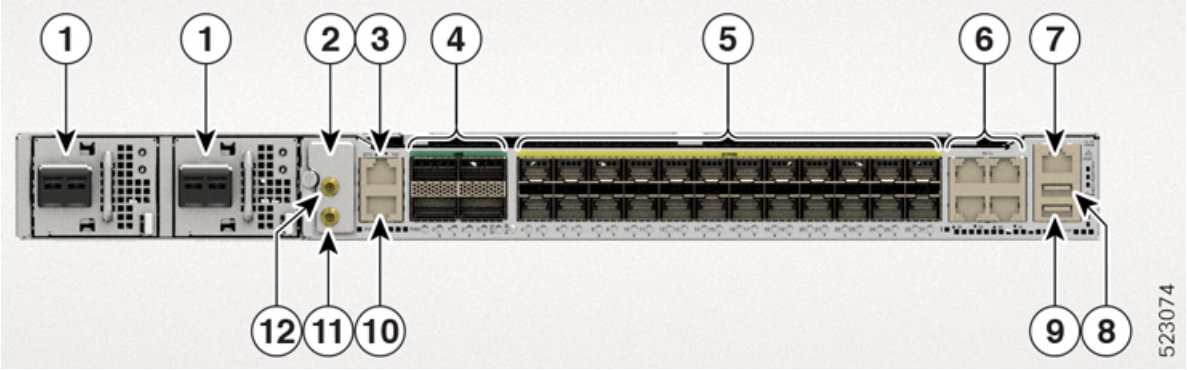
# Temperature and Physical Specification

For temperature and physical specifications, see the *Cisco 8010 Series Router Data Sheet*.

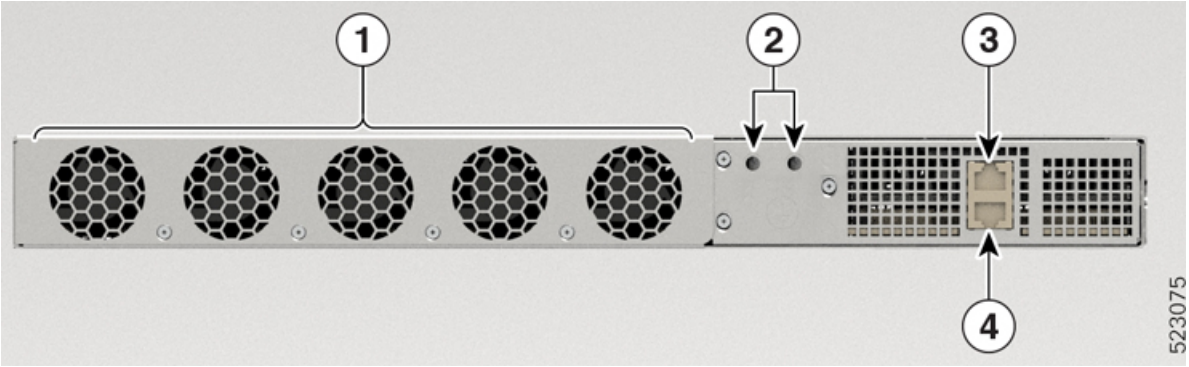
# Cisco 8010 Series Routers

*Figure 1: Cisco 8011-4G24Y4H-I Router Port and LED details on Front View*




| | | | |
|---|---|---|---|
| 1 | DC or AC PSU Power Module (PM0 and PM1) | 2 | 8000-Timing Interfaces Card (by default) or<br>8000-Timing Interfaces Card-GNSS (optional) |
| 3 | BITS port | 4 | 100G QSFP28 ports |
| 5 | 1/10/25G SFP28 ports | 6 | Copper ports |
| 7 | Management port | 8 | USB Memory port |
| 9 | USB Console port | 10 | 1PPS/Time of Day (ToD) port |
| 11 | 1PPS port | 12 | 10MHz port |

*Figure 2: Cisco 8011-4G24Y4H-I Router Fan and Alarm Port details on Rear View*



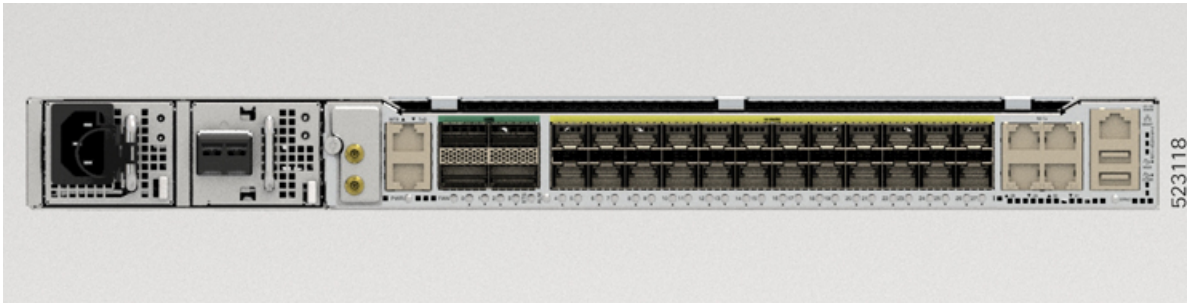

| | | | |
|---|---|---|---|
| 1 | Fixed Fan Modules | 2 | Grounding Lug Holes |
| 3 | Alarm port | 4 | RS232 Console port |

# Network Interfaces

The Cisco 8011-4G24Y4H-I router supports the following network interfaces:

- 4 x 1G Copper ports
- 24 x 1/10/25G SFP28 ports
- 4 x 100G QSFP28 ports

***Figure 3: Cisco 8011-4G24Y4H-I Router***




**Note** The ports are color coded in the chassis for ease of identification; for example, the 100G QSFP28 ports are in green, and the 1/10/25G SFP28 ports are in yellow.

# Interface Naming

The following table shows the interface naming of the Cisco 8011-4G24Y4H-I router:

***Table 1: Port Numbering***

| **100G QSFP28 ports** | **1/10/25G SFP28 ports** | **1G Copper ports**<br>**10/100/1000** |
|---|---|---|
| 0 to 3 | 4 to 27 | 28 to 31 |

The *interface-path-id* is *rack/slot/module/port*. The slash between values is required as part of the notation.

- **HundredGigE**— 0/0/0/0 to 0/0/0/3
- **TwentyFiveGigE**— 0/0/0/4 to 0/0/0/27
- **TenGigE**— 0/0/0/4 to 0/0/0/27
- **GigE**— 0/0/0/4 to 0/0/0/27
- **GigE Copper**— 0/0/0/28 to 0/0/0/31

### Port Speed on 100G Ports

The 100G ports (0-3) support:

- 4 x 10G QSFP28 Ports
- 4 x 25G QSFP28 Ports
- 40G QSFP Ports

# Network Timing Interfaces with GNSS

**Note** The router supports the following Timing Interfaces Card (TIC):

- Cisco 8010 Timing Interfaces Card (8000-TIC)
- Cisco 8010 Timing Interfaces Card with GNSS (8000-TIC-GNSS)

By default, the router comes with 8000-TIC. As an option, you can choose the 8000-TIC-GNSS, while ordering the router.

**Note**

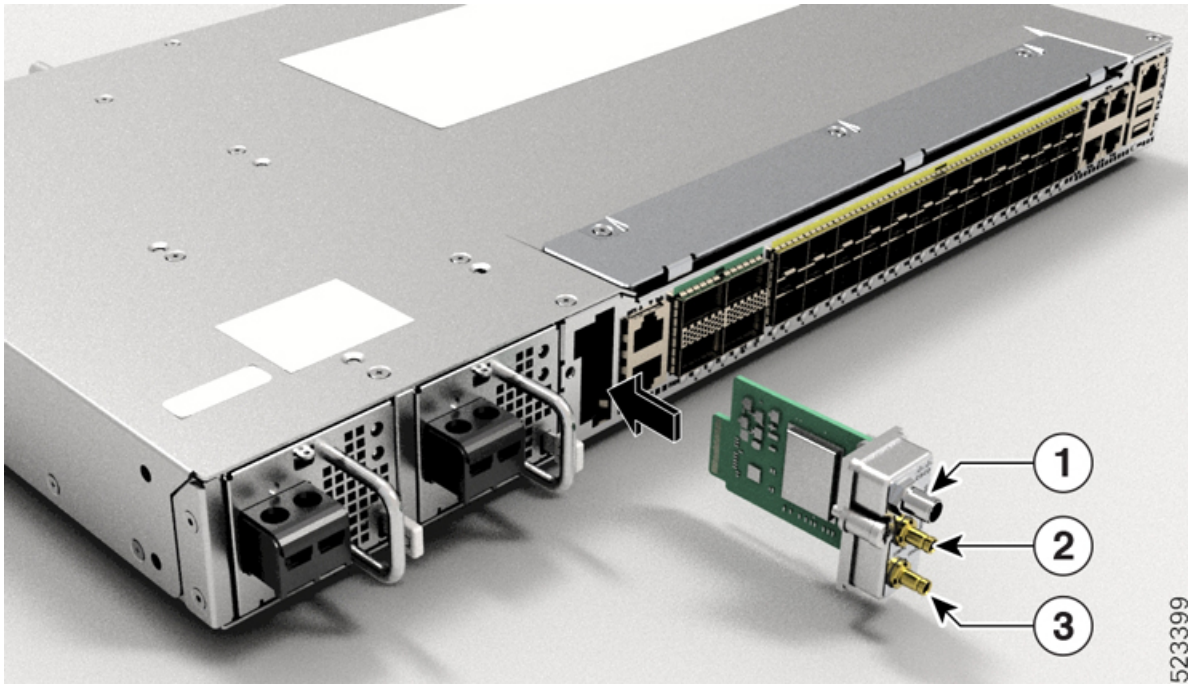
- The TIC is modular, but you must insert a TIC module for the router to work.
- Online Insertion and Removal (OIR) of a TIC module isn't supported when the router is operational.

- 1PPS input or output and ToD input or output—The interface is used for input or output of Time-of-Day (ToD) and 1PPS pulses. ToD format includes both NTP and IEEE 1588-2008 time formats.
- The same RS422 pins for 1PPS and ToD are shared between the input and output directions. The direction for each can be independently configurable through software.
- BITS input or output—The BITS interfaces support clock recovery from either a T1 at 1.544MHz or an E1 at 2.048MHz, configurable by software.

# Timing Interfaces Card with GNSS (8000-TIC-GNSS)

Timing Interfaces Card with GNSS module has an in-built ESD protection on all pins, including the RF-input pin. However, extra surge protection is required if an outdoor antenna is to be connected.

*Figure 4: Ports on Timing Interfaces Card with GNSS (8000-TIC-GNSS) Module*




| | |
|---|---|
| 1 | GNSS port |
| 2 | 10Mhz port |
| 3 | 1PPS port |

The lightning protector must support 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 arrestor must support DC-pass and suitable for the GNSS frequency range (1.575GHz) with low attenuation.

### Timing Interfaces Card with GNSS Module RF Input Requirements

*Table 2: Timing Interfaces Card with GNSS Connectors*

| Category | GNSS RF Input |
|---|---|
| Connector Type | RF SMA Jack |
| Impedance | 50 ohms |
| Band | Multi band - L1/L2 |

| Category | GNSS RF Input |
|---|---|
| Accuracy | PRTC-B |

- For optimal performance, the Timing Interfaces Card with GNSS module requires a GNSS antenna with built-in Low-Noise Amplifier (LNA). The antenna LNA amplifies the received satellite signals for the following two purposes:
  - Compensation of losses on the cable
  - Lifting the signal amplitude to the suitable range for the receiver frontend

  The amplification required is 22dB gain + cable/connector loss + Splitter signal loss.

  The recommended range of LNA gain (- cable/connector loss) is 22–30dB with a minimum of 20dB and a maximum of 35dB, at the connector of the receiver module.

- Timing Interfaces Card with GNSS module provides 5V to the active antenna through the same RF input.
- Surge requirement:
  - Timing Interfaces Card with GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, extra surge protection may be required if rooftop antennas are to be connected, to meet the regulations and standards for lightning protection of countries where the end-product is installed.
  - 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 should support DC-pass and suitable for the Timing Interfaces Card with GNSS frequency range (1.575GHz) with low attenuation.

- Antenna Sky visibility:
  - Timing Interfaces Card with GNSS signals can only be received on a direct line of sight between antenna and satellite. The antenna must have a clear view of the sky. For proper timing, minimum of four satellites should be locked.

**Note** The antenna terminal should be earthed at the building entrance in accordance with the ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of Outer Conductive Shield of a Coaxial Cable.

- Use a passive splitter if more than one Timing Interfaces Card with GNSS module is fed from a single antenna.

**Note** The splitter should have at least one RF port capable of DC-pass, and an antenna should be connected to that port, if the antenna needs to feed power from 8000-TIC-GNSS.

### Primary Reference Time Clock

As packet timing requirements emerged, the ITU-T developed the Primary Reference Time Clock (PRTC) standard for time and phase for transport over a packet network and this standard is known as G.8272.

**Note** The performance specified in the following table also applies to the output of the combined PRTC and T-GM function when integrated into a single piece of equipment. Therefore, for both the PRTC-A and PRTC-B, there's no additional (performance) allowance for the inclusion of the T-GM function.

*Table 3: PRTC-A versus PRTC-B*

| Category | PRTC-A | PRTC-B |
|---|---|---|
| Standard | G.8272 | G.8272 |
| Time output accuracy (max) | 100 ns | 40 ns |
| **Phase Error at Output** | | |
| Wander in locked mode (MTIE) | 100 ns | 40 ns |
| Wander in locked mode (TDEV) | 30 ns | 5 ns |
| Holdover | *Optional* | *Optional* |

There's no standardized requirement for holdover, it's up to the implementation. Some standalone PRTC devices have very-high quality quartz oscillators or even a Rubidium oscillator as an option to allow an option for extended holdover. Redundancy is provided through network design instead of relying on holdover performance from expensive oscillators.

According to the standards, there are only a few differences between the two classes of clock. Meeting those requirements may result in different implementations, which may influence the cost of the device.

To achieve improved performance, PRTC-B is typically implemented with a two-band GNSS receiver instead of a single-band receiver. The "traditional" band for GPS signals in the L1 band, while the newer devices receive signals in the L2 band.

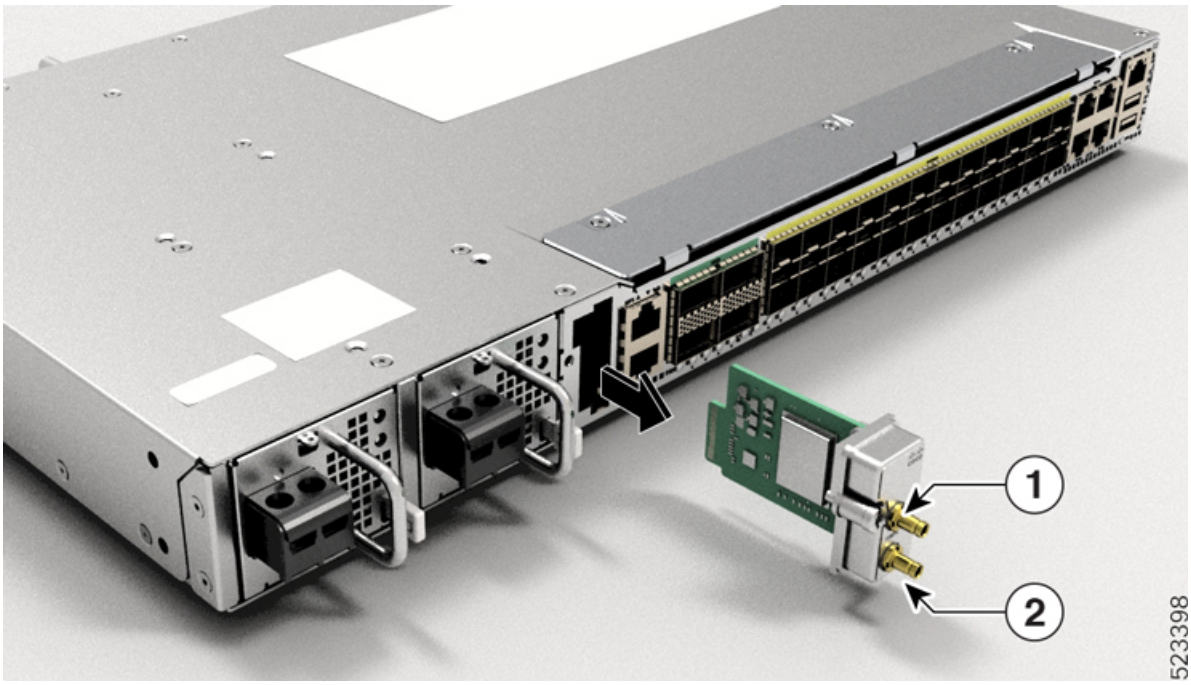
*Table 4: Bands on PRTC-A versus PRTC-B*

| Category | PRTC-A | PRTC-B |
|---|---|---|
| Bands (GPS) | L1 (1575.42 MHz) | L1 + L2 (1227.60 MHz) |
| Bands (Galileo) | E1 (1575.42 MHz) | E1 (1227.60 MHz) |
| Ionospheric delay model | Basic | Advanced |
| Antenna | Single band (L1/E1) | Dual band (L1/E1, L2) |
| Constellation | GPS, Galileo, other | GPS, Galileo, other |

# Timing Interfaces Card (8000-TIC)

The timing ports with 1PPS and 10Mhz ports are provided as a pluggable module and is DIN 1.0/2.3 jack connector compliant to DIN 41626 specifications.

*Figure 5: Ports on Timing Interfaces Card (8000-TIC) Module*




| | |
|---|---|
| 1 | 10Mhz port |
| 2 | 1PPS port |

## Timing Interfaces Card Ports Specification

*Table 5: Timing Interfaces Card Ports*

| Category | 10MHz (Input) | 1PPS (Input and Output) |
|---|---|---|
| Waveform | Input—Sine wave<br>Output—Sine wave | Input—Rectangular pulse<br>Output—Rectangular pulse |
| Amplitude | Input—Greater than (>) 1.7 volt p-p(+8 to +10 dBm)<br>Output—Greater than (>) 2.4 volts TTL compatible | Input—Greater than (>) 2.4 volts TTL compatible<br>Output—Greater than (>) 2.4 volts TTL compatible |
| Impedance | 50 ohms | 50 ohms |
| Pulse Width | 50% duty cycle | 100 microseconds |

| Category | 10MHz (Input) | 1PPS (Input and Output) |
|---|---|---|
| Rise Time | Input—AC coupled<br>Output—5 nanoseconds | Output—5 nanoseconds |

# External Alarm Inputs

The router supports four dry contact alarm inputs through an RJ45 jack at the back panel.

The alarm condition is normally open, which 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 being critical, major, or minor.

# USB Console

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to Uboot flash for Cisco software 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.
- If you insert the USB cable and connect to the host computer, then you can only enter the commands using the USB.

# RS232 Console

The RS232 console port in RJ45 form factor on the rear panel of the router provides, transmission (Tx), reception (Rx), and ground (Gnd) information.

# Online Insertion and Removal

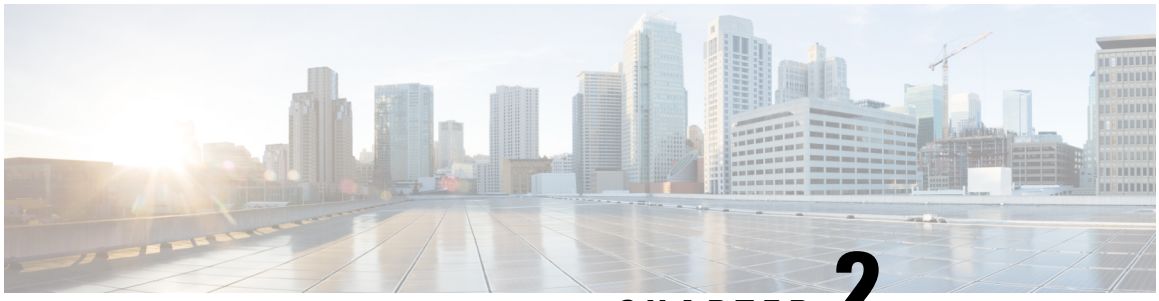
The router supports the following Online Insertion and Removal (OIR) operations:

- When an SFP is removed, there’s no effect on traffic flowing on other ports.
- When an SFP is installed, there’s no effect on traffic flowing on other ports, the system initializes that port for operation based on the current configuration. If the inserted SFP is incompatible with the current configuration of that port, the port doesn’t become operational until the configuration is updated.

- When both power supplies are installed and active, the load may be shared between them, or a single PSU supports the whole load. When a power supply isn't working or the input cable is removed, the remaining power supply takes the entire load without disruption.
- Both the PSUs are field replaceable units and when one PSU is removed or installed there's no functional impact to the router.

# Supported Transceiver Modules

For more information on the supported transceiver modules, see Transceiver Module Group (TMG) Compatibility Matrix. In the **Begin your Search** search box, enter the keyword and click **Enter**.



CHAPTER 2

# Prepare for Installation

**Note** The images in this chapter are only for representational purposes, unless specified otherwise. The chassis' actual appearance and size may vary.

**Warning** **Statement 1071**—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS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- Compliance and Safety Information, on page 12
- Laser Safety, on page 13
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# General Precautions

Observe the following general precautions when using and working with your 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, 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 to the system components.

# Compliance and Safety Information

The Cisco 8000 Series Routers are designed to meet the regulatory compliance and safety approval requirements. For detailed safety information, see *Regulatory Compliance and Safety Information—Cisco 8010 Series Routers*.

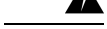
**Warning**

**Statement 1089—**Instructed and Skilled Person Definitions

An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.



**Warning** **Statement 9001—**Product Disposal

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

**Warning** **Statement 1074—**Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

**Warning** **Statement 1090—**Installation by Skilled Person

Only a skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of a skilled person.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

**Warning** **Statement 1091—**Installation by an Instructed Person

Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed or skilled person.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

**Warning** **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they reduce the risk of electric shock and fire, they contain electromagnetic interference (EMI) that might disrupt other equipment, and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

# Laser Safety

**Warning** **Statement 1051—**Laser Radiation

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

**Warning** **Statement 1055—**Class 1/1M Laser

Invisible laser radiation is present. Do not expose to users of telescopic optics. This applies to Class 1/1M laser products.


**Warning** **Statement 1255—**Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

# Energy Hazard

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

**Warning** **Statement 1086—**Replace Cover on Power Terminals

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

# Preventing Electrostatic Discharge Damage

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

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

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

# Cautions and Regulatory Compliance Statements for NEBS

The NEBS-GR-1089-CORE regulatory compliance statements and requirements are discussed in this section.

**Note** **Statement 7001—**ESD Mitigation

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

**Warning** **Statement 7003—**Shielded Cable Requirements for Intrabuilding Lightning Surge

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

**Warning** **Statement 7005—**Intrabuilding Lightning Surge and AC Power Fault

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

**Warning** **Statement 7012—**Equipment Interfacing with AC Power Ports

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

**Note** **Statement 7013—**Equipment Grounding Systems—Common Bonding Network (CBN)

This equipment is suitable for installations using the CBN.

**Note** **Statement 8015—**Installation Location Network Telecommunications Facilities

This equipment is suitable for installation in network telecommunications facilities.

**Note** **Statement 8016—**Installation Location Where the National Electric Code (NEC) Applies

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

# 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** **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

## Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply has 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.
- Protect the circuit by a dedicated two-pole DC circuit breaker. Ensure that the circuit breaker is sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered as the disconnect device and is easily accessible.
- The system ground is the power supply and chassis ground.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.
- Do not connect the DC return wire to the system frame or to the system-grounding equipment.
- Ensure that the DC return is grounded at the source side.
- Ensure that each power feed of the equipment is connected to different power sources.

## Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

- Each chassis power supply has its own dedicated branch circuit.
- Ensure that the circuit breaker is sized according to the power supply input rating and local or national code requirements.

- The AC power receptacles that are used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles must connect to protective earth ground at the service equipment.

### Prevent Power Loss

Use the following guidelines to prevent power loss to the device:

- To prevent input power loss, ensure that the maximum load on each circuit supplying the power 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 device, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

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

## Site Planning Checklist

Use the following checklist to perform and account for all the site planning tasks described in this chapter:

- The site meets the environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the router.
- The floor space that the router occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the router complies with the requirements.
- Consideration has been given to the console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- The router Ethernet cabling distances are within the prescribed limitations.
- The equipment rack in which you plan to install the router complies with prescribed requirements.
- The following factors have been carefully considered when selecting the location of the rack: safety, ease of maintenance, and proper airflow.

## Environmental Requirements

For outside plant installation (cell site cabinet, hut, and so on), equipment must be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements. Sealed equipment chamber with air-conditioning or a heat exchanger is recommended for OSP deployments. The equipment chamber must comply with the temperature and clearance requirements. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telcordia GR487. Temperature must be maintained within –40ºC to 65ºC.

The equipment shall be placed inside an enclosure (that is protected from direct outside weather and environmental stresses by the enclosure), and where the operating climate, as defined by Class 2 of GR-3108-CORE, is between:

- –40 to 149°F (–40 to 65°C)
- 5% and 85% RH

For more information on Environmental properties and Regulatory standards, see the Cisco 8010 Series Router Data Sheet.

# Temperature

Temperature extremes may cause a system to operate at reduced efficiency and cause various problems, including premature aging and failure of chips, and failure of mechanical devices. Extreme temperature fluctuations may also cause chips to become loose in their sockets.

Observe the following guidelines:

- Ensure that the chassis has adequate ventilation.
- Don’t place the chassis within a closed-in wall unit or on top of cloth, which can act as thermal insulation.
- Don’t place the chassis where it receives direct sunlight, particularly in the afternoon.
- Don’t place the chassis next to a heat source of any kind, including heating vents.
- Adequate ventilation is important at high altitudes. Make sure that all the slots and openings on the system remain unobstructed, especially the fan vent on the chassis.
- Clean the installation site at regular intervals to avoid the buildup of dust and debris, which may cause a system to overheat.

Failure to observe these guidelines may damage the chassis' internal components.

# Dust and Particles

Fans cool power supplies and system components by drawing in room-temperature air and exhausting heated air out through various openings in the chassis. However, fans also ingest dust and other particles, causing contaminant buildup in the system and increased internal chassis temperature. A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the mechanical components in the system.

PM2.5 and PM10 are some of the commonly available air quality parameters to indicate dust concentration levels. Periodically check dust concentration levels and provide required protection to improve air quality around the equipment.

# Air Quality

Dust is everywhere and often invisible to the naked eye. It consists of fine particles in the air that originate from various sources, such as soil dust lifted by weather, from volcanic eruptions, or pollution. Dust at an installation site may contain small amounts of textile, paper fibers, or minerals from outdoor soil. It may also contain natural contaminants, such as chlorine from the marine environment and industrial contaminants such as sulfur. Ionized dust and debris are dangerous and get attracted to electronic equipment.

The accumulation of dust and debris on electronic equipment has the following adverse effects:

- It increases the operating temperature of the equipment. According to the Arrhenius effect, an increase in the operating temperature leads to a decrease in reliability and life of the equipment.
- The moisture and corrosive elements that are present in the dust can corrode the electronic or mechanical components and cause premature board failure.

These adverse effects are further accelerated by the presence of fans in the data networking equipment that ingest dust and other particles into the equipment. Higher the volume of air that is generated by the fans for cooling, the higher the quantity of dust and particulates that get deposited and trapped inside the equipment.

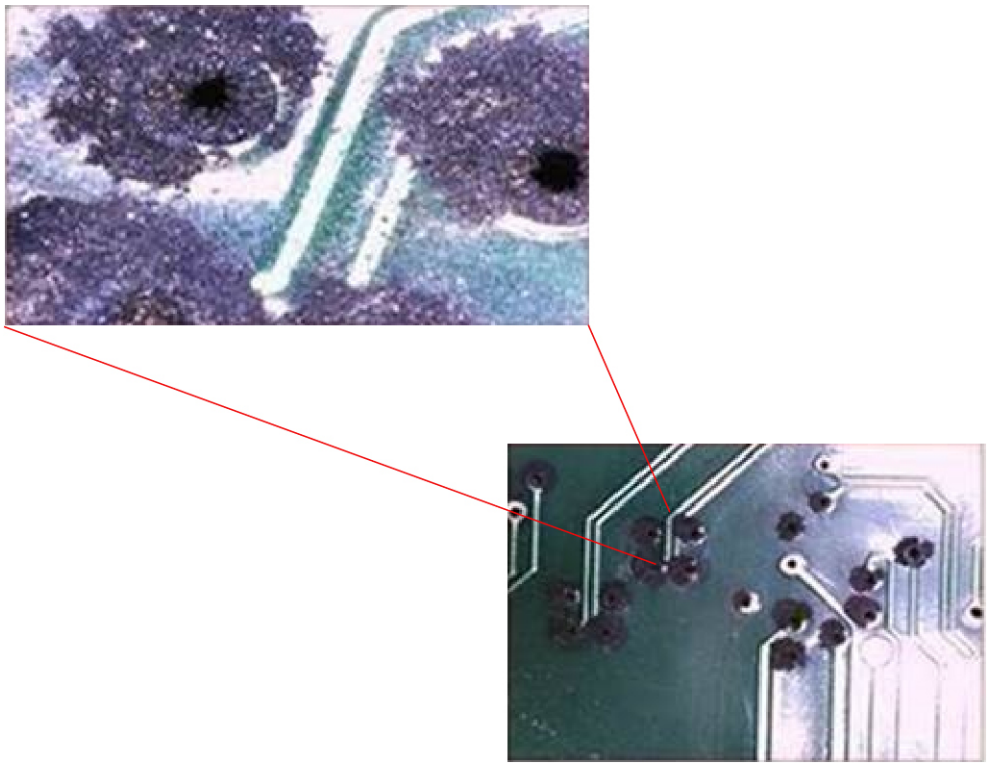
# Corrosion

Corrosion is a chemical reaction that occurs between electronic components, gases, and humidity, which results in metal deterioration. Corrosion attacks edge connectors, pin connectors, IC plug-in sockets, wire wraps, and all other metal components. Depending on the type and concentration level of the corrosive gases, performance degradation of the components occurs either rapidly or over a period of time. It also leads to blocked currents, brittle connection points, and overheated electrical systems. Corrosion by-products from insulating layers on circuits and causes electronic failure, short circuits, pitting, and metal loss.

A type of corrosion known as creep corrosion, that primarily affects PCBA (Printed Circuit Board Assembly) occurs when the PCBA is subjected to a harsh, and sulfur-rich (hydrogen sulfide) end-use environment over a prolonged period of time. The corrosion begins on certain exposed metals, such as copper and silver, and then creeps along the remaining metal surface either causing electrical short circuits or creating holes. Creep corrosion also occurs on electronic components such as resistors and PCBs.

**Note** To prevent corrosion, remove or minimize the presence of dust and particulates at the installation site by following the guidelines mentioned in ANSI 71-04-2013 regulations.

***Figure 6: PCB with Corrosion on its Metal Contacts***



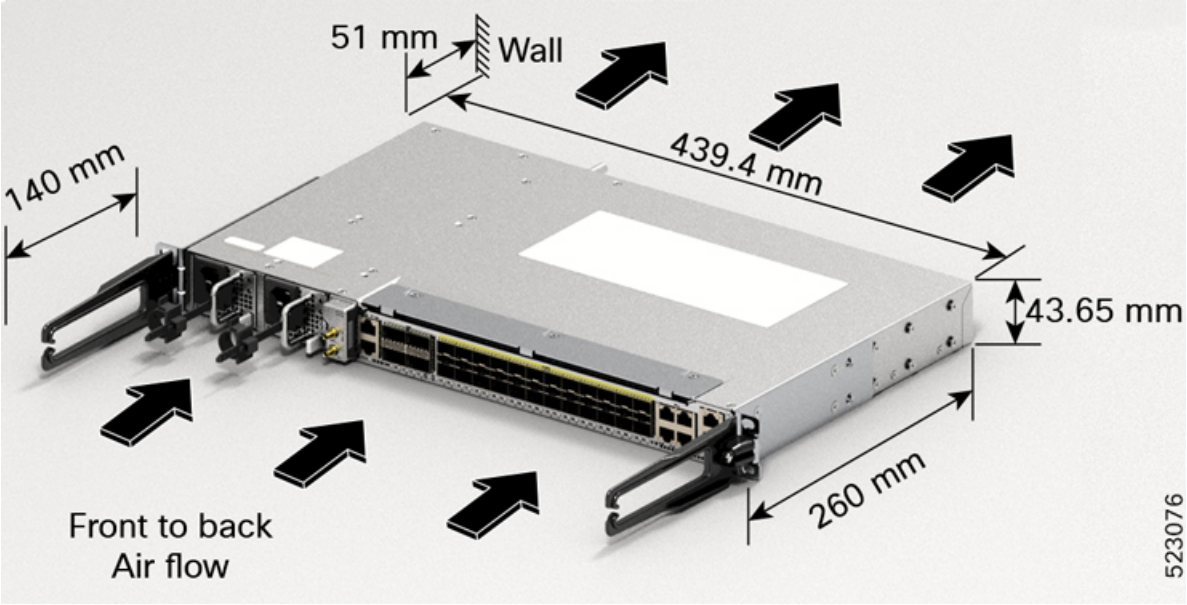
# Airflow Guidelines

Cool air is circulated through the router by fans that are located along the rear side of the router. The internal fans maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents, and circulating the air through the router.

To ensure adequate airflow, we recommended that you always maintain this minimum clearance distance for the router:

- Front clearance—5 inches (12.7 centimeters)
- Rear clearance—2 inches (5.08 centimeters)

***Figure 7: Cisco 8011-4G24Y4H-I Router Airflow is from Front to Back***




Note the following points:

- When installing the router in a back-to-back position with another device, ensure that there's a minimum of 3.9 inches (10 centimeters) airflow clearance between the two devices.
- If airflow through the equipment rack and the routers that occupy it's blocked or restricted, or if the ambient air being drawn into the rack is too warm, an overtemperature condition may occur within the rack and the routers that occupy it.
- The site must be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers that occupy it, thereby increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack isn't congested because each router generates heat. An enclosed rack must have louvered sides and a fan to provide cooling air. The equipment generates heat near the bottom of the rack, which can be drawn upward into the intake ports of the equipment above.
- When mounting a router in an open rack, ensure that the rack frame doesn't block the exhaust fans.

- When rack-installed equipment fails, especially equipment in an enclosed rack, try operating the equipment by itself, if possible. Power off all the other equipment in the rack (and in adjacent racks) to give the router maximum cooling air and clean power.
- Avoid installing the router in a location in which the router air intake vents may draw in the exhaust air from adjacent equipment. Consider how the air flows through the router; the airflow direction is front to back, with ambient air drawn in from the vents located on the front panel of the router.

# Site Power Guidelines

The chassis has specific power and electrical wiring requirements. Adhering to these requirements ensures the 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 a 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.
- Circuit breaker specifications—a maximum of 20A (North America) and 16A (Europe) for AC power feed and a maximum of 12A for DC power feed is supported.
- Check the power at your site before installation, and periodically after installation, to ensure that you are 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** The AC PSU requires external surge protection devices for installations where electrical surges higher than 2KV common mode and 2KV differential mode are expected. Failure to do so can result in permanent damage to the product.

The DC PSU requires external surge protection devices for installations where electrical surges higher than 2KV common mode and 1KV differential mode are expected. Failure to do so can result in permanent damage to the product.

## Electrical Circuit Requirements

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

The routers can be powered by a DC source. Ensure that equipment grounding is present and observe the 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 router, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, ElectroMagnetic Interference (EMI), and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, Channel Service Units (CSU), or Data Service Units (DSU).

Before you install the router, have all the additional external equipment and cables on hand. For information about ordering, contact a Cisco customer service representative.

The extent of your network and the distances between the network interface connections depend, in part, on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline when planning your network connections *prior to* installing the router.

If wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

## Asynchronous Terminal Connections

The router provides a console port to connect a terminal or computer for local console access. The router supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

## Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they may cause data errors or damage to the equipment.

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

## Electromagnetic Interference

All the equipment powered by AC current can propagate electrical energy that can cause EMI and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the router and even create an electrical hazard by causing power surges through the power lines into installed equipment. These problems are rare, but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment that could consume substantial time and money. However, you can ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

## Radio Frequency Interference

When electromagnetic fields act over a long distance, Radio Frequency Interference (RFI) may be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal.

## Lightning and AC Power Fault Interference

If signal wires exceed the recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the router.

The Electromagnetic Pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI and EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your router operating environment.

# Tools and Equipment

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

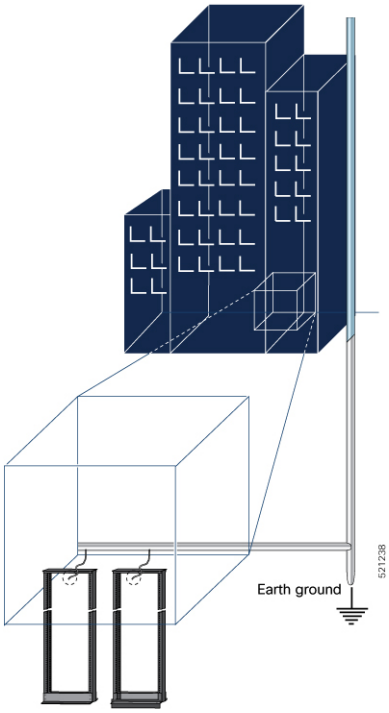
- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- #12-24 pan-head screws to secure the router to the equipment rack
- Cables for connecting to the network ports (depending on the configuration)
- Ethernet hub, switch, or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 115200 baud, 8 data bits, no parity, no flow control, and 1stop bit

- Console cable for connecting to the console port
- Ratcheting torque screwdriver with a Phillips head that exerts up to 20-pound force per square inch (in-lb) or 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-AWG and 14-AWG wires
- Tape measure and level

# Prepare Your Location

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

***Figure 8: Building with Rack Room Connected to Earth Ground***

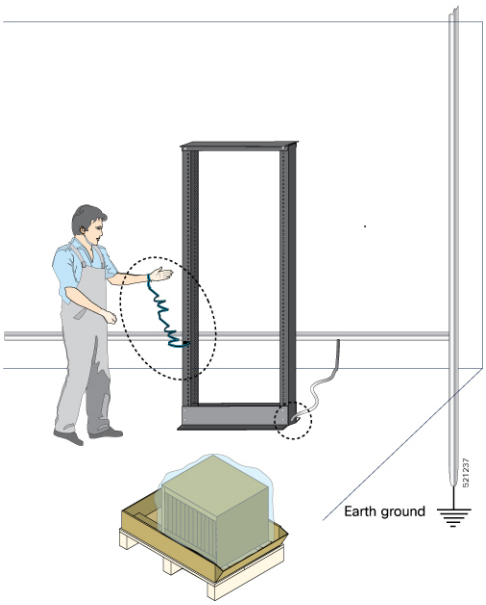



# Prepare Yourself

This section illustrates how to prepare yourself before removing the chassis from the sealed antistatic bag. The figures show how to wear the ESD strap around the wrist and how to connect the other end of the strap to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

Note: These images are for only representation purposes. The chassis' actual appearance and size would vary.

*Figure 9: Wearing the ESD Strap*




# Prepare Rack for Router Installation

Install the chassis into a two-post standard rack with standard horizontal mounting rails. Before you mount the chassis into the rack, we recommend that you do the following:

**Procedure**

**Step 1** Place the rack where you plan to install the chassis. Ensure that the rack is grounded to earth.

**Step 2** Secure the rack to the floor.

To bolt the rack to the floor, a floor bolt kit (also called an anchor embedment kit) is required. For information on bolting the rack to the floor, consult a company that specializes in floor mounting kits (such as Hilti; see Hilti.com for details). Make sure that floor mounting bolts are accessible, especially if an annual retorquing of bolts is required.

# Cabinet Selection Guidelines

Equipment that is intended for installation in controlled environmental space has average yearly levels of contamination. Ventilated cabinets or racks can be used if pollutant levels are maintained within allowable limits.

Equipment intended for installation in outside plant (OSP) areas must have sealed cabinets with heat exchanger that meet the IP66 or IP65 protection and low average yearly levels of concentration of contaminants inside the cabinet.

**Note** Ventilated cabinets and racks are not recommended for OSP applications.

*Table 6: Cabinet Type for Indoor and Outdoor Installation*

| Cabinet Type | Suitable for Indoor Installation? | Suitable for Outdoor Installation? |
|---|---|---|
| Open rack with no front and rear doors | Yes | No |
| Ventilated cabinets with normal air filter at intake and fans | Yes | No |
| Sealed cabinets with heat exchanger that meet NEMA -4 or protection | Yes | Yes |
| Sealed cabinets with air-conditioners that meet NEMA -4 or IP65 protection | Yes | Yes |

**Allowable limits for Environmental Pollutants**

Concentration of pollutant levels in outdoor and indoor environment must be less than pollutant levels mentioned in Table 2.3 and Table 2.4 of *NEBS GR-63-CORE Issue 5 Dec 2017*, respectively. High concentrations of pollutants have a negative impact on the equipment life time.

**Allowable Temperature and Humidity**

Maximum allowable temperature and humidity levels must be within the values that are mentioned in the data sheets. Do not install in places where condensation may occur, or where equipment is exposed to high humidity for long time, such as near the sea, rivers, and large water bodies.

**Installations in Highly-corrosive Environment**

Installation in highly corrosive area is not recommended. Examples of highly corrosive areas are seashore, less than 10 meters from high traffics roadway, and areas having high industrial pollutants.

**Periodic Measurement of Environmental Pollutants**

We recommend that you check concentration of pollutants periodically. Necessary protection should be provided to ensure the equipment is not exposed to high concentration level of pollutants.

# Unpack the Cisco 8011 Router

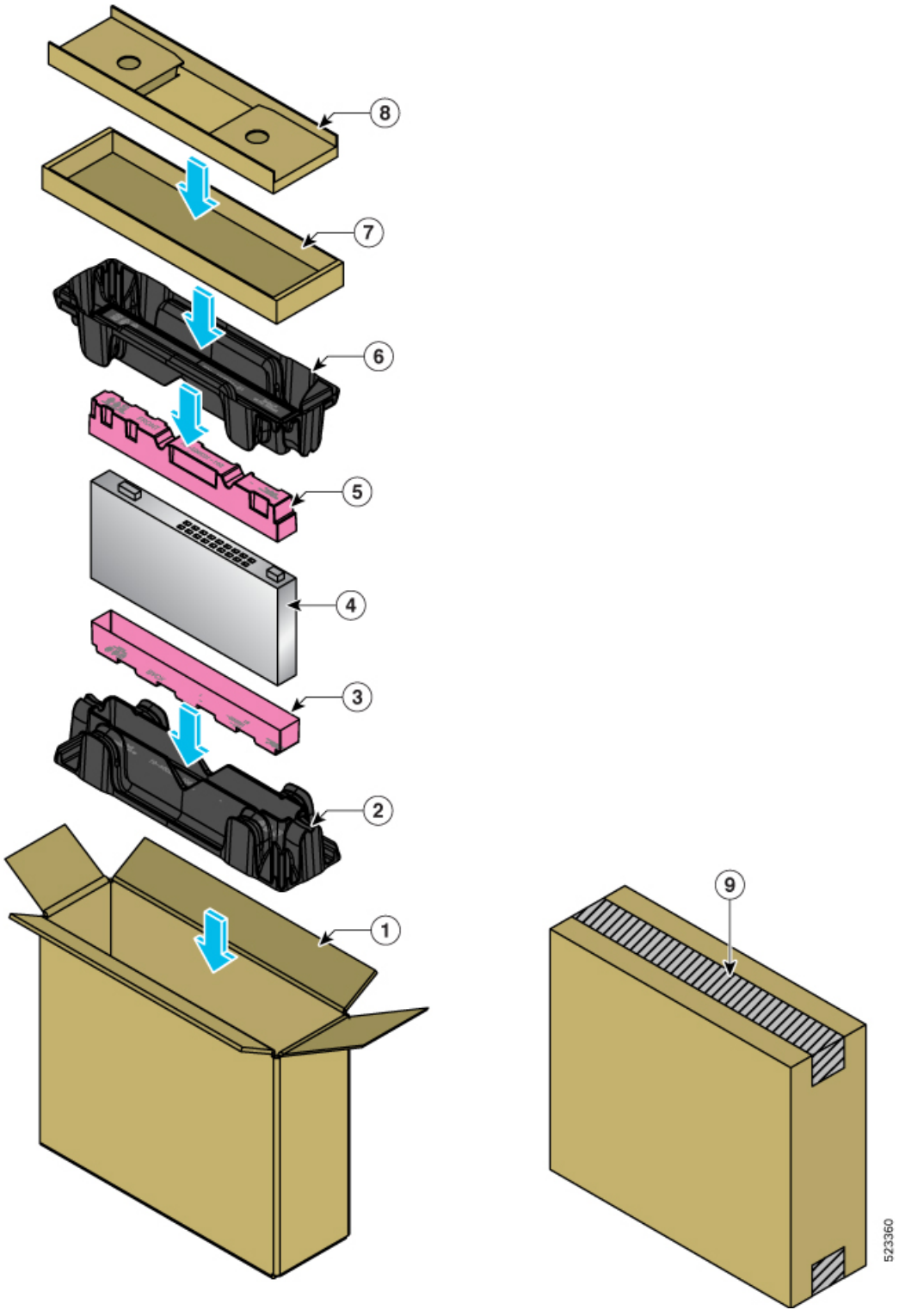
Ensure that there is sufficient room around the chassis pallet for unpacking.

1. Remove the accessory tray and the packing material.
2. Carefully set the packing material aside.

**Tip** Be sure to save the packaging in case you need to return any of the components products.

**Note** These images are for only representation purposes. The chassis' actual appearance and size would vary.

*Figure 10: Unpacking the Router*



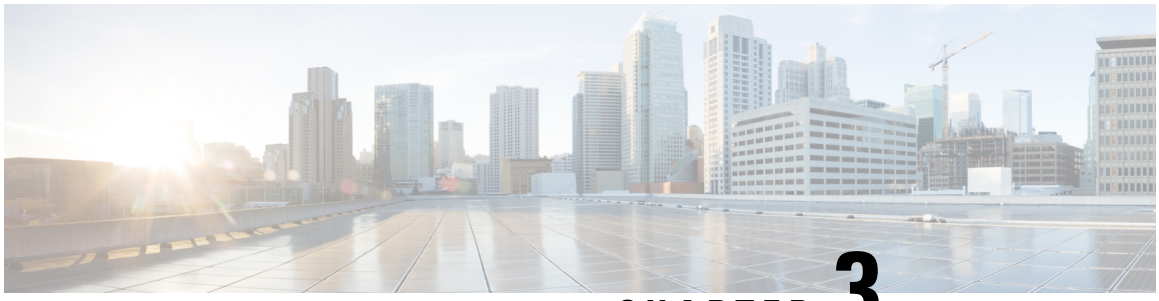

| | | | |
|---|---|---|---|
| 1 | Regular Slotted Container (shipping box) | 2, 6 | Foam end caps |

| | | | |
|---|---|---|---|
| 3, 5 | Corrugated caps | 4 | Front end of the product |
| 7 | Accessory tray | 8 | Corrugated insert |
| 9 | Carton sealing tape | | |

*Table 7: Accessories Kit for 8011 Router*

| 19- inch Rack Mount Brackets | 23- inch Rack Mount Brackets | ETSI Rack Mount Brackets | Wall Mount Brackets | Desktop Brackets | Cable Management Brackets |
|---|---|---|---|---|---|
| RCKMT-19-V1 | RCKMT-23-V1 | RCKMT-ETSI-V1 | 53-101650-01 | NA | CBL-BRKT-V1 |

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



CHAPTER 3

# Install the Router

Before you begin this task, ensure that you have read and understood the safety warnings.

**Note** The installation instructions of the Cisco 8010 Series Routers are similar, and any differences between the router variants are specifically called out.

The illustrations are for reference purpose only, the actual router may vary based on your variant of Cisco 8010 Series Routers.

Installing the the Cisco router involves the following tasks:


- Rack Mounting the Router, on page 31
- Ground the Router, on page 47
- Install the AC Power Cables, on page 48
- Install the DC Power Cables, on page 50
- Port Connection Guidelines , on page 52
- Connect to the Console Port , on page 52
- Connect to the Management Ethernet Port, on page 53
- Connecting Timing Cables, on page 54
- Connecting Cables to Timing Interfaces Card, on page 54
- Install and Remove Transceiver Module, on page 55
- Connect Interface Ports, on page 59
- Maintain Transceivers and Optical Cables, on page 60


## Rack Mounting the Router

You can choose to either set up the router on a rack or wall mount it.

We recommend that you use the following racks while mounting the router.

*Figure 11: Rack specification EIA (19 inches and 23 inches)*

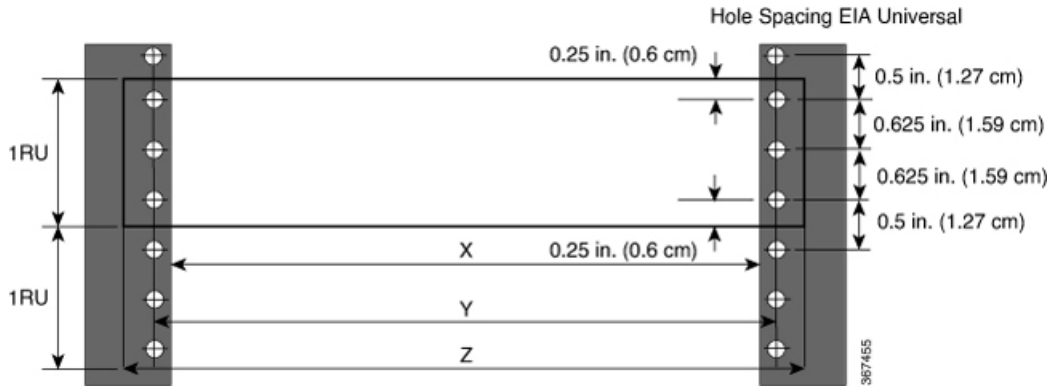



*Table 8: Rack specification EIA (19 inches and 23 inches)*

| 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) | 17.75 inches (45 centimeters) | 18.31 inches (46.5 centimeters) | 19 inches (48.2 centimeters) |
| 2 Post | | | | |
| 4 Post | 23 inches (58.4 centimeters) | 21.75 inches (55.24 centimeters) | 22.31 inches (56.6 centimeters) | 23 inches (58.4 centimeters) |
| 2 Post | | | | |

*Figure 12: Four Post Rack Type*

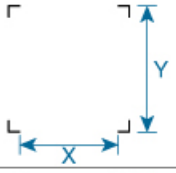
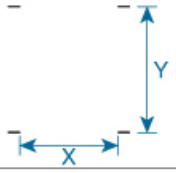
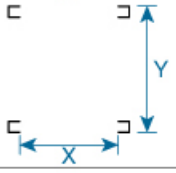
| 4 – Post Type (Hole EIA Universal) | | Width Available (X) | Compatibility |
|---|---|---|---|
| All 23” Type rack | | 552.45mm (21.75”) | Yes |
| All ETSI rack (21” rack) | | 500.0mm (19.68”) | Yes |
| 19” Type rack<br>L-Type Post |  | 17.75” (450.8 mm) | Yes |
| | | 17.50” (444.5 mm) | No |
| 19”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

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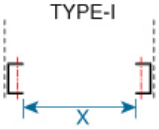
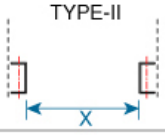
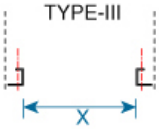
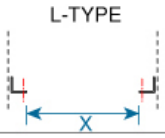
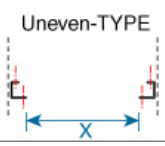
*Figure 13: Two Post Rack Type*

| 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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# Rack Mounting Brackets

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

**Caution** If the rack is on wheels, ensure that the brakes are engaged or the rack is otherwise stabilized.

*Table 9: Rack-Mount Kit Product Identification Number*

| Product Identification Number | Description |
|---|---|
| RCKMT-19-V1 | 19 inch rack mounting kit |
| RCKMT-23-V1 | 23 inch rack mounting kit |
| RCKMT-ETSI-V1 | ETSI rack mounting kit |
| 53-101699-01 | Grounding lug kit |
| CBL-BRKT-V1 | Cable management |
| 53-101650-01 | Wall mount bracket |

*Table 10: Router Rack-Mount Kit*

| Quantity | Part Description |
|---|---|
| 2 | Rack-mount brackets |
| 8 | M4 x 0.7 x 7-mm Phillips flat-head screws |
| 4 (48-101690-01) | SCR, M, PAN, PH, 12-24 x 0.49"L, CSwZN, nickel alloy |

**Caution**

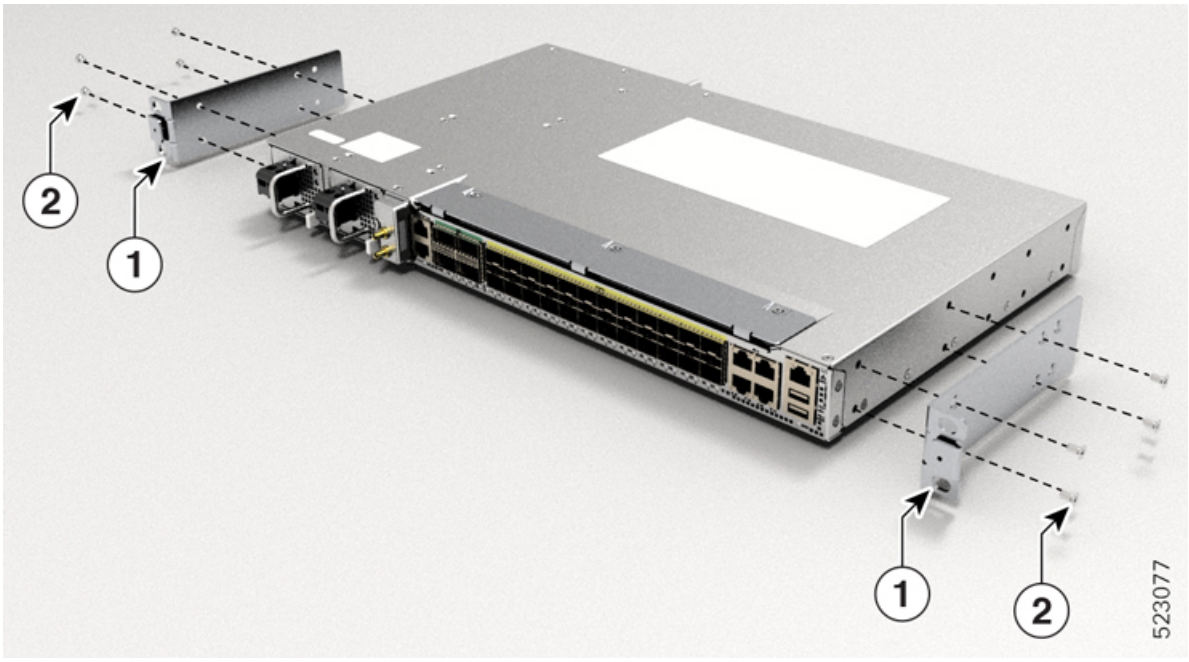
- Ensure that you secure the lugs only with the Cisco-provided screw or a Phillips head screw with an integrated washer of 10-32 x 0.3125 inch. Secure the screws only while assembling the lugs.
- Using excessive length screw for mounting the grounding lug may cause short-circuit as it may come in contact with parts inside the router.

# Mounting the Router on the Rack

To mount the router on the rack:

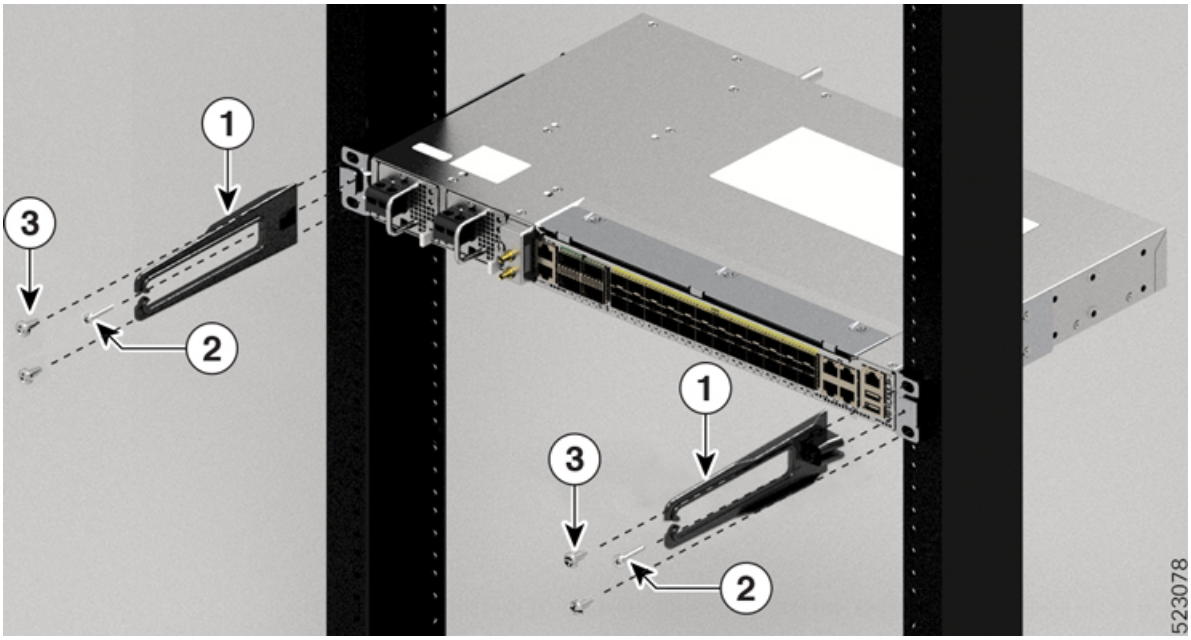
1. Attach the rack-mount brackets and the cable guides to the router as follows:
   a. The router has port-side intake modules, position the router so that its ports are facing the cold aisle.
   b. Position the bracket ears facing front or middle rack-mount, on the side of the chassis so that the holes are aligned.
   c. Use four M4 screws to attach the brackets to the chassis. Tighten the M4 screws to 13.3 inch-pounds (1.5 Nm).

*Figure 14: Installing 19 inch Rack-Mount Brackets in the Front*




| | |
|---|---|
| 1 | Mount Bracket |
| 2 | Screw |

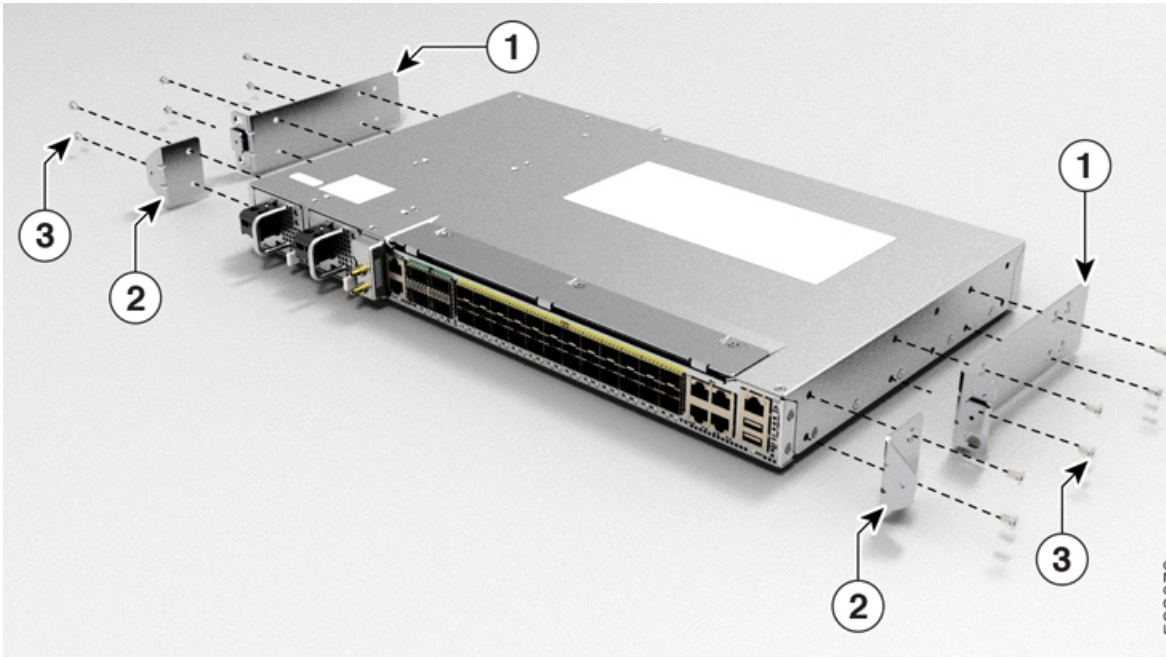
*Figure 15: Installing Cable Management and 19 inch Rack-Mount Brackets in the Front*




| | |
|---|---|
| 1 | Cable Management Bracket |

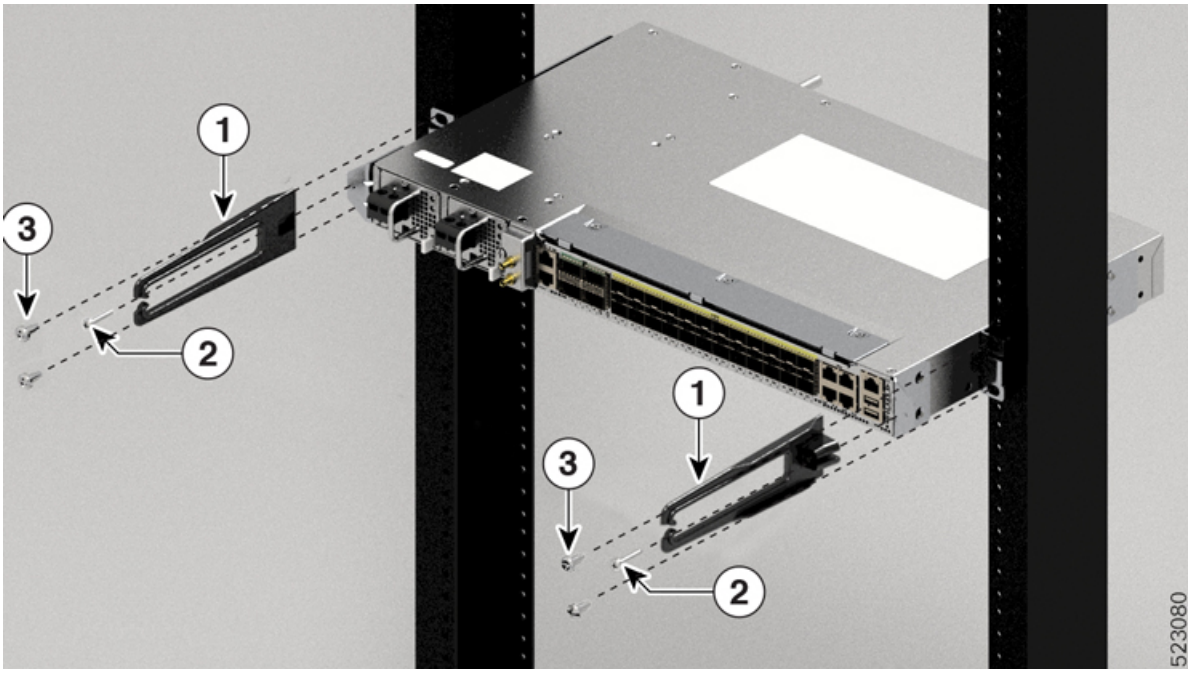
| | |
|---|---|
| 2 | Cable Management Screw |
| 3 | Screw |

*Figure 16: Installing 19 inch Rack-Mount Brackets in the Middle*



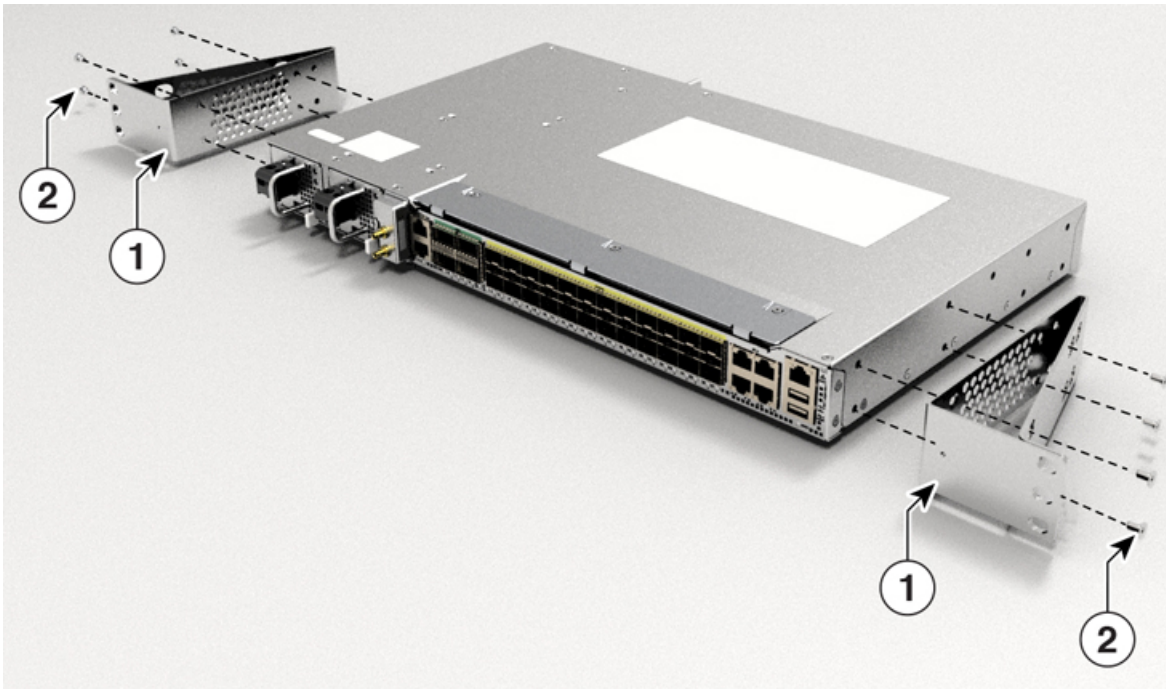

| | |
|---|---|
| 1 | Mount Bracket |
| 2 | Cable Management Bracket |
| 3 | Screw |

*Figure 17: Installing Cable Management and 19 inch Rack-Mount Brackets in the Middle*



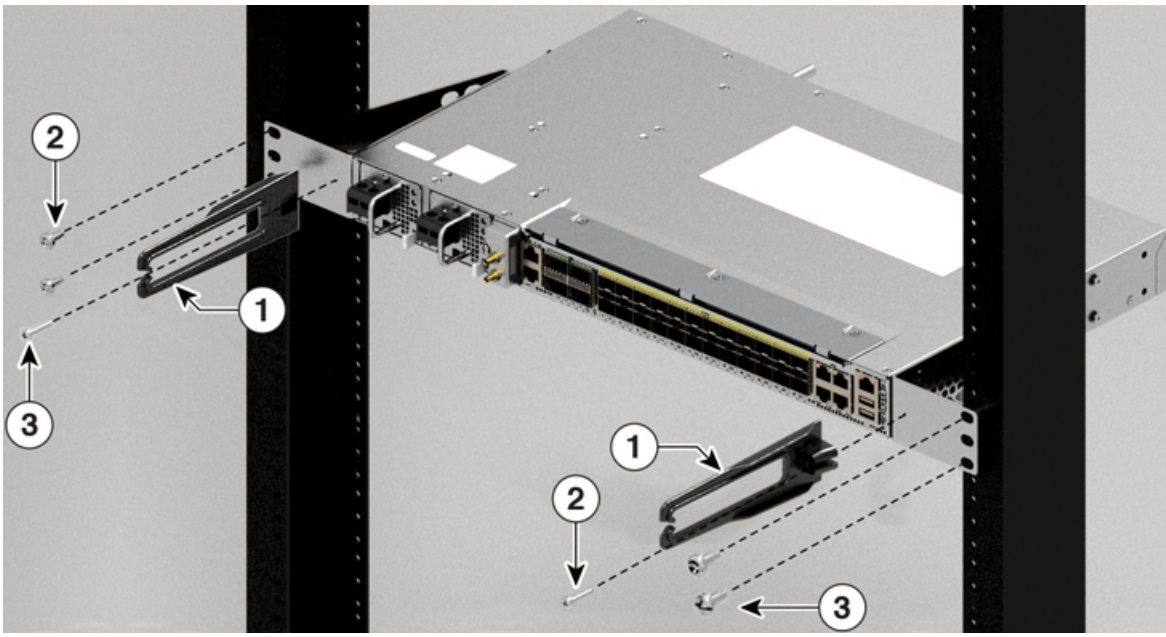

| | |
|---|---|
| 1 | Cable Management Bracket |
| 2 | Cable Management Screw |
| 3 | Screw |

*Figure 18: Installing 23 inch Rack-Mount Brackets in the Front*




| | |
|---|---|
| 1 | Mount Bracket |
| 2 | Screw |

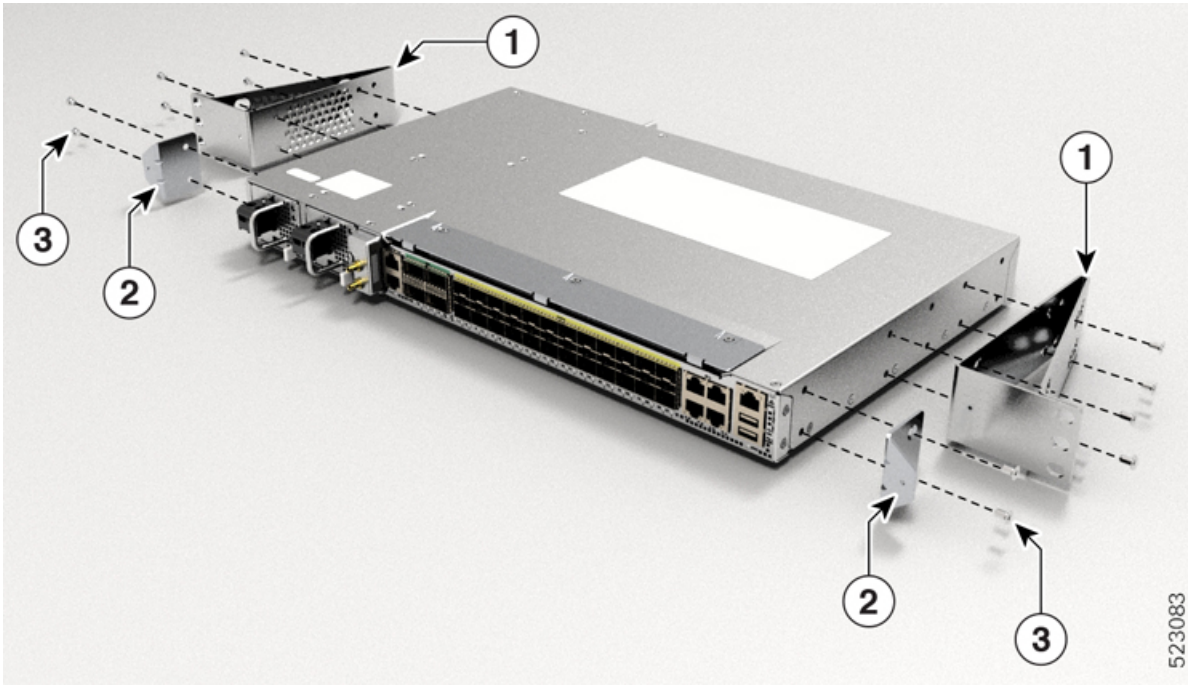
*Figure 19: Installing Cable Management and 23 inch Rack-Mount Brackets in the Front*




| | |
|---|---|
| 1 | Cable Management Bracket |

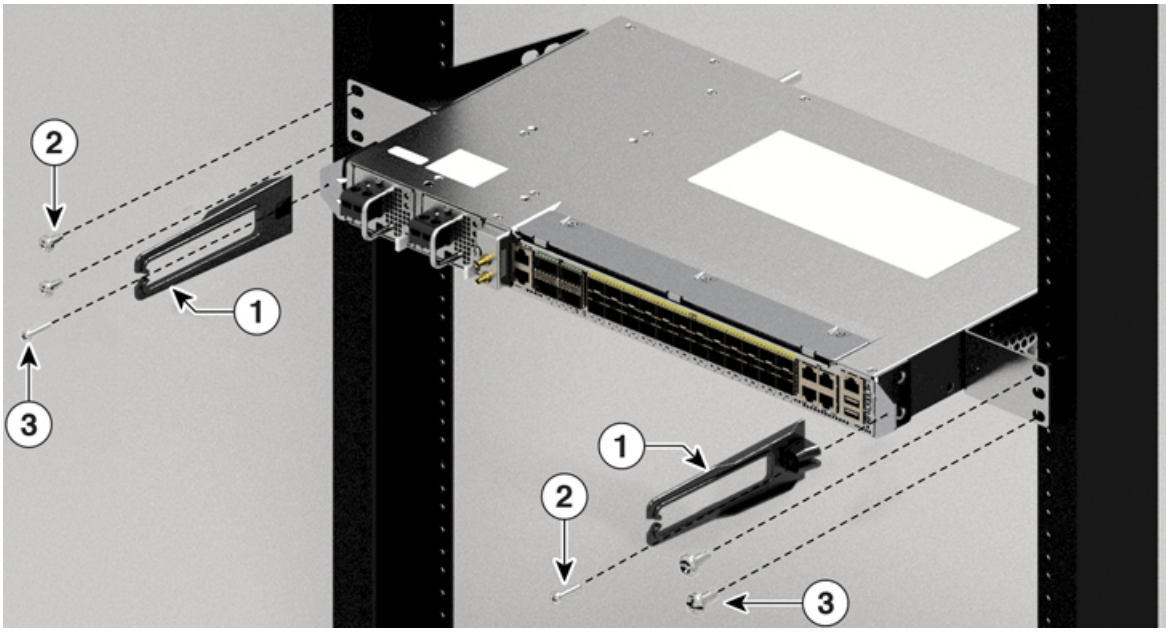
| | |
|---|---|
| 2 | Cable Management Screw |
| 3 | Screw |

*Figure 20: Installing 23 inch Rack-Mount Brackets in the Middle*



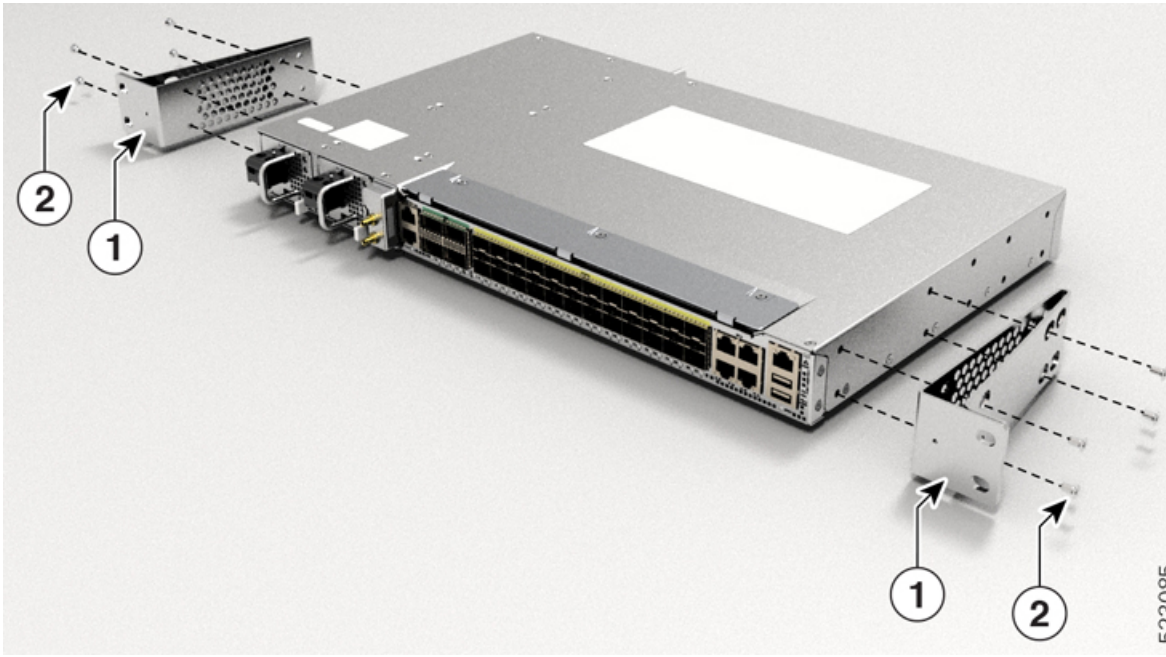

| | |
|---|---|
| 1, 2 | Mount Bracket |
| 3 | Screw |

*Figure 21: Installing Cable Management and 23 inch Rack-Mount Brackets in the Middle*



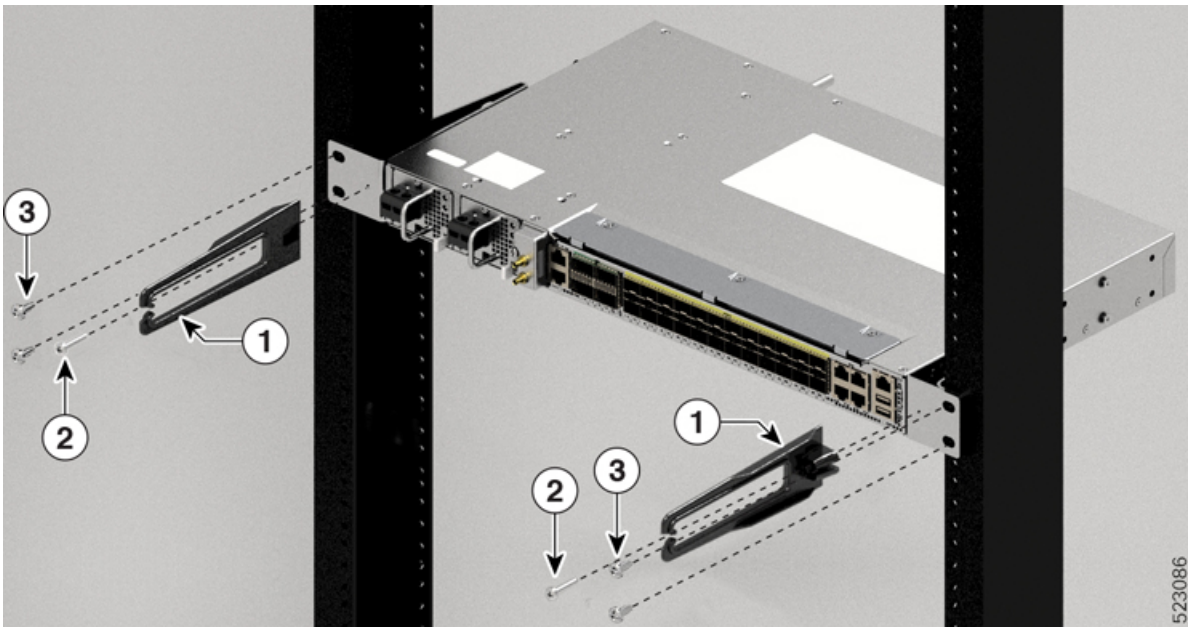

| | |
|---|---|
| 1 | Cable Management Bracket |
| 2 | Cable Management Screw |
| 3 | Screw |

*Figure 22: Installing ETSI Rack-Mount Brackets in the Front*



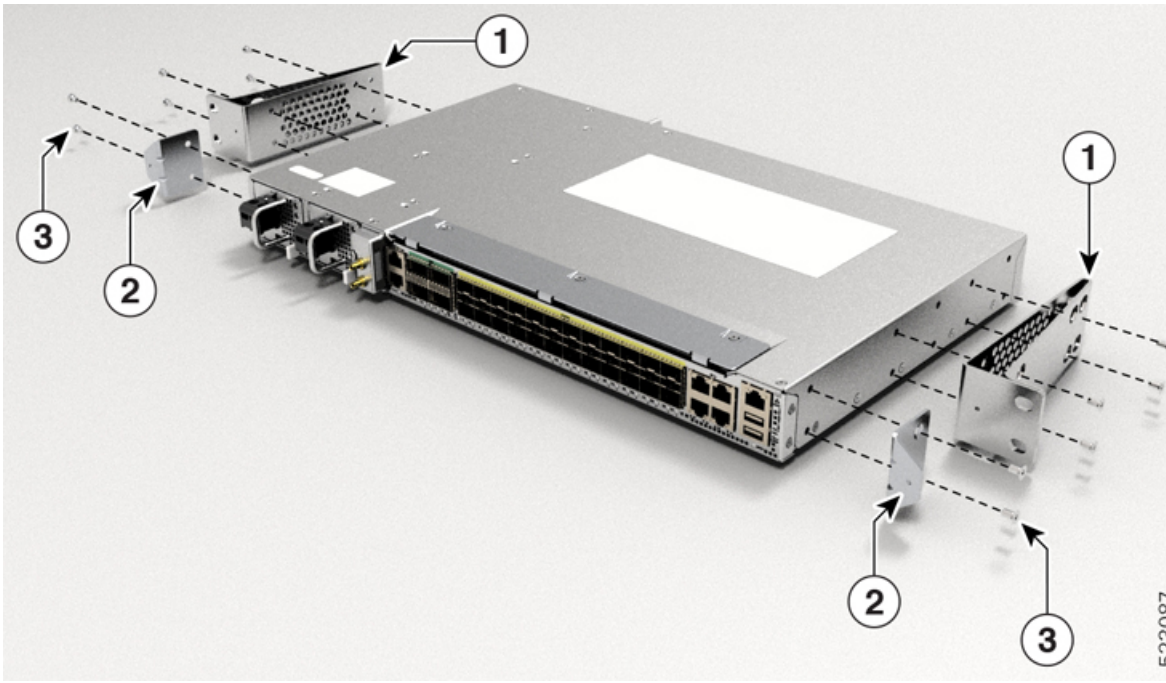
| | |
|---|---|
| 1 | Mount Bracket |
| 2 | Screw |

*Figure 23: Installing Cable Management and ETSI Rack-Mount Brackets in the Front*



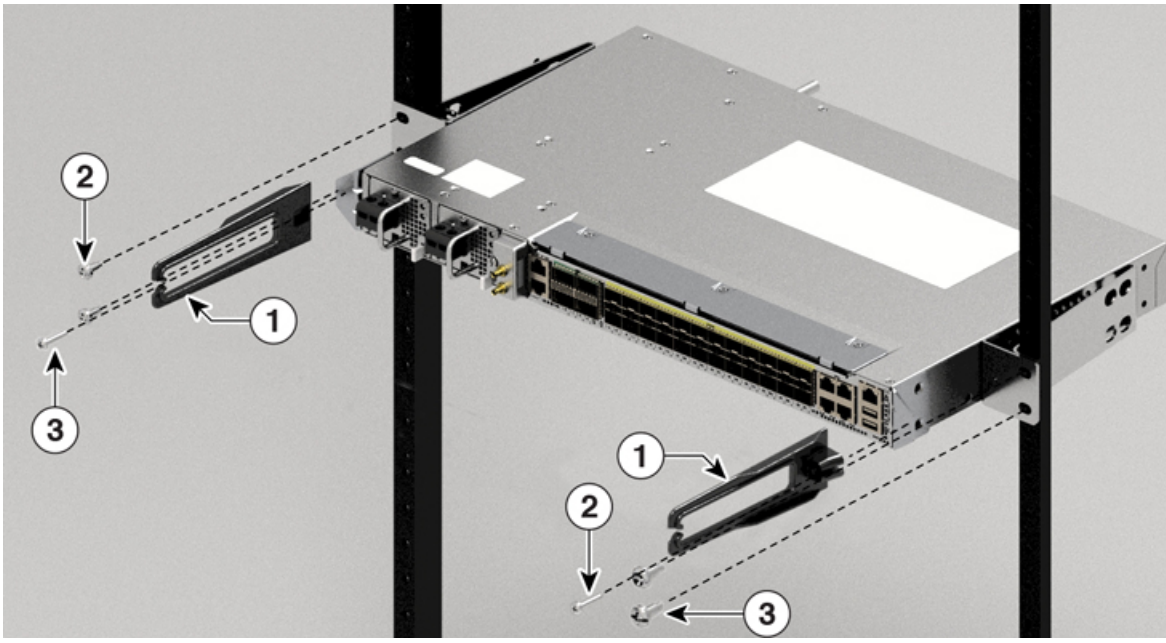

| | |
|---|---|
| 1 | Cable Management Bracket |
| 2 | Cable Management Screw |
| 3 | Screw |

*Figure 24: Installing ETSI Rack-Mount Brackets in the Middle*




| | |
|---|---|
| 1,2 | Mount Bracket |
| 3 | Screw |

*Figure 25: Installing Cable Management and ETSI Rack-Mount Brackets in the Middle*




| | |
|---|---|
| 1 | Cable Management Bracket |

| | |
|---|---|
| 2 | Cable Management Screw |
| 3 | Screw |

**d.** Repeat Steps 1b and 1c with the other rack-mount bracket on the other side of the router.

**e.** Use four 12-24 screws and mount the router to the rack.

**2.** Install the router onto the 2-post rack as follows:

**a.** Lift and position the router into position between the two rack posts.

**b.** Move the router until the rack-mount brackets come in contact with the two rack posts.

**c.** Hold the chassis at level and have another while the second person inserts two screws 12-24 in each of the two rack-mount brackets (using a total of four screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails.

**d.** Tighten the 12-24 screws to 30 in-lb (3.39 N.m).

# Wall Mount

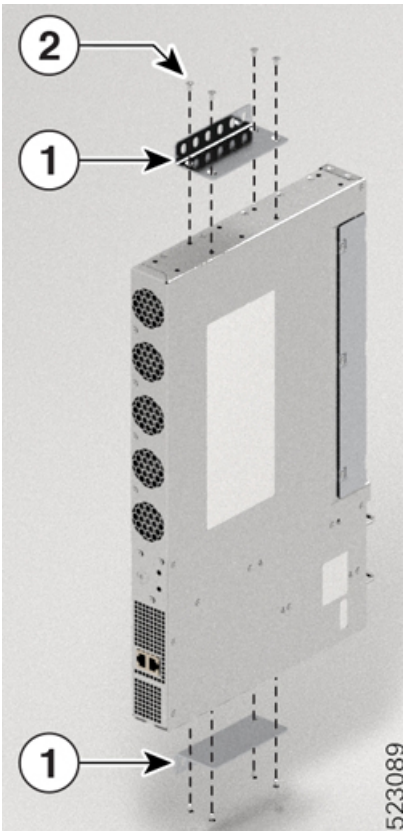
The router is shipped with wall mounting brackets that are to be secured on the sides of the router.

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

### Install Wall Brackets

**1.** Remove the wall mounting brackets from the accessory kit and position them beside the router. You can install the brackets as shown in the figure.

*Figure 26: Install Wall Mount Brackets*




| | |
|---|---|
| 1 | Wall Mount Bracket |
| 2 | Screw |

2. Secure the bracket to the router with the recommended maximum torque of 13.3 inch-pounds (1.5 newton meters) using M4 flat head screws.

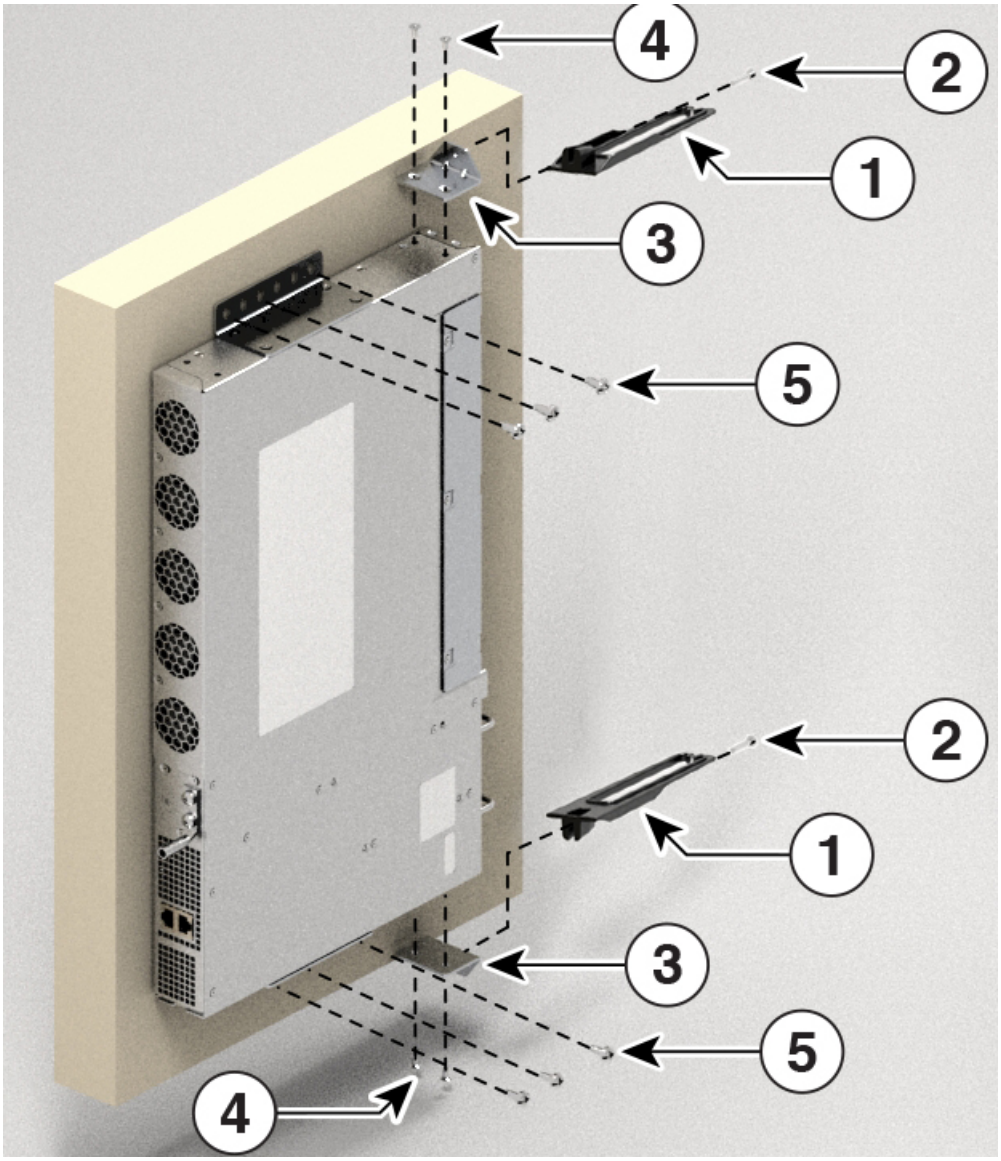
### Wall Mount the Router

**Caution** Before mounting the router, ensure that all unused holes at the sides of the router are always protected by screws.

**Note** While you mount the router, always ensure that the power supplies are at the bottom position.

For the support of the router and cables, ensure that the router is attached securely to wall studs or to a firmly attached plywood mounting backboard.

*Figure 27: Install Brackets to Wall*




| | |
|---|---|
| 1 | Cable Management |
| 2 | Cable Management Screw |
| 3 | Cable Management Bracket |
| 4 | Cable Management Bracket Screw |
| 5 | Wall Mount Bracket Screw |

# Ground the Router

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.

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

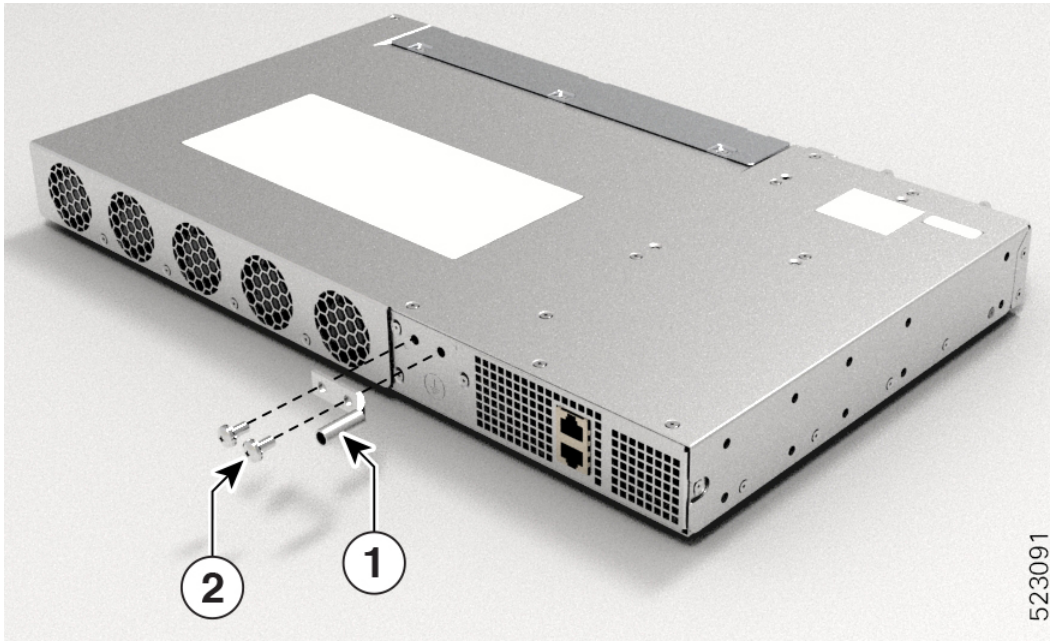
This section describes how to ground the router. The grounding lug location is on the back panel of the router.

**Note** A minimum of 5 inches (127 mm) space must be provided at the rear to accommodate 90 degree grounding lug with a minimum bend radius for 6 AWG ground cable.

To ground the router:

1. Verify that the ground cable is connected to the top of the rack and according to local site practice.

***Figure 28: Ground Lug***




| | |
|---|---|
| 1 | Lug (Part number is 32-0608-01) |
| 2 | Screw (Part number is 48-101620-01) |

**Caution** Use only Cisco supplied screws for mounting the grounding lugs. If procured from local market or from outside other source, ensure that the grounding lug screw length should not exceed 0.365 inches (9.27 mm). Using excessive length screw for mounting the grounding lug may cause short-circuit as it may come in contact with parts inside the router.

2. Attach one end of the shelf ground cable (No. 6 AWG cable) to the ground point on the rear of the router using the specified dual-hole lug connector.
   a. Use a wire-stripping tool to remove approximately 0.75 inches (19 mm) of the covering from the end of the grounding cable.
   b. Insert the stripped end of the grounding cable into the open end of the grounding lug.
   c. Use the crimping tool to secure the grounding cable in the grounding lug.
   d. Remove the adhesive label from the grounding pad on the chassis.
   e. Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two 10-32 screws with washer through the holes in the grounding lug and into the grounding pad. Tighten the 10-32# screws to 27.5 inch-pounds (3.1 Nm).
   f. Ensure that the lug and cable do not interfere with other equipment.
   g. Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

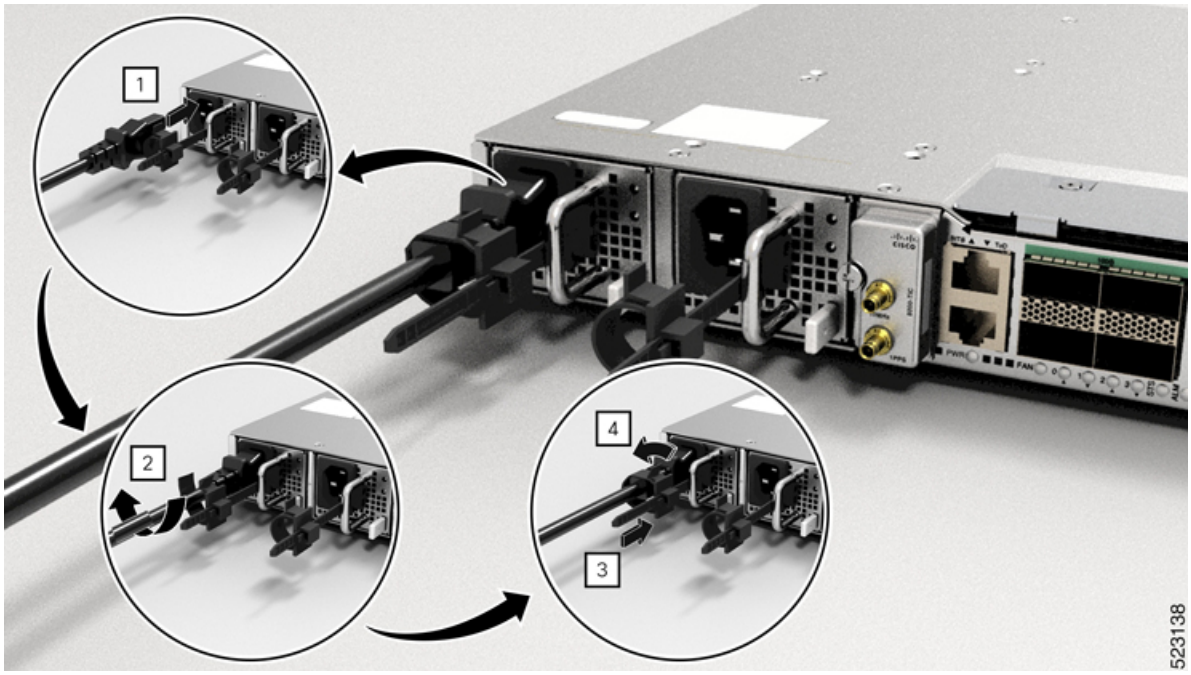
# Install the AC Power Cables

**Note** A dual pole breaker is needed for the installation. The rating of the dual pole breaker for 110V is 20A and for 220V is 16A. The minimum cable size is 14AWG for 110V and 16AWG for 220V.

To install the AC power cables in the power supply slots:

1. Plug the power supply cord in to the power supply module.
2. Wrap the tie around the power supply cord.
3. Ensure that the power supply cord is secured to the power supply module.
4. Tighten the tie around the power supply cord as shown.
5. Ensure that the power cord is secured always to a cable support to ensure the cable load doesn’t act on the PSU.

*Figure 29: Attach the AC Power Cables*




**Note** These images are for representation purpose only. Certain Cisco 8011 Series Routers may not include a tie for the power supply cord.

| | |
|---|---|
| 1 | Insert power cord |
| 2 | Wrap power cord with tie |
| 3 | Attach the power cord |
| 4 | Secure power cord with tie |

### Turn On an AC Power Supply Module

Perform the following procedure to activate an AC power supply:

1. Plug the power cord into the power supply.
2. Connect the other end of the power cord to an AC-input power source.
3. Verify power supply operation by checking if the respective power supply front panel LED (PM0 or PM1) is green.
4. If the LEDs indicate a power problem, see *Appendix* for troubleshooting information.
5. If you're also connecting a redundant AC power supply, repeat these steps for the second power source.

**Note** If you're connecting a redundant AC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.

The operating voltage range is 100V-240VAC, 50/60Hz, 5-2.2A maximum.

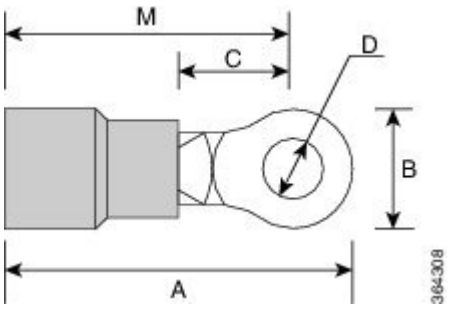
# Install the DC Power Cables

**Note** When installing DC power supply, use 14AWG for longer cables and 14-16AWG for shorter cables, 90°C temperature rated cable. The recommended cable length is three meters maximum from source.

**Note**

- Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 15A.
- We recommend you to use a circuit breaker or a fast acting fuse with a maximum DC rating, based on the router variants for over current protection.

***Figure 30: DC Lug Dimensions***



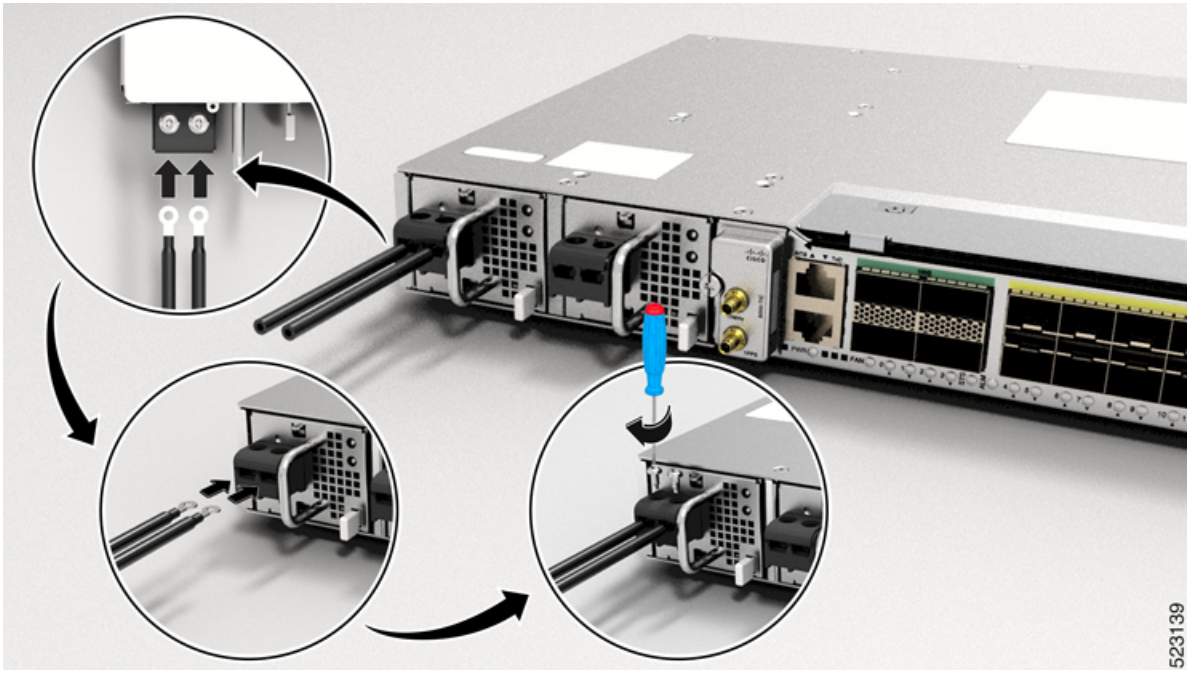

| | | | |
|---|---|---|---|
| A | 0.97 in. (2.4 cm) | C | 0.27 in. (0.68 cm) |
| B | 0.31 in. (0.78 cm) | D | 0.17 in. (0.43 cm) |
| M | 0.81 in. (2 cm) | | |

To attach the DC power supplies:

1. Locate the terminal block plug.
2. Insert the DC-input power source wires into the terminal block plug.
3. Attach the DC supply wires using the designated screws.

4. Use a ratcheting torque screwdriver to torque the terminal block plug captive screw. (See the following figure.)

*Figure 31: Attach the DC Power Supply Wires*




**Note** These images are for representation purpose only. Certain Cisco 8011 Series Routers may not include a tie for the power supply cord.

### Turn On a DC Power Supply Module

Perform the following procedure to activate a DC power supply:

1. Verify the power supply operation by checking whether the respective power supply front panel LED (PS0 or PS1) is green.
2. If the LEDs indicate any issues with power problem, see *Appendix*.
3. If you are also connecting a redundant DC power supply, repeat these steps for the second power source.

**Note** If you are connecting a redundant DC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.

The operating voltage range is 48V to 60VDC, 12A maximum.

# Port Connection Guidelines

Depending on the chassis, you can use Quad Small Form-Factor Pluggable Plus (QSFP+), QSFP28, SFP, SFP+, and RJ45 connectors to connect the ports on the line cards to other network devices.

To prevent damage to the fiber-optic cables, we recommend that you keep the transceivers disconnected from their fiber-optic cables when installing the transceiver in the line card. Before removing a transceiver from the router, remove the cable from the transceiver.

To maximize the effectiveness and life of your transceivers and optical cables, do the following:

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The router is typically grounded during installation and provides an ESD port to which you can connect your wrist strap.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be kept below 0.35 dB.
    - Clean these parts before installation to prevent dust from scratching the fiber-optic cable ends.
    - Clean the connectors regularly; the required frequency for cleaning depends upon the environment. In addition, clean connectors when they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
    - Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

# Connect to the Console Port

- The router must be fully installed in its rack, connected to a power source, and grounded.
- The necessary cabling for the console, management, and network connections must be available.
    - An RJ45 rollover cable and DB9F/RJ45 adapter are provided in the router accessory kit.
    - Network cabling should already be routed to the location of the installed router.

Before you create a network management connection for the router or connect the router to the network, you must create a local management connection through a console terminal and configure an IP address for the router. You also can use the console to perform the following functions (each of which can be performed through the management interface after you make that connection):

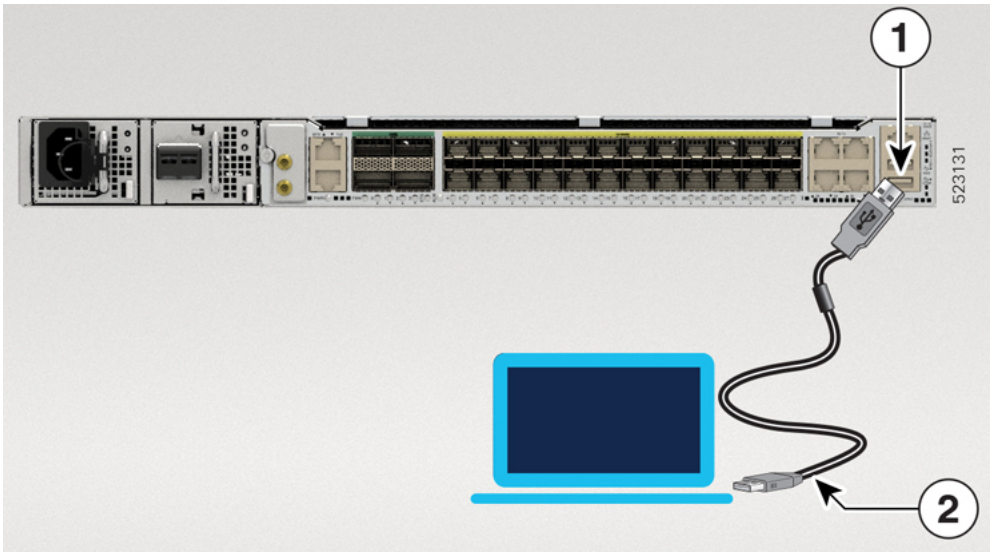
- Configure the router using the command-line interface (CLI).
- Monitor network statistics and errors.

- Configure Simple Network Management Protocol (SNMP) agent parameters.
- Download software updates.

The system console port is an RJ45 receptacle for connecting a data terminal to perform the initial configuration of the router. The console cable is shipped with the hardware.

**Note** Only RJ45 to DB-9 adapter cable is provided in the package.

***Figure 32: Connecting the USB Type-A Console Cable to the Chassis***




| | | | |
|---|---|---|---|
| 1 | USB Type-A console port | 2 | USB Type-A to USB Type-A cable |

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

1. Set your terminal to these operational values: 115200 bps, 8 data bits, no parity, and two stop bits.
2. Attach the terminal end of the cable to the interface port on the data terminal.
3. Attach the other end of the cable to the console port.

# Connect to the Management Ethernet Port

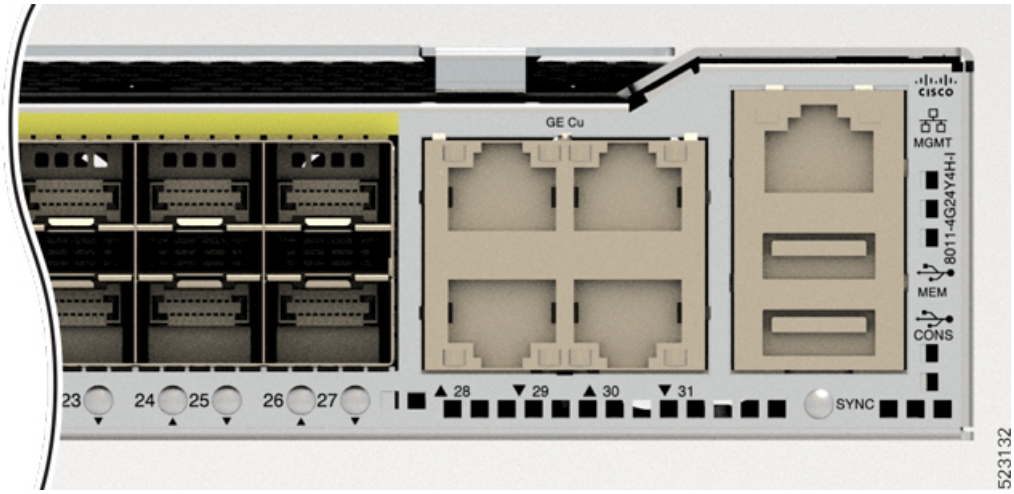
You must complete the initial router configuration.

The management Ethernet port provides out-of-band management, which enables you to use the Command Line Interface (CLI) to manage the router by its IP address. This port uses a 10/100/1000 Ethernet connection with an RJ45 interface.

**Note** To prevent an IP address conflict, do not connect the management Ethernet port until the initial configuration is complete.

To connect cables to the system management port, attach Category 5 cables directly to the RJ45 receptacle on the management Ethernet port.

***Figure 33: Connect to the Management Ethernet Port***




**Note** To comply with GR-1089-CORE, the intra-building port(s) of the equipment must use shielded intra-building cabling or wiring that is grounded at both ends.

1. Plug the cable directly into the RJ45 receptacle.
2. Connect the network end of your RJ45 cable to a switch, hub, repeater, or other external equipment.

# Connecting Timing Cables

The following sections describe how to connect timing cables.

# Connecting Cables to Timing Interfaces Card

Perform the following steps on how to connect cables from the router to a Timing Interfaces Card unit for input 10Mhz or 1PPS interface.

1. Connect one end of a mini-coax cable to the Timing Interfaces Card unit.
2. Connect the other end of the mini-coax cable to the 10MHz or 1PPS port on the router.

# Install and Remove Transceiver Module

This section shows how to install and remove transceiver module.

## Safety Precautions for Module Installation and Removal

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

**Warning** **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

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.

**Warning** **Statement 1008—**Class 1 Laser Product

This product is a Class 1 laser product.

**Warning** **Statement 1089—**Instructed and Skilled Person Definitions

An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

**Warning** **Statement 1090—**Installation by Skilled Person

Only a skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of a skilled person.

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

# Install and Remove SFP Modules

Before you remove or install an SFP or SFP+ module, read the installation information in this section.

**Caution** Protect all the unused ports by inserting clean dust covers or dust caps into them.

**Warning** **Statement 1055—**Class 1/1M Laser

Invisible laser radiation is present. Do not expose to users of telescopic optics. This applies to Class 1/1M laser products.


**Warning** **Statement 1056—**Unterminated Fiber Cable

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

**Caution** Protect the line card by inserting a clean SFP/SFP+ module cage cover (shown in the following figure) into the optical module cage when there is no SFP or SFP+ module installed. The SFP/SFP+ module cage cover is not a standard part of the accessories kit.

***Figure 34: SFP/SFP+ Module Cage Cover***


**Caution** Protect the SFP or SFP+ modules by inserting clean dust covers into them after the cables are removed. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module. Avoid getting dust and other contaminants into the optical ports of your SFP or SFP+ modules, because the optics do not work correctly when obstructed by dust.

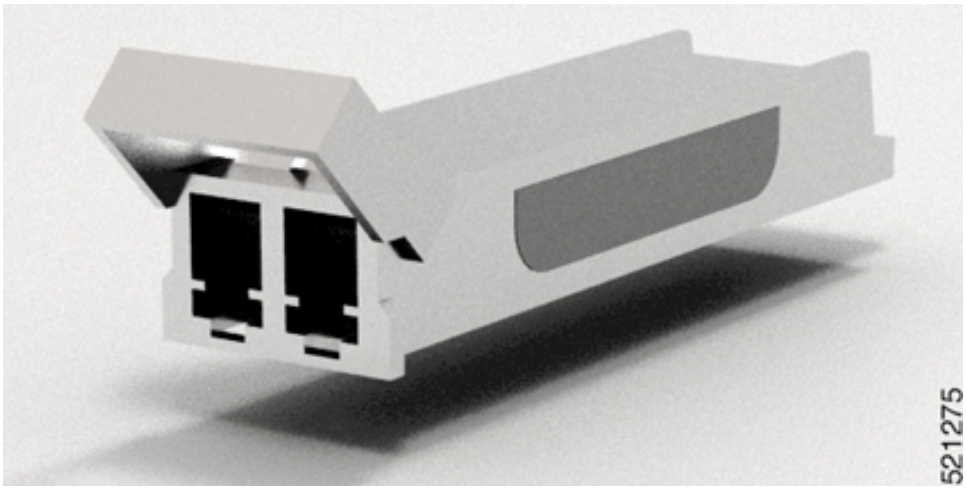
**Caution** We strongly recommend that you do not install or remove the SFP or SFP+ module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP or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

**Note** When installing an SFP or SFP+ module, you would hear a click as the triangular pin on the bottom of the module snaps into position into the hole in the receptacle. The click indicates that the module is correctly seated and secured in the receptacle. Verify that the modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP or SFP+ module.

# Bale Clasp SFP or SFP+ Module

The bale clasp SFP or SFP+ module has a clasp that you use to remove or install the module. (See the figure below.)

***Figure 35: Bale Clasp SFP or SFP+ Module***

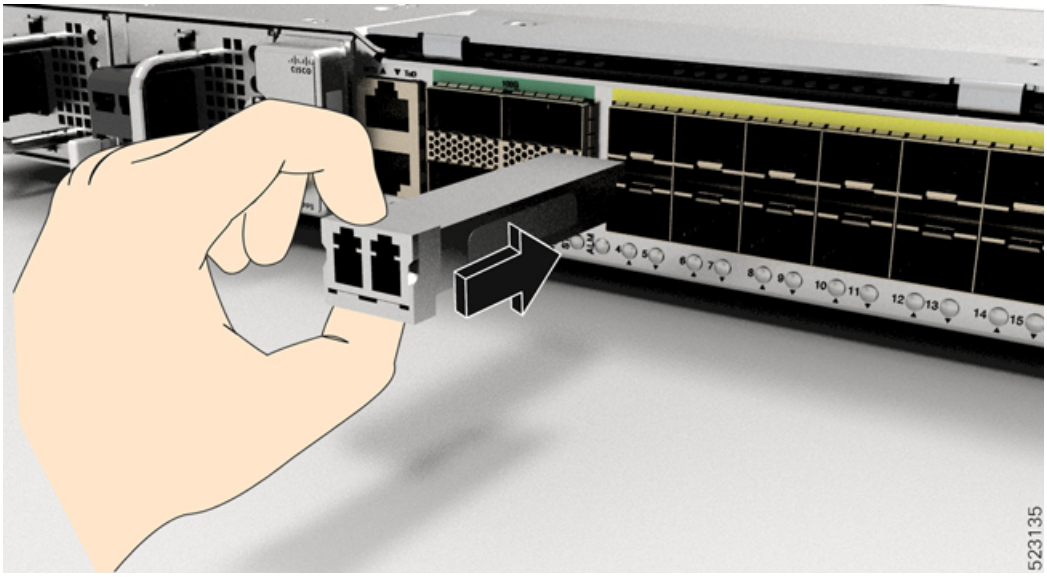



# Install a Bale Clasp SFP or SFP+ Module

To install this type of SFP or SFP+ module:

1. Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
2. Close the bale clasp before inserting the SFP module.
3. Line up the SFP module with the port and slide it into the port. (See the figure below.)

*Figure 36: Installing a Bale Clasp SFP Module into a Port*




**Note** When installing an SFP or SFP+ module, you should hear a click as the triangular pin on the bottom of the SFP module snaps into the hole in the receptacle. This click indicates that the module is correctly seated and secured in the receptacle. Verify that the SFP modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP module.

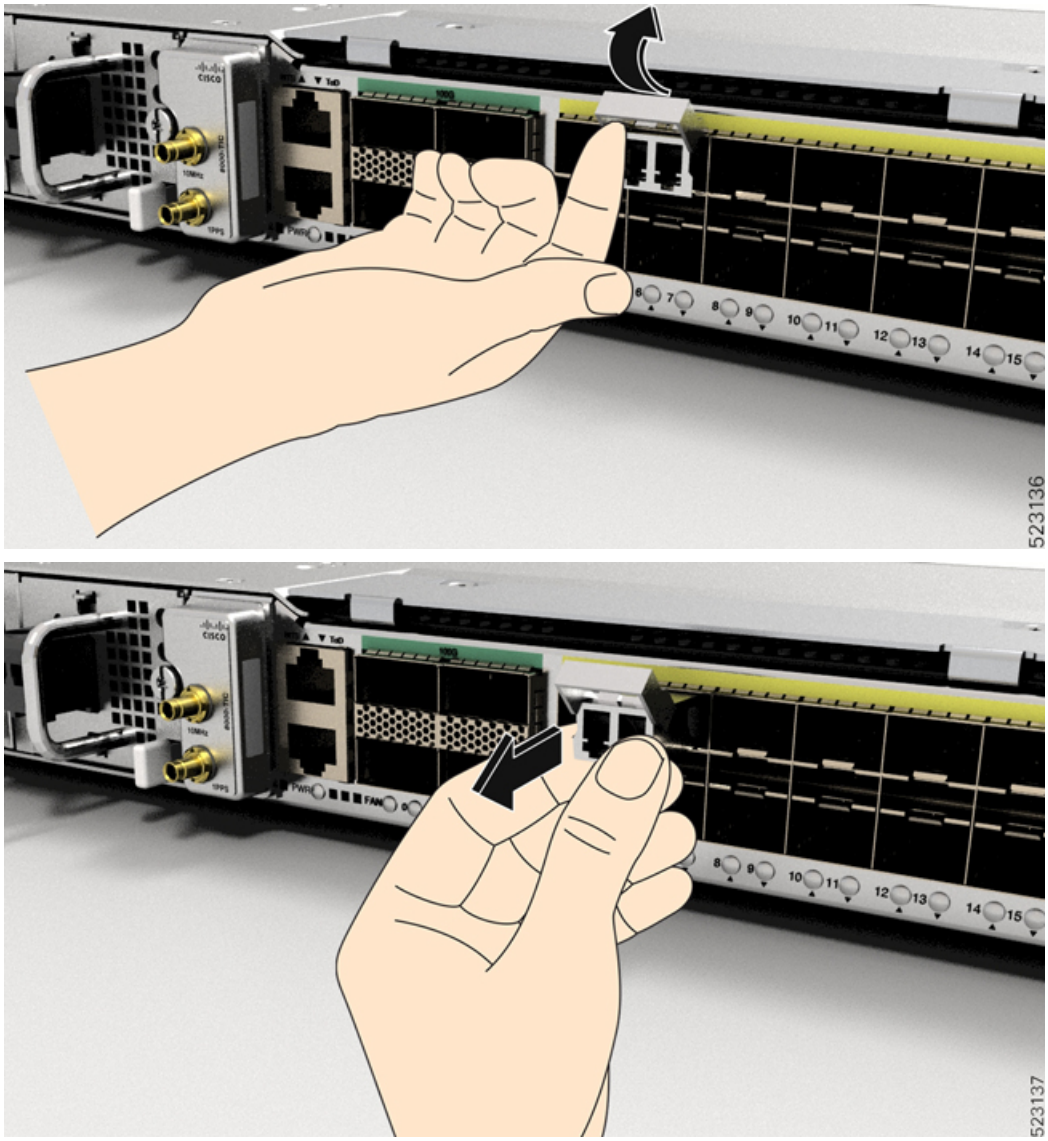
# Remove a Bale Clasp SFP or SFP+ Module

To remove this type of SFP or SFP+ module:

1. Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
2. Disconnect and remove all interface cables from the ports; note the current connections of the cables to the ports on the line card.
3. Open the bale clasp on the SFP module with your index finger, as shown in the figure below. If the bale clasp is obstructed and if you cannot open it, use your index finger, use a small flat-blade screwdriver or other long, narrow instrument to open the bale clasp.
4. Grasp the SFP module between your thumb and index finger and carefully remove it from the port, as shown in the figure below.

**Note** This action must be performed during your first instance. After all ports are populated, this may not be possible.

*Figure 37: Removing a Bale Clasp SFP or SFP+ Module*




5. Place the SFP module that you removed on an antistatic mat, or immediately place it in a static shielding bag if you plan to return it to the factory.
6. Protect your line card by inserting a clean SFP module cage covers into the optical module cage when there is no SFP module installed.

# Connect Interface Ports

You can connect optical interface ports on line cards with other devices for network connectivity.

## Connect a Fiber-Optic Port to the Network

Depending on the line card model that you are using, you can use either QSFP+ or QSFP28 transceivers. Some transceivers work with fiber-optic cables that you attach to the transceivers and other transceivers work with pre-attached copper cables. When installing fiber-optic cables for a port, you must install SFP transceivers for 1-Gigabit optical ports or install SFP+ transceivers for 10-Gigabit optical ports or QSFP+ transceivers for 100-Gigabit ports before installing the fiber-optic cable in the transceivers.

⚠

**Caution** Removing and installing a transceiver can shorten its useful life. Do not remove and insert transceivers more than it is absolutely necessary. We recommended that you disconnect cables before installing or removing transceivers to prevent damage to the cable or transceiver.

## Disconnect Optical Ports from the Network

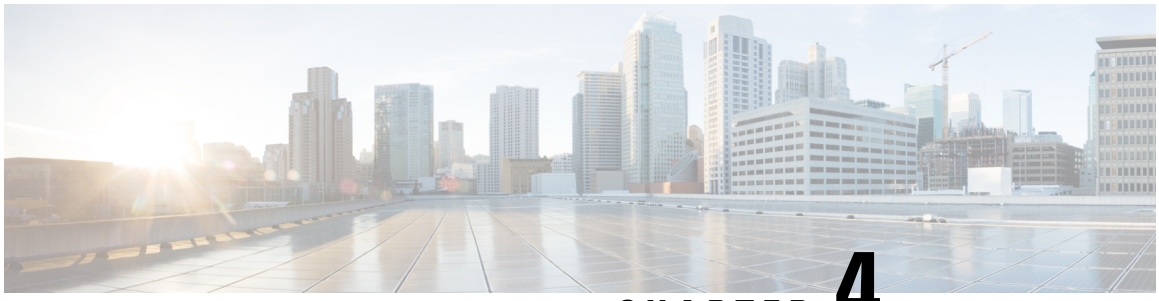
When you need to remove fiber-optic transceivers, you must first remove the fiber-optic cables from the transceiver before you remove the transceiver from the port.

# Maintain Transceivers and Optical Cables

To maintain high signal accuracy and to prevent damage to the connectors, transceivers and fiber-optic cables must be kept clean and free of dust. Attenuation (loss of light) is increased by contamination and should be below 0.35 dB.

Consider the following maintenance guidelines:

- Transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventative wrist strap that is connected to the grounded chassis.
- Do not remove and insert a transceiver more than it is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before use to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends would leave fingerprints and cause other contamination.
- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or have been accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
- Inspect routinely for dust and damage. Clean and then inspect fiber ends under a microscope to determine whether any damage has occurred.



CHAPTER 4

# Configure the Router

Before you begin this task, ensure that you have read and understood the safety warnings in the *Compliance and Safety Information* section.

Configuring the Cisco router involves these tasks:

- Create the Initial Router Configuration, on page 61
- Verify Router Installation, on page 63

# Create the Initial Router Configuration

You must assign an IP address to the router management interface so that you can then connect the router to the network.

When you initially power up the router, it boots up and asks a series of questions to help configure the router. To enable you to connect the router to the network, you can use the default choices for each configuration except for the IP address, which you must provide.

**Note** These equipment are designed to boot up in less than 30 minutes, depending on its neighboring routers be fully up and running.

### Before you begin

- A console device must be connected with the router.
- The router must be connected to a power source.

### Procedure

**Step 1** Power up the router.

The LEDs on each power supply light up (green) when the power supply units are sending power to the router, and the software asks you to specify a password to use with the router.

**Step 2** When the system is booted up for the first time, a new username and a password is to be created. The following prompt appears:

```
!!!!!!!!!!!!!!!!!!! NO root-system username is configured. Need to configure root-system username.
 !!!!!!!!!!!!!!!!!!!

--- Administrative User Dialog ---


Enter root-system username:
% Entry must not be null.

Enter root-system username: root
Enter secret:
Use the 'configure' command to modify this configuration.
User Access Verification

Username: root
Password:


RP/0/RP0/CPU0:ios#
```

**Step 3** Enter a new password to use for this router.

The software checks the security strength of it and rejects your password if it is not considered to be a strong password. To increase the security strength of your password, make sure that it adheres to the following guidelines:

- At least eight characters
- Minimizes or avoids the use of consecutive characters (such as "abcd")
- Minimizes or avoids repeating characters (such as "aaa")
- Does not contain recognizable words from the dictionary
- Does not contain proper names
- Contains both uppercase and lowercase characters
- Contains both numbers and letters

**Note**
Clear text passwords cannot include the dollar sign ($) special character.

**Tip**
If a password is trivial (such as a short, easy-to-decipher password), the software rejects the password configuration. Be sure to configure a strong password as described by the guidelines in this step. Passwords are case sensitive.

If you enter a strong password, the software asks you to confirm the password.

**Step 4** Reenter the password.

When you enter the same password, the software accepts the password.

# Verify Router Installation

After installing the Cisco router, you use the **show** commands to verify the installation and configuration. If any issue is detected, take corrective action before continuing with further configurations.

1. **show inventory**

   Displays information about the field replaceable units (FRUs), including product IDs, serial numbers, and version IDs.

   Example:

   ```
   #show inventory
   ```

2. **show environment**

   Displays all environment-related router information.

   Example:

   ```
   # show environment
   ```

3. **show environment temperature**

   Displays temperature readings for on-board temperature sensors and for PSU. Each temperature sensor has three thresholds:

   - Minor temperature threshold: When a minor threshold is exceeded, a minor alarm occurs and the following actions occur for all sensors:
     - System messages are displayed
     - SNMP notifications (if configured) are sent
     - Log environmental alarm event is triggered (Run the **show alarm** command to review this.)
   - Major temperature threshold: When a major threshold is exceeded, a major alarm occurs and the following actions occur for all sensors:
     - System messages are displayed
     - SNMP notifications (if configured) are sent
     - Log environmental alarm event is triggered (Run the **show alarm** command to review this.)
   - Critical temperature threshold: When a critical threshold is exceeded, a critical alarm occurs and the following actions occurs:
     - For all the main board sensors the system is shut down.
     - For the PSU sensor, the particular PSU is turned off .

4. **show environment power**

   Displays the power usage information for the entire router.

   Example:

   ```
   #show environment power
   ```

5. **show environment voltage**

   Displays the voltage for the entire router.

   Example:

   ```
   #show environment voltage
   ```

6. **show environment current**

   Displays current for different voltage rails of the router.

   Example:

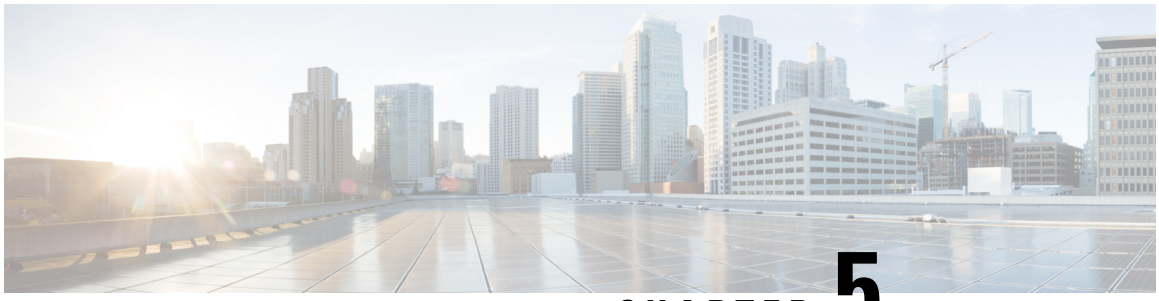
   ```
   #show environment current
   ```

7. **show environment fan**

   Displays the speed of all the fans including the fan in PSU.

   Example:

   ```
   #show environment fan
   ```



CHAPTER 5

# Replace Chassis Components


- Replace Power Supply, on page 65
- Replace DC Power Supply Modules, on page 66
- Replace AC Power Supply Modules, on page 67


## Replace Power Supply

The router provides a choice of two different power supplies as AC and DC. The router also supports a combination of AC (PWR-400-AC) and DC (PWR-400-DC) PSUs together:

- DC power (PWR-400-DC)—The DC power supply uses two-position terminal block-style connector with positive latching or securing, and labeled connections for + 48V and -48V. The terminal block connector is of suitable size to carry the appropriate AWG wire size to handle the input current of the power supply. No ON/OFF switch is provided.
- AC power (PWR-400-AC)—The AC power supply has an IEC 320-type power receptacle and a 16 Amp service connector. You can use standard right angle power cords with the AC power supply. The power supply includes a power cord retainer. No ON/OFF switch is provided.

You can install dual power supplies for redundancy.

**Note** Products that have an AC power connection are required to have an external SPD provided as part of the building installation to comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety.

**Caution** Don’t use interface module and power supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

**PSU Redundancy Lost Alarm**:

PSU redundancy lost alarms are generated when there’s no proper input feed applied on any one of Power Modules (PMs) (PM0 or PM1). The alarms are also generated when the output for PM0 or PM1 isn’t proper.

The following alarms are raised for PSU redundancy lost event with a faulty PM0:

- Power Module Generic Fault
- Power Module Error
- Power Group Redundancy Lost

# Replace DC Power Supply Modules

## Remove the DC Power Supply Module

This section provides information about removing and replacing the DC power supply.

**Warning** **Statement 1003—**DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

**Procedure**

**Step 1** Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.

**Step 2** Slip on the ESD-preventive wrist strap that is included in the accessory kit.

**Step 3** Switch the power supply circuit-breaker switch to the Off (O) position.

**Step 4** Pull the terminal block plug cover out of the terminal block head in the power supply.

**Step 5** Unscrew the terminal block screws and remove the cables.

**Step 6** Grasp the power supply handle. Press the power supply lock towards the left and simultaneously pull the power supply out from the chassis while supporting it with the other hand.

## Install the DC Power Supply Module

This equipment is suitable for installation in network telecommunications facilities and locations where the NEC applies.

This equipment is suitable for installations utilizing the Common Bonding Network (CBN).

The grounding architecture of this product is DC-Isolated (DC-I) for DC-powered products. DC-powered products have a nominal operating DC voltage of 48 VDC.

Perform the following procedure to install the power supply module:

### Procedure

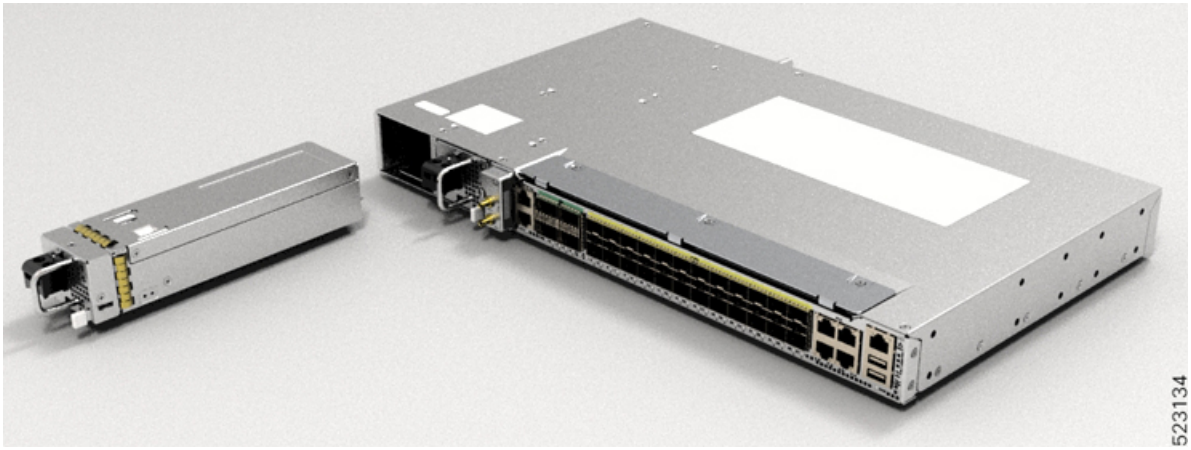
**Step 1** Ensure that the system (earth) ground connection is made. (See the following figure.)

**Step 2** If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

**Step 3** Verify that power to the DC circuit connected to the power supply you are installing is turned off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.

**Step 4** Grasp the power supply handle with one hand. Place your other hand underneath the power supply. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

***Figure 38: Install DC Power Supply Module***




# Replace AC Power Supply Modules

## Remove the AC Power Supply Module

### Before you begin

This section describes how to remove and replace the AC power supply.

**Warning** **Statement 1046—**Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

**Warning** **Statement 1074—**Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Perform the following steps to remove and replace the AC power supply:

**Procedure**

**Step 1** Disconnect the power cord from the power source. Do not touch any metal on the power cord when it is still connected to the power supply.

**Step 2** Loosen the tie and remove the power cord from the tie-and holder.

**Step 3** Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.

**Step 4** Grasp the power supply handle. Press the power supply lock towards the left and simultaneously pull the power supply out from the chassis while supporting it with the other hand.

# Install the AC Power Supply Module

Follow these steps to install the AC power supply module:

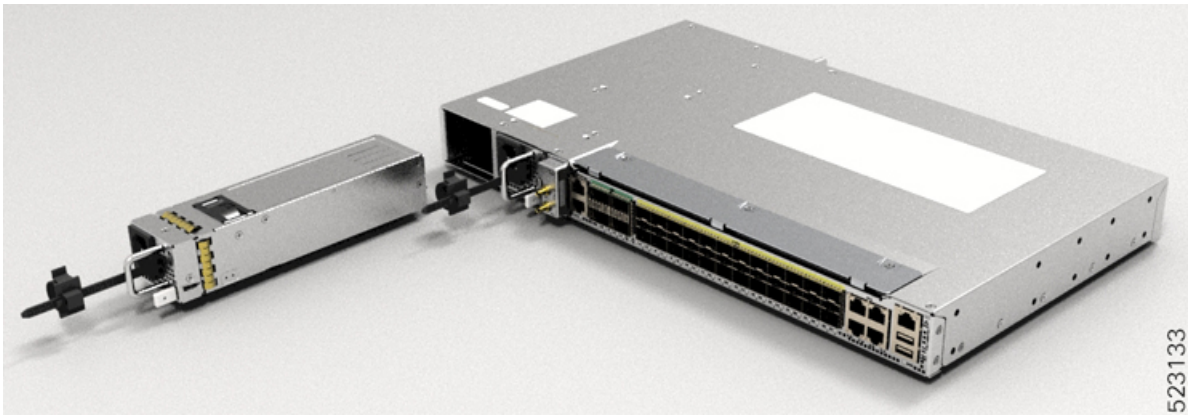
**Procedure**

**Step 1** Ensure that the system (earth) ground connection is made.

**Step 2** If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

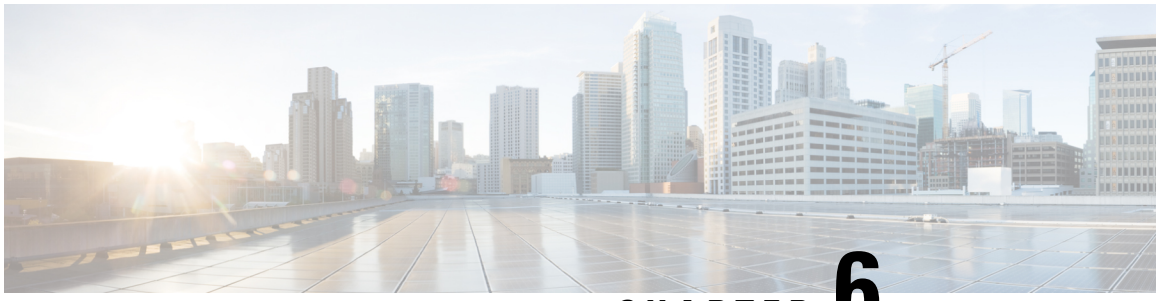
**Step 3** Grasp the power supply handle with one hand. Place your other hand underneath the power supply. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay. (See the following figure.)

*Figure 39: Install AC Power Supply Module*




**Step 4** Slide the AC power supply cord inside the tie of the tie-and-holder and tighten the tie around the power supply cord.

**Step 5** Plug the power supply cord into the AC power supply.

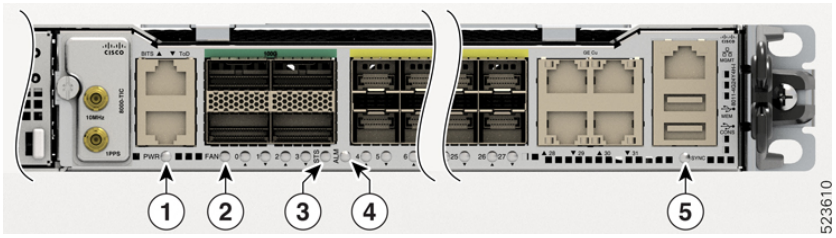


CHAPTER 6

# Appendix

Certain troubleshooting aids of the Cisco 8011-4G24Y4H-I Router enable you to perform these tasks that assist the troubleshooting process:

***Figure 40: Cisco 8011-4G24Y4H-I Router LEDs***




| | | | |
|---|---|---|---|
| 1 | Router Power Status LED | 2 | Fan Assembly LEDs |
| 3 | System Status LED | 4 | Alarm Status LED |
| 5 | Synchronization LED | | |


- LEDs, on page 71
- System Specifications, on page 75


# LEDs

The Cisco 8011 Router LEDs are similar for most of the variants, and any differences between the routers are specifically called out.

## Router LEDs

All the data port LEDs in the Cisco router are at the front panel.

*Table 11: Router LED Descriptions*

| LED Label | Color | Status |
|---|---|---|
| STS | Off | The module is powered-off (set by hardware); only standby power mode is available. |
| | Flashing Amber (Slow) | The module is booting up (set by IOFPGA). |
| | Flashing Amber (Fast) | The module is booting up (set by BIOS), shutting down, or is being reloaded. |
| | Amber | Host kernel is booted and is ready to start SysAdmin VM. |
| | Green | The module is operational and has no active major or critical alarms. |
| | Flashing Red | The router has active major or critical alarms. |
| ALM | Off | No alarm |
| | Red | Critical alarm - system scope, critical temperature. |
| | Flashing Red | Critical alarm - Relating to voltage rail failures. |
| | Amber | Major alarm - system-scope. |
| | Flashing Amber | Minor alarm - system-scope |
| SYNC | Off | Time core clock synchronization is disabled or in free-running state. |
| | Green | Time core is synchronized to an external source including IEEE1588. |
| | Flashing Green | System is in Synchronous Ethernet mode. |
| | Amber | Acquiring state or Holdover: Time core is in acquiring state or holdover mode. |

# Fan Assembly LEDs

Cisco 8011-4G24Y4H-I router has 5 fixed fans at the back panel. Fan modules are numbered from left to right as Fan 4 to Fan 0. There is an LED on the front panel of the router that reflect the different status of the fans.

*Table 12: Fan Assembly LEDs*

| LED Label | Color | Status |
|---|---|---|
| FAN | Off | Fan tray is not receiving power. |
| | Green | Fans are operating normally. |
| | Amber | Single fan failure. |
| | Red | More than one fan failure. |

# Power Status LEDs

*Table 13: Power Status LEDs*

| LED Label | Color | Status |
|---|---|---|
| PWR | Off | Sytem is powered off. |
| | Green | All the power supplies are on and operating normally. |
| | Amber | Standby FPGA upgrade is in progress (this is expected to take about three to five minutes). |
| | Red | Power redundancy is lost due to a power feed failure or an internal power supply failure. |

# Combination of LEDs

*Table 14: Fan and Power Status LED Combination*

| FAN | PWR | Status |
|---|---|---|
| For all the conditions below, the system will not boot. | | |
| Off | Red | Chassis Power Indication Failure |
| Green | Flashing Amber | All Fans are Switched Off or Not Running |
| Amber | Green | Default Condition |

| FAN | PWR | Status |
|---|---|---|
| Flashing Green | Flashing Green | BIOS Validation Failure |
| Flashing Red | Flashing Red | Thermal shutdown at Power Up |
| Flashing Red | Flashing Amber | MSS Ready Failure |
| Flashing Amber | Flashing Green | TAM Init Failure |
| Flashing Amber | Flashing Red | TAM Ready Failure |
| Flashing Amber (Slow) | Flashing Amber (Slow) | Secure JTAG Failure (CPU) |
| Flashing Amber (Fast) | Flashing Amber (Fast) | Secure JTAG Failure (NPU) |

# SFP and SFP+ Port LEDs

*Table 15: SFP and SFP+ Port LEDs*

| LED Label | Color | Status |
|---|---|---|
| STATUS | Off | Admin is down |
| | Green | Link is up in 1/10/25G ports |
| | Yellow | Fault or Error or Link Down |

# Copper Port LEDs

*Table 16: 1G Copper Port LEDs*

| LED Label | Color | Status |
|---|---|---|
| Left LED | Green | Link is up in 1G/100/10Mbps |
| | Blinking Green | Activity in 1G/100/10Mbps |
| | Amber or Orange | Fault/Error/Link is down |
| | Off | Admin is down |
| Right LED | Green | Link is up in full duplex |
| | Off | Link is up in half duplex |

# Management Port LEDs

*Table 17: Management Port LEDs*

| LED Label | Color | Status |
|---|---|---|
| Left LED | Green | Link is up in 1000 Mbps |
| | Blinking Green | Activity in 1000 Mbps |
| | Amber or Orange | Link is up in 100/10Mbps |
| | Blinking Amber or Orange | Activity in 100/10Mbps |
| | Off | Link is down |
| Right LED | Off | Unused |

# System Specifications

For more information on the weight, power consumption, environmental specifications, and other details, see *Cisco 8010 Series Router Data Sheet*.

# RJ45 Connectors

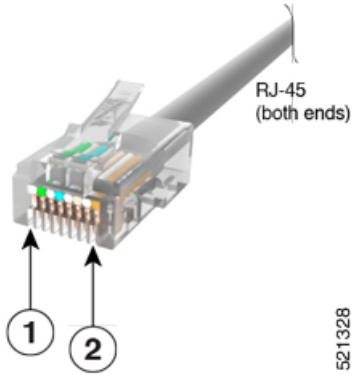
The RJ45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

- Router chassis
  - CONSOLE port
  - MGMT ETH port

**Caution** To comply with GR-1089 intrabuilding, lightning immunity requirements, you must use a foil twisted-pair (FTP) cable that is properly grounded at both ends.

The following figure shows the RJ45 connector.

*Figure 41: RJ45 Connector*




| | |
|---|---|
| 1 | Transmit data (bidirectional) |
| 2 | NC (Not Connected) |

# Transceiver and Cable Specifications

To determine which transceivers and cables are supported by this router, see Cisco Transceiver Modules Compatibility Information.

To see the transceiver specifications and installation information, see Cisco Transceiver Modules Install and Upgrade Guides.

# RJ45 ToD or 1PPS Port Pinouts

The following table summarizes the RJ45 ToD or 1PPS port pinouts:

*Table 18: RJ45 ToD or 1PPS Port Pinouts*

| Pin | Signal Name | Direction | Description |
|---|---|---|---|
| 1 | NA | NA | NA |
| 2 | NA | NA | NA |
| 3 | 1PPS_N | Output or Input | 1PPS RS422 signal |
| 4 | GND | NA | NA |
| 5 | GND | NA | NA |
| 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 |

# Console Port Pinouts

This summarizes the Console port pinouts:

***Table 19: Console Port Pinouts***

| Pin | Signal Name | Direction | Description |
|---|---|---|---|
| 1 | ACONS-TX | Output | Aux Consoles transmit output, RS232 |
| 2 | NC | NA | NA |
| 3 | CONS-TX | Output | Console RS232 transmit |
| 4 | GND | NA | Ground |
| 5 | GND | NA | Ground |
| 6 | CONS-RX | Input | Console RS232 receive |
| 7 | ACONS-RX | Input | Aux Consoles receive input, RS232 |
| 8 | NC | NA | NA |

# Alarm Port Pinouts

This summarizes the alarm port pinouts:

***Table 20: Alarm Port Pinouts***

| Pin | Signal Name | Description |
|---|---|---|
| 1 | ALARM1_IN | Alarm input 1 |
| 2 | ALARM2_IN | Alarm input 2 |
| 3 | NC | NA |
| 4 | ALARM3_IN | Alarm input 3 |
| 5 | ALARM4_IN | Alarm input 4 |
| 6 | NC | NA |
| 7 | NC | NA |
| 8 | ALARM_I_COMMON | Alarm input COM |

To set the description of the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number description
description
```

To set the severity of the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number severity
[critical | major | minor] [
```

To set the trigger for the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number trigger [open
 | closed]
```

**Note** You can configure up to four external alarms.

The *contact-number* is the pin number of the connected alarm port, that is Alarm input 1 to Alarm input 4.

The **description** string can be up to 80 alphanumeric characters in length and is included in any generated system messages.

For **severity**, enter any one of: **critical**, **major**, or **minor**.

Description and severity are both mandatory values.

Use the **show alarms** command in admin mode to view the alarm details. Use the **show logging** command to view the displays the state of syslog error and event logging.

An SNMP trap is sent for every external alarm that is raised or cleared on the system.

# USB Port Console Pinouts

This table summarizes the USB port console pinouts:

***Table 21: USB Port Console Pinouts***

| Pin | Signal Name | Description |
|---|---|---|
| A1 | VCC | +5 VDC |
| A2 | D– | Data– |
| A3 | D+ | Data+ |
| A4 | GND | Ground |

# USB Port Memory Pinouts

This table summarizes the USB port memory pinouts:

***Table 22: USB Port Memory Pinouts***

| Pin | Signal Name | Description |
|---|---|---|
| A1 | VCC | +5 VDC |
| A2 | D– | Data– |

| Pin | Signal Name | Description |
|---|---|---|
| A3 | D+ | Data+ |
| A4 | GND | Ground |

# Management Ethernet Port Pinouts

This table summarizes the management ethernet port pinouts:

***Table 23: Management Ethernet Port Pinouts***

| Pin | Signal Name |
|---|---|
| 1 | TRP0+ |
| 2 | TRP0– |
| 3 | TRP1+ |
| 4 | TRP2+ |
| 5 | TRP2– |
| 6 | TRP1– |
| 7 | TRP3+ |
| 8 | TRP3– |