



## **Cisco 1120 Connected Grid Router Hardware Installation Guide**

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# CHAPTER 1

## Unpacking the Router

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This chapter includes instructions about how to unpack the Cisco 1120 Connected Grid Router and describes the items that ship with the router. This chapter includes the following sections:

- [Unpacking the Router, page 1-1](#)
- [Router Package Contents, page 1-2](#)

## Unpacking the Router



### Tip

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When you unpack the router, do not remove the foam blocks attached to antennas and antenna connectors. The foam protects the antennas and connectors during installation.

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Follow these steps to unpack the router:

- 
- Step 1** Open the shipping container and carefully remove the contents.
  - Step 2** Return all packing material to the shipping container, and save it.
  - Step 3** Ensure that all items listed in the section [Router Package Contents, page 1-2](#) are included in the shipment. If any item is damaged or missing, notify your authorized Cisco sales representative.
-

# Router Package Contents

Your router kit contains the items listed in [Table 1-1](#).

**Table 1-1 Router Package Contents**

Qty.	Item	Description
1	Cisco 1120 Connected Grid Router	Router enclosure with the following components installed: <ul style="list-style-type: none"> <li>• Connected Grid Modules (1 to 2, depending on configuration ordered) with required antennas</li> <li>• 1-GB SD Flash Memory Module</li> <li>• AC power supply (integrated)</li> </ul>
1	DIN Rail Mounting Kit	Includes: <ul style="list-style-type: none"> <li>• DIN rail mounting bracket</li> <li>• All required hardware to attach bracket to router</li> </ul>
2	Power connectors adapters	Use these mating connectors for wiring the router power connectors
1	User Documentation Kit	Includes: <ul style="list-style-type: none"> <li>• Read Me First card</li> <li>• Regulatory Compliance and Safety Information document</li> </ul>



## CHAPTER 2

# Installation Safety and Site Preparation

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This document provides information you should be aware of before installing the Cisco 1120 Connected Grid Router, such as safety information, installation recommendations, and site requirements.

This chapter contains the following sections:

- [Safety Recommendations, page 2-2](#)
- [General Site Requirements, page 2-4](#)
- [Rack Mounting, page 2-4](#)
- [Router Environmental Requirements, page 2-4](#)
- [Power Guidelines and Requirements, page 2-4](#)
- [Network Cabling Specifications, page 2-5](#)
- [Required Tools and Equipment for Installation and Maintenance, page 2-7](#)



### Note

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To see translated warnings that appear in this publication, see the Regulatory Compliance and Safety Information document that came with the router.

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### Warning

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

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### Warning

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

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### Warning

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

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### Warning

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**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: Maximum 15 A, 120 Vac or Maximum 10 A, 230 Vac** Statement 1005

---

**Warning****Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018**Warning****Installation of the equipment must comply with local and national electrical codes.** Statement 1074**Warning****This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.**

Statement 1017

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

Statement 1029

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

## Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

## Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-off switch in the room in which you are working. If an electrical accident occurs, you can quickly turn off the power.
- Disconnect all power before doing the following:
  - Installing or removing a chassis
  - Working near power supplies
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- Do not work alone if hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Never open the enclosure of the router's internal power supply.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the device.
  - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.



**Warning**

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**Do not work on the system or connect or disconnect cables during periods of lightning activity.**  
Statement 1001

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## Preventing Electrostatic Discharge Damage

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

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



**Caution**

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

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# General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of your router. Ensure that the site is properly prepared before beginning installation. If you are experiencing shutdowns or unusually high errors with your existing equipment, this section can also help you isolate the cause of failures and prevent future problems.

## Rack Mounting

The router is designed for mounting on a DIN rail, or a wall. Cisco recommends that the router not be rack mounted. However, if you install the router in a rack, follow these guidelines:

- Allow clearance around the rack for maintenance.
- Allow at least one rack unit of vertical space between routers.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.

## Router Environmental Requirements

The location of your router and the layout of the substation environment are important considerations for proper router operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can make maintenance difficult.

Install the router so that you can access both the module-side and the cable-side panels.

When planning your site layout and equipment locations, refer to [General Site Requirements, page 2-4](#). If you are currently experiencing shutdowns or an unusually high number of errors with your existing equipment, these precautions and recommendations may help you isolate the cause of failure and prevent future problems.

- Ensure that the room where your router operates has adequate air circulation. Electrical equipment generates heat. Without adequate air circulation, ambient air temperature may not cool equipment to acceptable operating temperatures.
- Always follow ESD-prevention procedures described in [Preventing Electrostatic Discharge Damage, page 2-3](#), to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis cover and module cable side panels are secure. All empty module slots and power supply bays must have filler panels installed.
- When equipment installed in a rack (particularly in an enclosed rack) fails, try operating the equipment by itself, if possible. Power off other equipment in the rack (and in adjacent racks) to allow the router under test a maximum of cooling air and clean power.

## Power Guidelines and Requirements

Check the power at your site to ensure that you are receiving “clean” power (free of spikes and noise). Install a power conditioner if necessary.

The AC power supply includes the autoselect feature for either 110 V or 220 V operation.

## Network Cabling Specifications

The following sections describe the cables needed to install the router:

- [Preparing for Network Connections, page 2-5](#)
- [Preparing for Network Connections, page 2-5](#)

## Preparing for Network Connections

When setting up your router, consider distance limitations and potential electromagnetic interference (EMI) as defined by the applicable local and international regulations.

Network connection considerations are provided for several types of network interfaces and are described in the following sections:

- [Ethernet Connections, page 2-5](#)
- [Serial Connections, page 2-5](#)

## Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The router supports the following Ethernet implementations:

- 1000BASE-X—1000 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3z). Supports the Ethernet maximum length of 328 feet (100 meters).
- 1000BASE-T—1000 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3ab). Supports the Ethernet maximum length of 328 feet (100 meters).
- 100BASE-TX—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3u). Supports the Ethernet maximum length of 328 feet (100 meters).

## Serial Connections

The router supports serial connections on the serial ports. Before you connect a device to a serial port, you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface
- Type of connector, male or female, required to connect to the device
- Signaling standard required by the device

## Configuring Serial Connections

The router serial ports use a supported cable with a DB-25 connector. Serial ports can be configured as DTE or DCE, depending on the serial cable used.

## Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DCE or DTE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that accompanied the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either DTE or DCE mode.) [Table 2-1](#) lists typical DTE and DCE devices.

**Table 2-1 Typical DTE and DCE Devices**

Device Type	Gender	Typical Devices
DTE	Male <sup>1</sup>	Terminal PC
DCE	Female <sup>2</sup>	Modem CSU/DSU Multiplexer

1. If pins protrude from the base of the connector, the connector is male.
2. If the connector has holes to accept pins, the connector is female.

## Signaling Standards Supported

The synchronous serial ports available for the router support the following signaling standards: EIA/TIA-232 (EIA-323). You can order a Cisco DB-25 shielded serial transition cable that has the appropriate connector for the standard you specify. The documentation for the device should indicate the standard used for that device. The router end of the shielded serial transition cable has a DB-25 connector, which connects to the DB-25 port on the router. The other end of the serial transition cable is available with a connector appropriate for the standard you specify.

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable.

All serial ports configured as DTE require external clocking from a CSU/DSU or other DCE device.

## Distance Limitations

Serial signals can travel a limited distance at any given bit rate; generally, the slower the data rate, the greater the distance. All serial signals are subject to distance limits, beyond which a signal significantly degrades or is completely lost.

[Table 2-2](#) lists the recommended maximum speeds and distances for each serial interface type; however, you might get good results at speeds and distances greater than those listed, if you understand the electrical problems that might arise and can compensate for them. For instance, the recommended maximum rate for V.35 is 2 Mb/s, but 4 Mb/s is commonly used.

**Table 2-2 Serial Signal Transmission Speeds and Distances**

Rate (bps)	Distance for EIA/TIA-232		Distance for X.21 and V.35		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
2400	200	60	4100	1250	16.4	5
4800	100	30	2050	625	16.4	5
9600	50	15	1025	312	16.4	5



**Table 2-2 Serial Signal Transmission Speeds and Distances (continued)**

Rate (bps)	Distance for EIA/TIA-232		Distance for X.21 and V.35		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
19200	25	7.6	513	156	16.4	5
38400	12	3.7	256	78	16.4	5
56000	8.6	2.6	102	31	16.4	5
1544000 (T1)	—	—	50	15	16.4	5

### Asynchronous/Synchronous Serial Module Baud Rates

The following baud-rate limitations apply to the slow-speed serial interfaces found in the asynchronous/synchronous serial modules:

- Asynchronous interface—Maximum baud rate is 115.2 kbps.
- Synchronous interface—Maximum baud rate is 128 kbps full duplex.

## Required Tools and Equipment for Installation and Maintenance

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

- ESD-preventive cord and wrist strap
- Number 2 Phillips screwdriver
- Phillips screwdrivers: small, 3/16-in. (4 to 5 mm) and medium, 1/4-in. (6 to 7 mm)
- Screws that fit your rack

In addition, depending on the type of modules you plan to use, you might need the following equipment to connect a port to an external network:

- Cables for connection to the WAN and LAN ports (dependent on configuration).
- Ethernet hub or PC with a network interface card for connection to an Ethernet (LAN) port.
- Console terminal (an ASCII terminal or a PC running HyperTerminal or similar terminal emulation software) configured for 9600 baud, 8 data bits, 1 stop bit, no flow control, and no parity.
- Modem for connection to the auxiliary port for remote administrative access (optional).
- Data service unit (DSU) or channel service unit/data service unit (CSU/DSU) as appropriate for serial interfaces.
- External CSU for any CT1/PRI modules without a built-in CSU.





## CHAPTER 3

# Router Hardware Description

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This chapter describes the major hardware features of the Cisco 1120 Connected Grid Router and includes information about:

- The router chassis, internal components, connectors, ports, and hardware specifications
- How and when to use the router hardware features

This chapter does not describe how to install the router or make network connections.

- **Mounting**—For mounting instructions, see the chapter, [Mounting the Router](#).
- **Installing**—For instructions on how to install the router, including making network and power connections, see the chapters [Connecting the Router to Power](#) and [Making Network Connections](#).

This chapter contains the following sections:

- [Router Overview, page 3-1](#)
- [Hardware Features, page 3-4](#).

## Router Overview

This section contains the following topics:

- [Applications Overview, page 3-1](#)
- [Hardware Compliance, page 3-2](#)
- [Router Hardware Overview, page 3-2](#)

## Applications Overview

The Cisco 1120 Connected Grid Router is a ruggedized communication platform, designed for use inside substations or utility cabinets. This platform is built to meet the communication infrastructure needs of electric, gas, and water utilities.

The router provides an end-to-end communication network that enables increased power grid efficiency and reliability, reduced energy consumption, and reduced greenhouse gas emissions. The router also enables distributed intelligence for converged smart grid applications, including:

- Advanced Metering Infrastructure (AMI)
- Distribution Automation (DA)

- Integration of Distributed Energy Resources (DER)
- Remote workforce automation

The router provides reliable and secure real-time communication between network systems and the many devices that exist on the distribution grid, including meters, sensors, protection relays, Intelligent Electronic Devices (IEDs), plug-in electric vehicle (PEV) charging stations, and distributed solar farms. Network data is forwarded and processed over secure communication links between devices within the distribution grid for local decision processing.

Additionally, this data is sent to Supervisory Control and Data Acquisition (SCADA) systems and other management systems. The router supports physical connection to legacy distribution automation (DA) devices (over the serial port); the data from these devices can also be sent to central SCADA systems using protocol translation over the IP network.

## Hardware Compliance

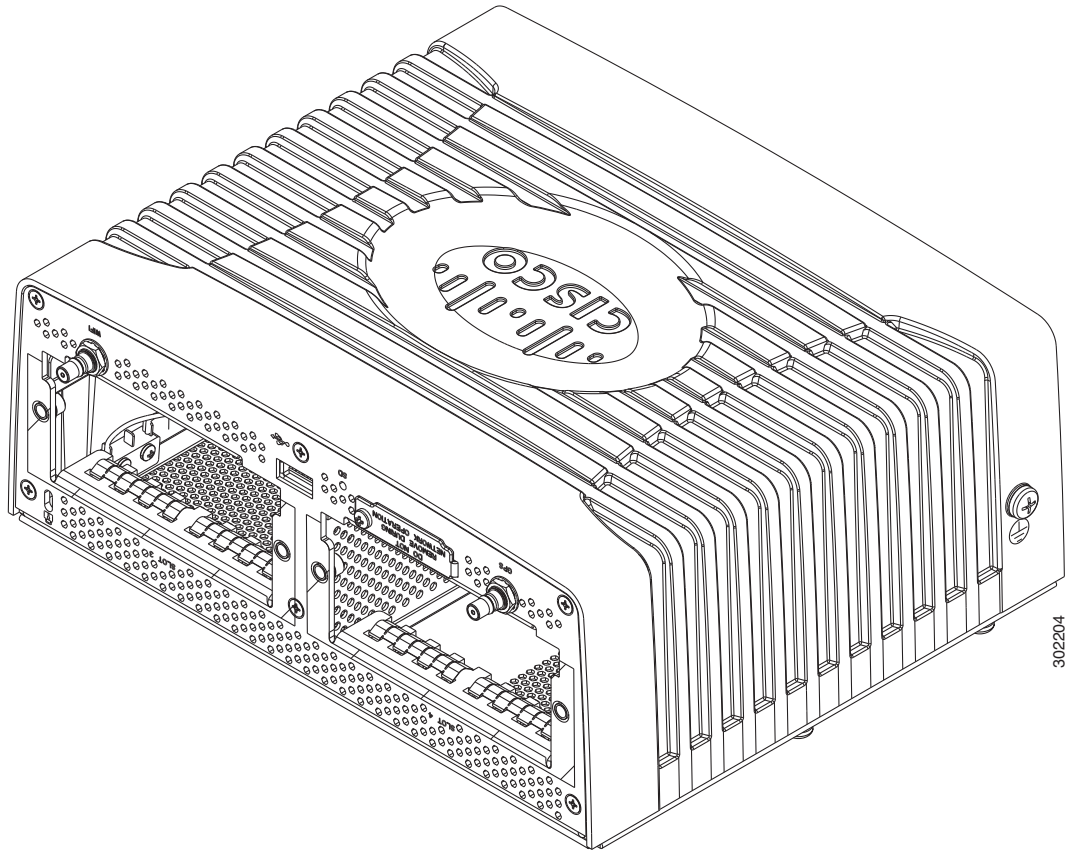
For a complete list of regulatory and compliance standards supported by the router, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Routers* document on Cisco.com at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs)

## Router Hardware Overview

The Cisco 1120 Connected Grid Router is a modular, ruggedized router that features:

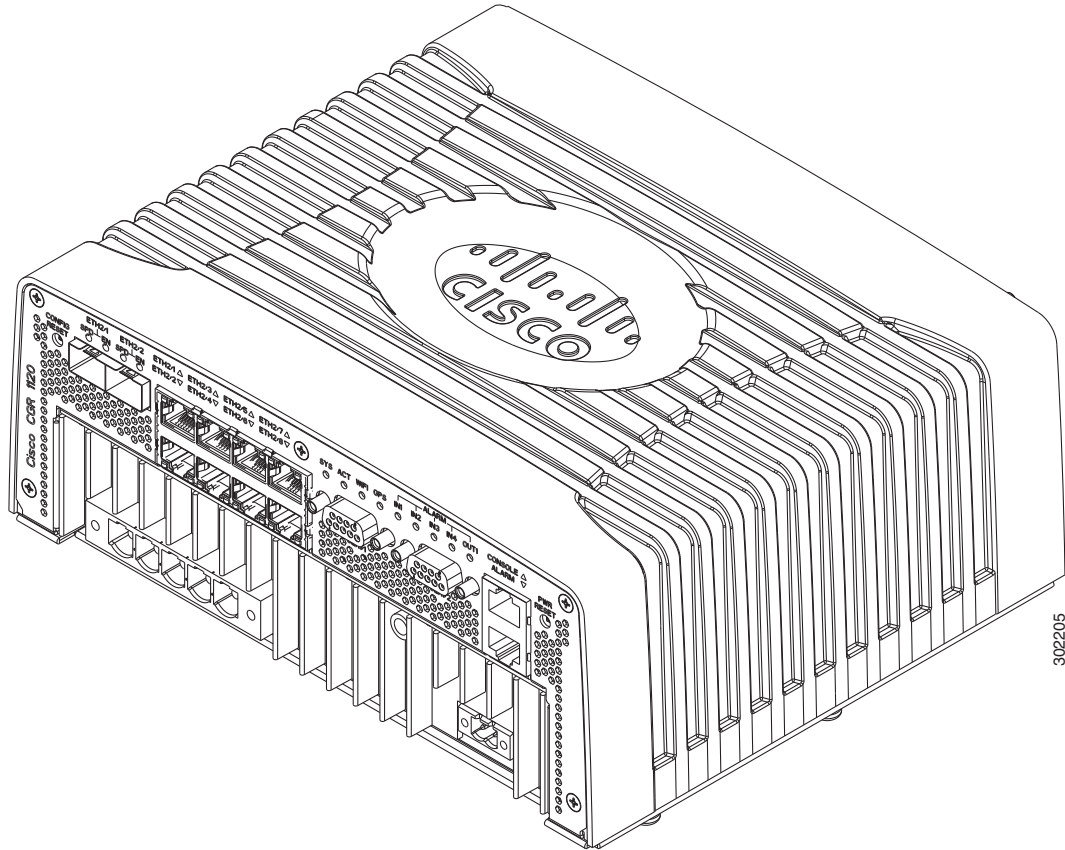
<b>2 – Connected Grid Module Slots</b>	Ruggedized Connected Grid modules provide connectivity to network endpoints, such as smart meters and DA devices.
<ul style="list-style-type: none"> <li>• <b>6 – Fast Ethernet Ports</b></li> <li>• <b>2 – Gigabit Ethernet Ports</b></li> </ul>	Ethernet connections to the backhaul network and other IP network devices.
<b>2 – Integrated Serial Ports</b>	RS232/RS485 serial ports for optional connections to existing or legacy equipment.
<b>Console Port</b>	A RJ-45 console port provides local access to the router for management and administration tasks.
<b>SD Flash Memory Module</b>	An external, default 2 GB SD Flash Memory Module stores the router configuration and data provides ease of managing router configurations.
<b>USB Port</b>	A Type A USB port for an optional connection to USB storage or other device, and provides power to the device.
<b>Internal GPS Module</b>	An integrated GPS can provide accurate time and location information to the system when used with an optional GPS antenna (ordered separately from Cisco).
<b>Short-Range Access Point</b>	An integrated 802.11b/g/n wireless access point provides short range wireless access to the router, when used with an optional WiFi antenna (ordered separately from Cisco). Wireless access enables local management over a WiFi connection to the router from outside the substation or utility box.
<b>Mounting Features</b>	Support for wall and DIN rail mounting.

Figure 3-1 Module Panel, Cisco 1120 Connected Grid Router



302204

Figure 3-2 Port Panel, Cisco 1120 Connected Grid Router



## Hardware Features

This section illustrates and describes in detail the router hardware features, including mounting brackets, network ports, device ports, and module slots.

## Chassis

The router chassis is ruggedized to withstand harsh indoor operating environments, such as power substations and utility boxes.



### Note

For a complete list of regulatory and compliance standards supported by the router, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Routers* document on Cisco.com at:

[www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs)

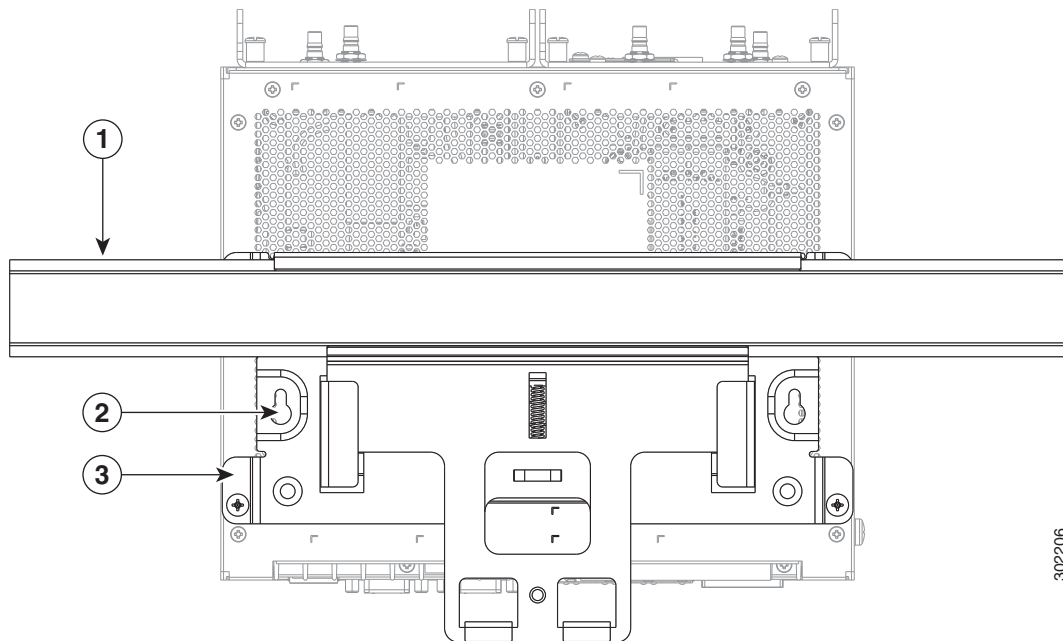
**Table 3-1 Router Chassis Specifications**

Specification	Description
Dimensions	8.9 cm x 22.9 cm x 20 cm (3.5 in. x 9.0 in. x 7.8 in.)
Weight	With 2 modules installed: 8 pounds (3.6 kg)
Operating temperature	-25° C to +60° C (-25° F to 140 °F), (Type test up to 85° C (185° F) for 16 hours)
IP rating	IP30

## Mounting Features

The router ships with a single mounting kit, which supports the following mounting options:

- Mounting on a DIN rail, which is a standard interior mounting option for substation devices and equipment. See [Figure 3-3](#).
- Mounting on a wall, using the mounting keyholes on the mounting bracket.

**Figure 3-3 Mounting Features (Router Shown Mounted on a DIN Rail)**

302206

**Table 3-2** Mounting Features (Shown in [Figure 3-3](#))

Item	Feature	Description
1	DIN rail	Standard rail type used for mounting industrial control equipment on an equipment rack.
2	Mounting keyhole (2)	Use the mounting keyholes on the mounting bracket to mount the router on a wall.
3	Mounting bracket	Included as part of the mounting kit. Use this bracket when mounting the router on a wall or DIN rail.

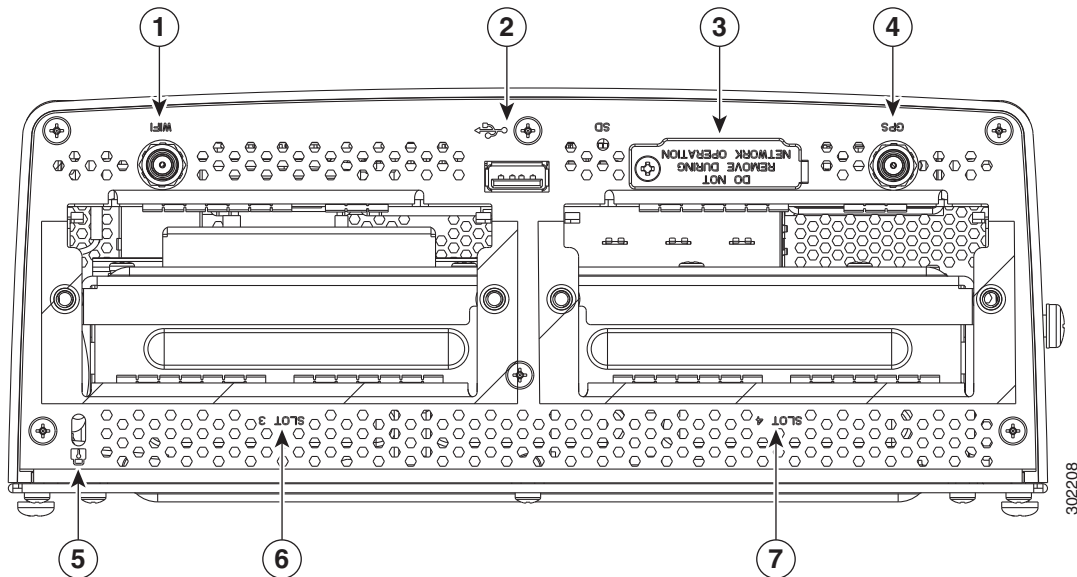
## Mounting Procedures

For instructions on how to mount the router using the mounting bracket kit, see the chapter [Mounting the Router](#).

## Module Panel (Front Panel) Features

**Figure 3-4** Module Panel (Front Panel) Features**Note**

The module panel labels appear inverted when the router rests on its base (see [Figure 3-4](#)). The label orientation is designed to be read when the router is installed on a DIN rail.





**Table 3-3** Module Panel (Front Panel) Features

Item	Feature	Description
1	WiFi antenna port	Install a WiFi antenna (ordered separately) in this port to support the router integrated <a href="#">Short-Range Access Point</a> . For more information, see <a href="#">WiFi Antenna Port, page 3-7</a> .
2	USB port	Connect this USB port to a supported, external USB device. For more information, see <a href="#">USB Port, page 3-8</a> .
3	SD Flash Memory module slot	Contains an external flash memory card that stores the operating system software image. For more information, see <a href="#">SD Flash Memory Module, page 3-8</a> .
4	GPS antenna port	Install a GPS antenna (ordered separately) in this port for connectivity to the router GPS system. For more information, see <a href="#">GPS Antenna Port, page 3-9</a> .
5	Kensington-compatible security slot	Provides security for the router by supporting Kensington or Kensington-compatible locking security cables. For more information, see <a href="#">Kensington-Compatible Security Slot, page 3-9</a> .
6	CG Module slot 3	Install Cisco Connected Grid modules in the module slots. For more information, see <a href="#">Connected Grid Module Slots, page 3-10</a> .
7	CG Module slot 4	

## Front Panel LEDs

For detailed descriptions of the LEDs that appear on the front panel, see the chapter [Router LED Locations and States](#).

## WiFi Antenna Port

See [Figure 3-4](#) for the WiFi antenna port location.

A single WiFi antenna is installed directly in this port to support the router [Short-Range Access Point](#). You must order this antenna separately from the router.

## Antennas

For more detailed information about supported antennas, including specifications and installation instructions, see these documents:

- [About Connected Grid Antennas](#) chapter, in this guide
- [Connected Grid Antennas Installation Guide](#) on Cisco.com

## Specifications

Specification	Description
Connector type	Female QMA
Supported antenna	<p><b>Cisco Product ID (PID):</b> ANT-4G-DP-IN-TNC</p> <p><b>Form factor:</b> Swivel-mount indoor dipole</p> <p><b>Bands supported:</b> Cellular/PCS/AWS/MDS, WiMAX 2100/2300/2500/2600 and global GSM900/GSM1800/UMTS/LTE2600</p>

## USB Port

See [Figure 3-4](#) for the USB port location.

The router features one standard USB 2.0 port for connecting and powering an optional USB peripheral device.

The USB port operates at the following speeds:

- 1 Mbps
- 12 Mbps
- 480 Mbps

## USB Connections

- Depending on the USB devices you connect to this port, you might require a USB extension cable to connect devices.
- To prevent a connected USB device accidental or unauthorized removal from the port, secure any connected USB device with a locking mechanism designed for this purpose. You must provide any locking device or mechanism.

## Specifications

Specification	Description
USB Port Type	Type A
USB Device Types Supported	USB 1.1, USB 2.0
Power Output	2.5W (+5V +/-5% @ 500mA) per port

## SD Flash Memory Module

The router supports one Cisco Secure Digital (SD) flash memory module (SD card), which stores router software, configurations, and network data. For detailed information about the SD card, see the chapter [Using the SD Flash Memory Module](#).

## Supported SD Cards

[Table 3-4](#) lists the SD cards that the router supports.

**Table 3-4** Supported SD Flash Modules

Size
2-GB flash memory module



### Caution

You must use a supported Cisco SD card with the router. Using an unsupported card could impact SD card reliability and therefore router performance.

**Caution**

Do not remove the SD card from the router; removing the SD card will cause the router to stop operating.

**Specifications**

Specification	Description
Socket type	14 pin
Power (from router)	+3.3 V
Voltage ramp rate range	1 mS to 100 mS

**GPS Antenna Port**

See [Figure 3-4](#) for the GPS antenna port location.

You can connect a single Connected Grid GPS antenna using the 15-foot cable that is integrated into the antenna. Mount the GPS antenna is mounted on the exterior of the substation or utility cabinet to enable connectivity between the router and the GPS system.

**Supported Antennas**

For more detailed information about supported antennas, including specifications and installation instructions, see these documents:

- [About Connected Grid Antennas](#) chapter, in this guide
- [Connected Grid Antennas Installation Guide](#) on Cisco.com

**Specifications**

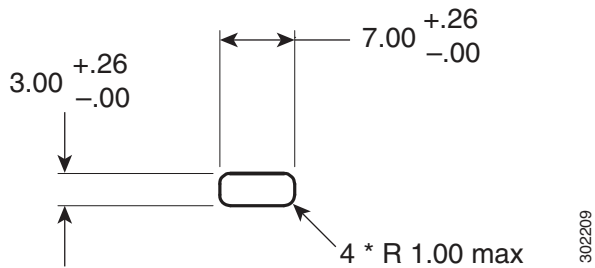
Specification	Description
Connector type	Female QMA
Power consumption (from router)	3V (when GPS connectivity is active)
Supported antenna	<b>Cisco Product ID (PID):</b> ANT-GPS-OUT-TNC

**Kensington-Compatible Security Slot**

See [Figure 3-4](#) for the Kensington-compatible security slot location.

The front panel features one Kensington-compatible security slot. Use this slot to secure the router at the installation location with a Kensington (or compatible) security cable.

## Dimensions



## Connected Grid Module Slots

The router has two module slots to support up to two compatible Cisco Connected Grid modules that add WAN and LAN interfaces to the router.

- For more information about the Connected Grid modules for this router, see the chapter [About Connected Grid Modules](#).
- For detailed installation instructions for installing Cisco Connected Grid modules in the router, see the corresponding installation and configuration guide for each module at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

## Module Numbering

The router uses module numbering to identify the integrated and modular router components. Some system software commands refer to the following module numbers.

- **Module 1** is the integrated router supervisor engine (located on the CPU motherboard)
- **Module 2** is the router integrated Ethernet switch module, which has six Fast Ethernet ports and two Gigabit Ethernet ports.
- **Module 3** and **Module 4** are external, Connected Grid modules installed in the router module slots with the corresponding numbers (see [Figure 3-4](#)).

## Cable Panel (Back Panel) Features

Figure 3-5 Cable Panel (Back Panel) Features

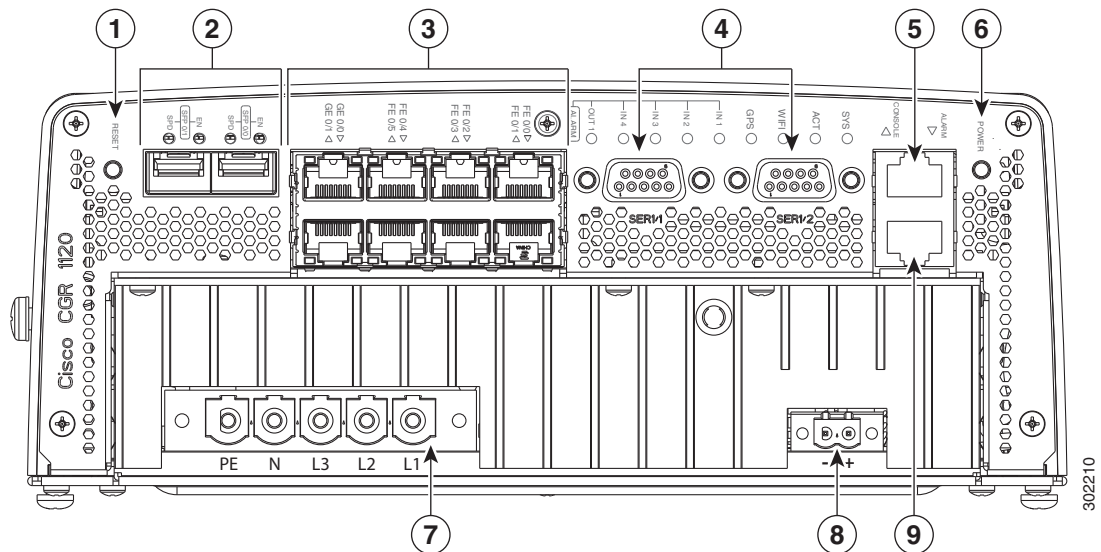


Table 3-5 Cable Panel (Back Panel) Features

Item	Feature	Description
1	CONFIG Reset button	Press for at least 5 seconds to return the router software configuration to the factory default, and power cycle the router. For information on how to use this feature, including a Caution statement, see <a href="#">CONFIG Reset Button, page 3-12</a> .
2	SFP ports	Install supported small-form-factor pluggable (SFP) modules in these two SFP ports, labeled ETH 2/1 and ETH 2/2. For more information and supported SFPs, see <a href="#">Small Form-Factor Pluggable (SFP) Ports, page 3-12</a> .
3	Ethernet ports: <ul style="list-style-type: none"> <li>2–Gigabit Ethernet (10/100/1000 Mbps)</li> <li>6–Fast Ethernet (10/100 Mbps)</li> </ul>	Make network connections using the Ethernet ports. For more information, see <a href="#">Ethernet Ports, page 3-13</a> . <ul style="list-style-type: none"> <li>Gigabit Ethernet (GE) ports—GE ports ETH 2/1 and ETH 2/2 are WAN ports for connectivity to a primary substation or a control center.</li> <li>Fast Ethernet (FE) ports —FE ports ETH 2/3 to ETH2/8 are LAN ports for local network devices.</li> </ul>
4	Serial ports	Connect the router to legacy devices using these two serial ports. For more information on these ports and supported devices, see <a href="#">Serial Ports, page 3-15</a> .
5	Console port	Connect a console or PC to the asynchronous console port to manage the router with a local connection.
6	PWR RESET button	Press the PWR RESET button for at least 5 seconds to power cycle the router. For more information on how to use this feature, see <a href="#">PWR RESET Button, page 3-12</a> .
7	AC power supply connector	Connect the router to the AC power supply (included). For more information, see <a href="#">AC Power Supply, page 3-17</a> .

**Table 3-5 Cable Panel (Back Panel) Features**

8	DC power connector	Connect an external backup battery unit (not included) to the router in the event that the AC power fails. For more information, see <a href="#">DC Input for Battery Backup, page 3-17</a> .
9	Alarm port	Connect this alarm port to an alarm system to monitor external events and trigger alarms for external events. For more information, see <a href="#">Alarm Port, page 3-18</a> .

## Back Panel LEDs

For detailed descriptions of the LEDs that appear on the back panel, see the chapter [Router LED Locations and States](#).

## CONFIG Reset Button

See [Figure 3-5](#) for the CONFIG Reset button location.



### Caution

When you use the CONFIG Reset button to restore the router to the factory default software configuration, the current software configuration is permanently deleted from the router.

Press the CONFIG Reset button for at least 5 seconds to return the router software configuration to the factory default, and power cycle the router. Power cycling the router turns the router off, then immediately back on. The router will temporarily stop operating on the network during the power cycle, then resume operating when the power cycle process is complete.

## PWR RESET Button

See [Figure 3-5](#) for the PWR RESET button location.

Press the PWR RESET button for at least 5 seconds to power cycle the router. Power cycling the router turns the router off, then immediately back on. The router will temporarily stop operating on the network during the power cycle, then resume operating when power cycle process is complete.

## Small Form-Factor Pluggable (SFP) Ports

The router features two fiber optical SFP ports that support optional Cisco rugged SFP modules for Gigabit Ethernet connections. The ports are labeled as follows (see [Figure 3-5](#)):

- ETH 2/1
- ETH 2/2



### Note

Interfaces ETH 2/1 and ETH 2/2 are also used by the [Gigabit Ethernet \(GE\) Ports](#). For more information about how these ports are used together, see [Combo Ports, page 3-15](#).

## Hot Swapping SFP Modules

The SFP modules can be installed or removed while the router is on and operating normally.

## Supported SFPs

Table 3-6 lists the supported SFP modules.



### Note

See the *Cisco 1000 Series Connected Grid Routers Release Notes* for the most recent information about supported hardware and software.

**Table 3-6 Supported SFP Modules**

Cisco Product ID	Description
GLC-SX-MM-RGD	1000BASE-SX short wavelength; rugged
GLC-LX-SM-RGD	1000BASE-LX/LH long wavelength; rugged
GLC-FE-100LX-RGD	100BASE-LX10 SFP
GLC-FE-100FX-RGD	100BASE-FX SFP
GLC-ZX-SM-RGD	1000BASE-ZX extended distance; rugged

## Specifications

Specification	Description
Connector type	RJ-45
Copper Interface	Full-duplex 10BASE-T, 100BASE-TX, 1000BASE-T
Fiber	SFP modules: <ul style="list-style-type: none"> <li>1000 Mbps 8B/10B coding</li> <li>100 Mbps 4B/5B coding.</li> </ul>
Pinouts	See <a href="#">Connector and Cable Specifications</a>

## Ethernet Ports

See [Figure 3-5](#) for Ethernet port locations

## Ethernet Connections

The router supports the following Ethernet connection types:

- 1000BASE-T—1000 Mbps full-duplex transmission over a Category 5 or higher shielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 100BASE-T—100 Mbps full-duplex transmission over a Category 5 or higher shielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).
- 10BASE-T—10 Mbps full-duplex transmission over a Category 5 or higher shielded twisted-pair (UTP) cable. Supports the Ethernet maximum length of 328 feet (100 meters).

## Fast Ethernet (FE) Ports

The router features six Fast Ethernet (FE) ports that can be connected to local network devices, such as IEDs, sensors, and reclosers. The ports are labeled as follows:

- ETH 2/3
- ETH 2/4
- ETH 2/5
- ETH 2/6
- ETH 2/7
- ETH 2/8

## Specifications

Specification	Description
Connector type	RJ-45
Cables	Category 5 or higher
Interface speed	10BASE-T and 100BASE-TX
IEEE standard	IEEE 802.3
Pinouts	See <a href="#">Connector and Cable Specifications</a>

## Gigabit Ethernet (GE) Ports

The router features two Gigabit Ethernet (GE) ports for a WAN connection to a primary substation or control center. The ports are labeled as follows:

- ETH 2/1
- ETH 2/2



### Note

Interfaces ETH 2/1 and ETH 2/2 are also used by the [Small Form-Factor Pluggable \(SFP\) Ports](#). For more information about how these ports are used together, see [Combo Ports, page 3-15](#).

The GE ports automatically detect the type of any connected cable (fiber or copper) and then switch to the corresponding mode (fiber or copper). When both cables types are connected to the router, the first cable that establishes a link is enabled.

## Specifications

Specification	Description
Connector type	RJ-45 (Copper mode)
Cables	Optical fiber Category 5, 5e, 6 shielded twisted pair (STP)
Interface speed	10BASE-TX, 100BASE-TX, 1000BASE-T
Pinouts	See <a href="#">Connector and Cable Specifications</a>



## Combo Ports

The two **Gigabit Ethernet (GE) Ports** and the two **Small Form-Factor Pluggable (SFP) Ports** are labeled identically (ETH 2/1 and ETH 2/2) because the SFP and GE interfaces share physical ports on the router. Only one instance of each interface (ETH 2/1 and ETH 2/2) can be in use at any time.

- **GE ports:** Copper GE connections
- **SFP modules:** Fiber optic GE connections

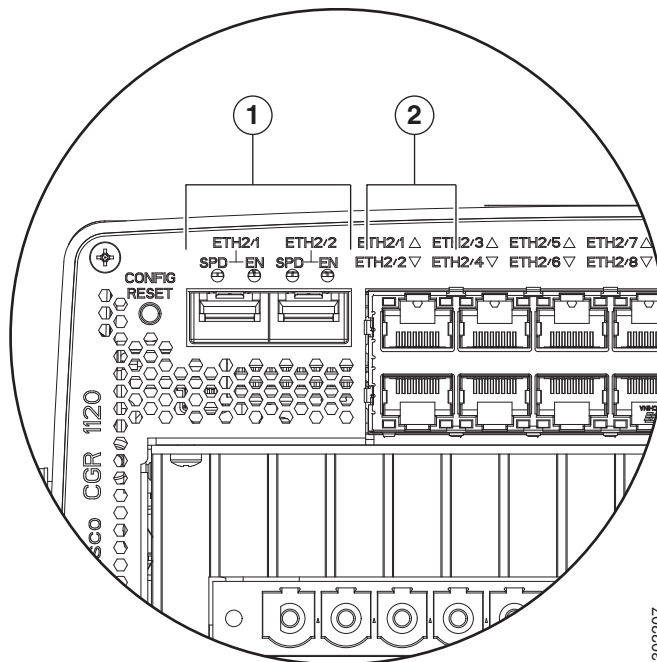
These ports automatically detect the type of any connected cable (fiber or copper) and then switch to the corresponding mode (fiber or copper).



### Note

If connections are made to both interfaces of the same name (ETH 2/1 or ETH 2/2), the first connection that establishes a link is the only connection enabled.

**Figure 3-6** GE Ports and SFP Ports Share Interfaces ETH 2/1 and ETH 2/2



Items	Description	Gigabit Ethernet Connection Type
1	SFP module ports	Fiber optic
2	Gigabit Ethernet ports	Copper

## Serial Ports

See [Figure 3-5](#) for serial port locations.

The router has two serial ports that support the following modes (selected with system software commands):

- RS232
- RS485

The ports are labeled as follows:

- SER 1/1
- SER 1/2

## Specifications

Specification	RS232	RS485
Connector type	DB-9	
Cable	You must order a serial transition cable for the signaling protocol.	
Signaling	Single-ended	Differential
Max. drivers	1	32
Max. receivers	1	256
Operating mode	Full duplex	Half duplex Full duplex
Network topology	Point-to-point	Multipoint
Max. distance (standard)	15 m	1200 m
Max speed (at 12 m/1200 m)	20 Kbps/1 Kbps	35 Mbms/100 Kbps
Pinouts	See <a href="#">Connector and Cable Specifications</a>	

## Console Port

See [Figure 3-5](#) for the console port location.

The router features a single asynchronous console port for connecting a console or PC directly to the router. To configure the router locally, using the command-line interface (CLI), you must establish a connection to the router with a terminal session.



### Note

The router also supports wireless console connections with an internal [Short-Range Access Point](#).

### Console Port Default Settings

The console port does not support hardware flow control. The default settings for the port are: 9600 baud, 8 data bits, no parity, and 1 stop bit.

### Connecting to the Console Port

Detailed information about connecting to the console port is in the chapter [Making Network Connections](#).

## Specifications

Specification	Description
Connector type	RJ-45
Transceiver	RS-232
Cable type	EIA RJ-45
Pinout	See <a href="#">Connector and Cable Specifications</a>

## AC Power Supply

See [Figure 3-5](#) for the AC power connection location.

The AC power supply connector on the router cable-side (back) panel is the connection to the AC power terminal block. The router supports single-phase and three-phase AC power input.

For detailed information about the AC power supply, including how to connect the router to AC power, see the chapter [Connecting the Router to Power](#).

## DC Input for Battery Backup

See [Figure 3-5](#) for the external DC power input connector.

The router supports an external battery backup DC power connection. You must provide the battery backup connection or unit.

For detailed information about the DC power input, including how to connect the router to a DC power input source, see the chapter [Connecting the Router to Power](#).

## Power Specifications

Specification	Description
DC Input Voltage	Nominal operating range: 10.6 to 52VDC Maximum operating range: 9 to 60VDC
AC Input Voltage	Three-phase <ul style="list-style-type: none"> <li>• 208 to 415VAC 4W+ PE WYE</li> </ul> Single-phase <ul style="list-style-type: none"> <li>• 100 to 240VAC @ 50/60Hz</li> </ul>

Circuit Breaker	<p>AC</p> <ul style="list-style-type: none"> <li>• Single Phase: Single 10A circuit breaker</li> <li>• Three-phase: Three 10A ganged circuit breaker</li> <li>• AC voltage rating: 250VAC L-N (minimum)</li> </ul> <p><b>Note</b> We recommend that the circuit breaker be installed in close proximity to the router by a licensed electrician in accordance with local electrical standards.</p> <p>DC</p> <ul style="list-style-type: none"> <li>• DC rating: 60VDC minimum, 10A maximum</li> </ul>
Output Power	40W
Cooling Type	Natural convection
Operating Temperature	-40 F to 140 C (-40 C to 60 C)
Lifetime	20 years, at 104 F (40 C)

## Alarm Port

See [Figure 3-5](#) for the alarm port location.

Attach the alarm port to an alarm system to monitor and trigger external alarm events. The router supports two alarm inputs and two alarm outputs.

The alarm-trigger setting determines when an alarm is sent to the attached alarm system.

The alarm port has a rating of 30V DC, 1A.

### Input Alarm Trigger Settings

- **Open**—The **open** setting indicates that the normal router operating condition has an electrical current passing through the alarm circuits (DRY contact closed). If this electrical current is no longer detected (DRY contact open), an alarm is generated.
- **Closed**—The **closed** setting indicates that the normal router operating condition is that no electrical current is passing through the alarm circuits (DRY contact open). If an electrical current is detected (DRY contact closed), an alarm is generated.

### Output Alarm Trigger Settings

- **Normally Open (NO)**—This setting depends on the pinout of the cable that is connected to the alarm port. See the appendix [Connector and Cable Specifications](#) for details.
- **Normally Closed (NC)**—This setting depends on the pinout of the cable that is connected to the alarm port. See the appendix [Connector and Cable Specifications](#) for details.

If interfaces fail or other non-fatal errors occur, the alarm port does not respond. Continue to use SNMP to manage these types of errors.



#### Note

Due to the RJ-45 pin spacing, the alarm port does not support AC signaling.

## Specifications

Specification	Description
Connector type	RJ-45
Alarm input	8 volts @ 1 mA
Alarm output	30 volts @ 1 A

## Internal Hardware Features

This section describes router hardware features that are integrated into the router and which are not visible from the router exterior. This section describes the following features:

- [Memory, page 3-19](#)
- [Internal GPS Module, page 3-19](#)
- [Short-Range Access Point, page 3-20](#)
- [Real-Time Clock \(RTC\), page 3-21](#)
- [Temperature Sensor, page 3-21](#)

## Memory

This router supports the three types of memory described in this section.

- **SD Flash Memory Module**—See the chapter [Using the SD Flash Memory Module](#) for information about the router SD card, which stores the router configuration and system data.
- **DDR2 SDRAM**—The router features 1 GB of double data rate (DDR2) SDRAM.
- **Boot Flash**—The router features 16 MB of boot flash memory, consisting of two 8 MB Serial Peripheral Interface (SPI) flash devices. The boot flash supports the Common Flash Interface (CFI) standard.

## Internal GPS Module

The router has an internal Global Positioning System (GPS), which provides precise time and location information to the system.

## GPS LED

You can view the GPS LED to determine the GPS state and whether or not it is successfully connected to a GPS satellite. For information on the GPS LED, see the chapter [Router LED Locations and States](#).

## Specifications

Specification	Description
Channels	12
Tracking sensitivity	-160 dBm
Acquisition sensitivity	-148 dBm
Fast TTFF (Cold start)	38 sections
Error correction	Space Based Augmentation Systems (SBAS)

## Related Commands

Use the commands in this section to see the GPS current time and location.

Use the **show gps time** command to display the current GPS time:

```
cgr-1000# show gps time
8:46:9.923 UTC Fri Sep 11 2011
```

Use the **show gps location** command to display the GPS latitude and longitude:

```
cgr-1000# show gps location
Latitude: 37.4090637
Longitude -121.9523598
```

## Short-Range Access Point

The router features an integrated, short-range WiFi access point to support a wireless connection to the router, over which you can administer the router. The router can be installed in a utility box or substation; the wireless connection enables you to manage the router from outside these enclosures.

The WiFi connection is available only when the system software is operating. If the system software is not operating, you cannot use the WiFi connection to connect to or administer the router.

## Related Commands

To display WiFi configuration information, enter any or all of the following commands:

- **show interface wifi slot/port [associations | brief | description | statistics]**—Summarizes the status of the interface as up or down, the five second input and output rate and the number of input and output packets. Additionally, the Cisco CG-OS router displays hardware details such as radio type (802.11N, 2.4 GHz radio), MAC address and MTU setting.
- **show controller wifi slot/port**—Displays serial number, software version, and configured frequency and power settings

For detailed information about these commands, see the chapter “Configuring the WiFi Interface” in the *Cisco 1000 Series Connected Grid Routers WiFi Software Configuration Guide*, at [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).

## Real-Time Clock (RTC)

The router features an integrated real-time clock (RTC) with battery backup that supplies the system software with accurate date and time information. The integrated router GPS compares the current RTC time with the time at which it last received a valid signal to ensure accurate timekeeping on the router.

When the router is powered on using the [CONFIG Reset Button](#), the RTC sets the router memory controller and clock frequency.

### RTC Battery

The RTC includes battery backup for the date and time when the router is not receiving any power.

### Specifications

Specification	Description
Battery type	High-capacity lithium (550 mAh)
Battery life span	10 years
Supported interrupts	Time-of-day alarms (Range: 1/second – 1/month)
	Periodic rates (Range: 122 us – 500 ms)
	End-of-update-cycle notifications

## Temperature Sensor

The router hardware features an internal temperature sensor used by the router software to monitor the system operating temperature. The router can be configured to generate alerts when the temperature falls outside of a user-defined temperature range. The router can also be configured to store historical temperature data.

For more information about monitoring and storing router temperature data, see the *Cisco 1000 Series Connected Grid Routers Software Configuration Guide Set*.







## CHAPTER 4

# Mounting the Router

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This chapter describes the safety information, equipment, and procedures required to mount the Cisco 1120 Connected Grid Router on a vertical pole or streetlight. This chapter contains these sections

- [Router Mounting Kit, page 4-1](#)
- [Prepare to Mount the Router, page 4-2](#)
- [Mounting Instructions, page 4-4](#)
- [Ground the Router, page 4-8](#)

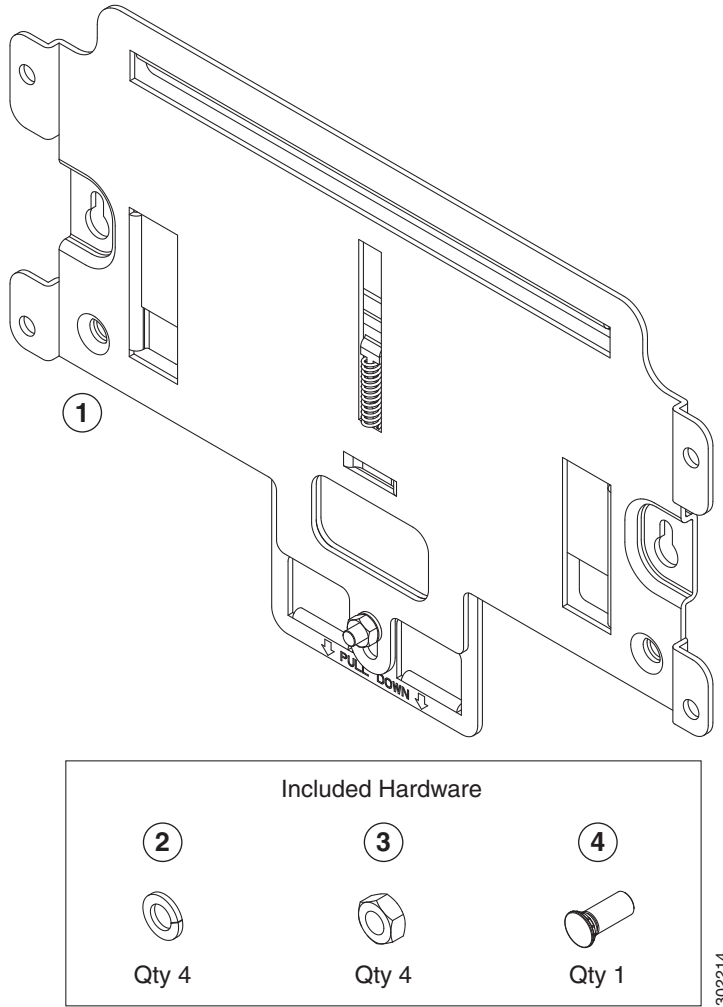
## Router Mounting Kit

The router ships with a mounting kit that contains all the parts required to mount the router on a DIN rail or on a wall. The [Mounting Kit Contents](#) section includes a detailed description of the mounting parts shipped with your router.

## Mounting Kit Contents

The mounting bracket attaches to the router. The router is then installed on a wall using the mounting bracket, or on a DIN rail, using the DIN rail adapter.

Figure 4-1 Mounting Kit Contents



Item	Description	Qty.
1	Mounting bracket	1
2	Split lock washer (M8)	4
3	Nut (M8)	4
4	Mounting stud (M8)	1

## Prepare to Mount the Router

Read the topics in this section before mounting the router:

- [Materials and Tools You Supply](#), page 4-3
- [Router Orientation When Mounting](#), page 4-3
- [General Safety Information for Mounting](#), page 4-3

## Materials and Tools You Supply

You must supply some or all of these items to mount the router on a pole. The items you supply depend on the installation procedure that you use.

Item	Required for These Procedures
#2 Phillips screwdriver	<a href="#">Attach the Mounting Bracket to the Router</a> <a href="#">Ground the Router</a>
Crimping tool or pliers	<a href="#">Ground the Router</a>

## Router Orientation When Mounting

When mounting the router on a DIN rail or wall, ensure that the router is oriented with the chassis cabling openings pointing down so the router cable hangs down.



**Caution**

Mounting the router with the cable panel at the top (facing up) can cause stress on the cables and potentially impact network and other connections. Cisco discourages mounting the router with the cable panel at the top.

## General Safety Information for Mounting

Before performing any of the tasks in this chapter, read the safety warnings in this section and in the [Installation Safety and Site Preparation](#) chapter.

One person is required to properly and safely mount the router.



**Caution**

All mounting methods at any location are subject to the acceptance of local jurisdiction.



**Caution**

Personnel mounting the router must understand grounding methods.



**Warning**

**Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54). Statement 1052**

# Mounting Instructions

This section includes all the steps required to mount the router on a wall or DIN rail. There are two main procedures for mounting the router:

1. [Attach the Mounting Bracket to the Router, page 4-4](#)
2. [Mount the Router on a DIN Rail, page 4-6](#)

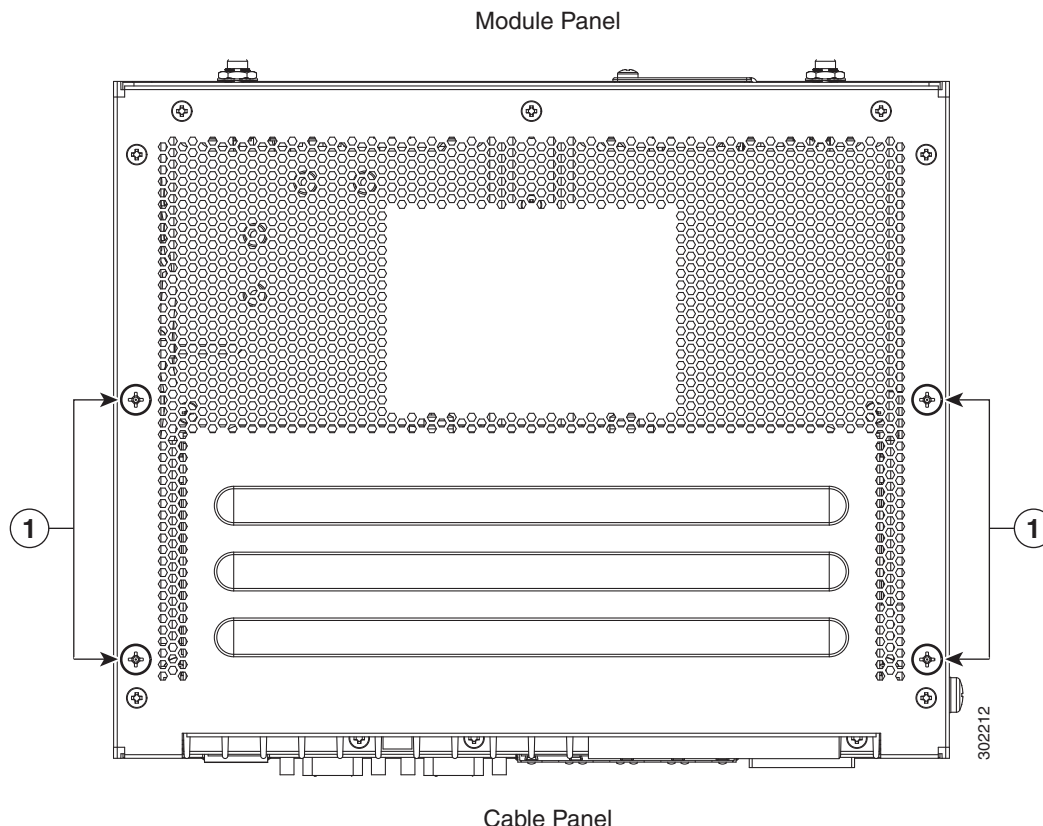
In some environments, you might want to mount the router on a wall instead of DIN rail. The wall mounting procedure is described in [Mount the Router on a Wall, page 4-7](#).

## Attach the Mounting Bracket to the Router

Before you begin, disconnect the router from power and any network connections.

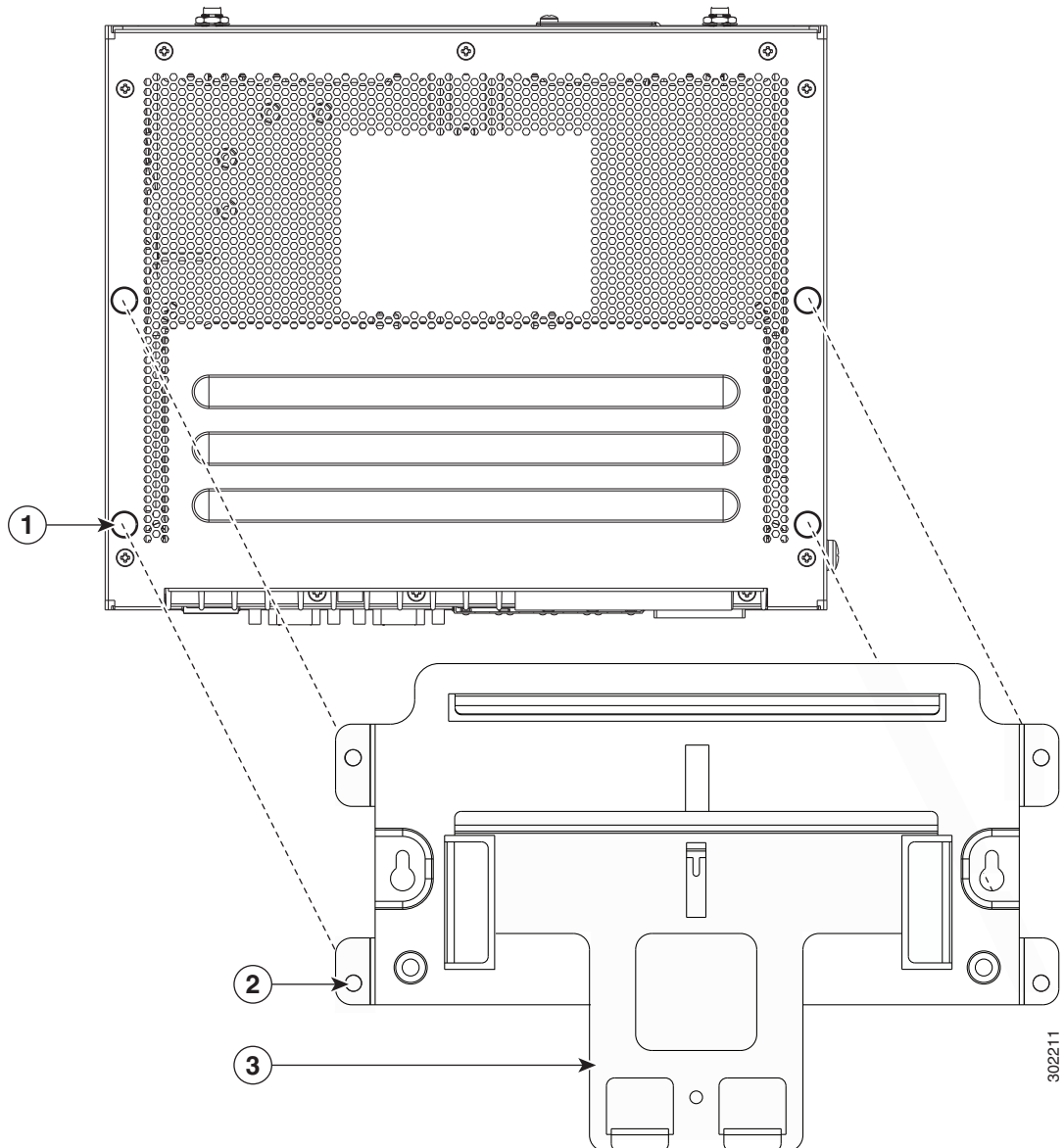
- Step 1** Place the router on a stable surface, with the base of the router facing up and the module panel at the top, as shown in [Figure 4-2](#).
- Step 2** Use the #2 Phillips screwdriver to remove the four large screws (Item 1, [Figure 4-2](#)) from the chassis base. Keep the screws. You will replace them at the end of this procedure to mount the bracket on the chassis.
- Step 3** Remove only the screws indicated in [Figure 4-2](#). Do not remove the smaller screws, which secure the router bottom panel to the chassis.

**Figure 4-2** Remove the Four Large Screws (1) from the Router Base



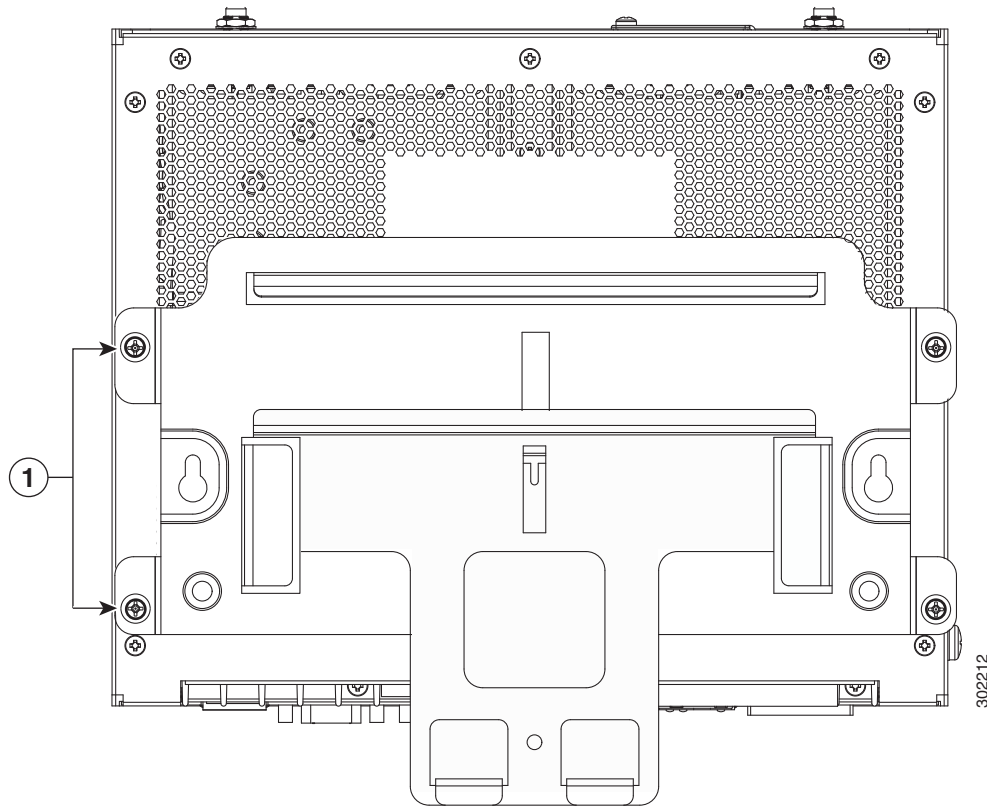
- Step 4** Place the mounting bracket onto the back of the router, following these guidelines, shown in [Figure 4-3](#):
- The **bracket handle** (Item 3, [Figure 4-3](#)) should be facing the router cable panel.
  - Align the **bracket mounting holes** (Item 2, [Figure 4-3](#)) with the router **bracket connectors** (Item 1, [Figure 4-3](#)). (The screws were removed from the bracket connectors in [Step 2](#).)

**Figure 4-3** *Align the Bracket Mounting Holes (2) over the Router Bracket Connectors (3)*



- Step 5** Replace the screws you removed in [Step 2](#) to secure the mounting bracket to the chassis.
- Step 6** Evenly hand-tighten the screws (Item 1 in [Figure 4-4](#)), then tighten with the Phillips #2 screwdriver.

**Figure 4-4** Replace and Tighten Screws to Secure Bracket to Router



## Mount the Router on a DIN Rail

The steps in this section assume that your substation or utility box already has a DIN rail installed and ready to support equipment. If your environment does not use DIN rails, you can [Mount the Router on a Wall, page 4-7](#).

To mount the router on a DIN rail:

- 
- Step 1** Tilt the chassis-bracket assembly about 10 to 30 degrees and the bracket handle facing down. Do not mount the router with the bracket handle facing up.
  - Step 2** Place the **top lip of the bracket** (Item 2 in [Figure 4-5](#)) over the top of the **DIN rail** (Item 3 in [Figure 4-5](#)).
  - Step 3** Firmly pull the **bracket handle** (Item 1 in [Figure 4-5](#)) down and rotate the unit until it is parallel to the wall or DIN rail.

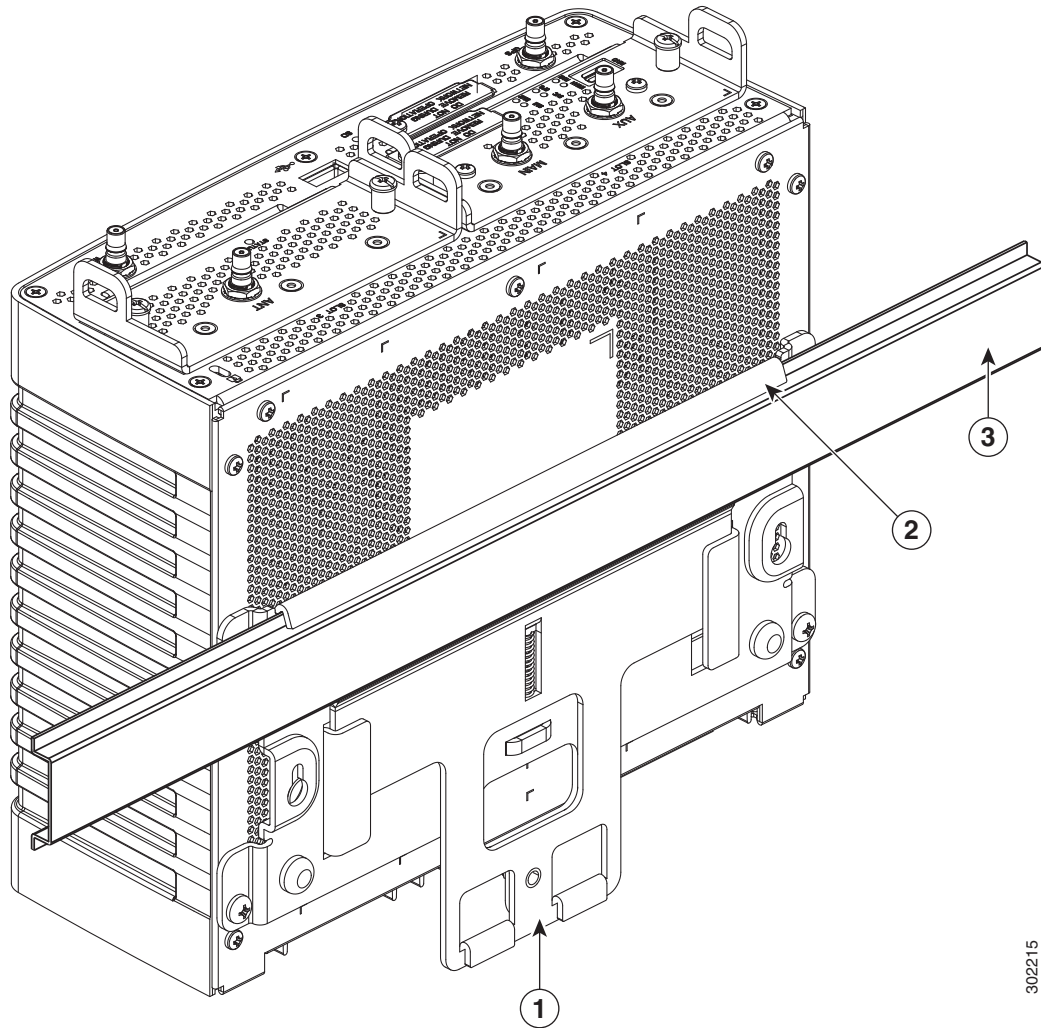


**Caution**

Use caution when pulling the bracket handle: The handle is spring-loaded and will snap shut when released quickly.

- 
- Step 4** Slowly release the bracket handle so that the bottom lip of bracket is secured over the top of the DIN rail.

Figure 4-5 Router Mounted on DIN Rail (3)



302215

## Mount the Router on a Wall

The mounting bracket has wall-mount holes that you can use to mount the router directly on a wall.

To mount the router on a wall, you must provide the hardware that can be used with the wall material in the installation environment.



### Caution

The wall material and hardware that you use to mount the router must be able to support the weight of the router with two modules installed: **8.0 pounds (3.6 Kg)**.

### Wall-Mount Orientation

See [Router Orientation When Mounting](#), page 4-3.

**Wall-Mount Location**

Identify an area on a wall that meets the safety, space, and environmental requirements described in the chapter [Installation Safety and Site Preparation](#).

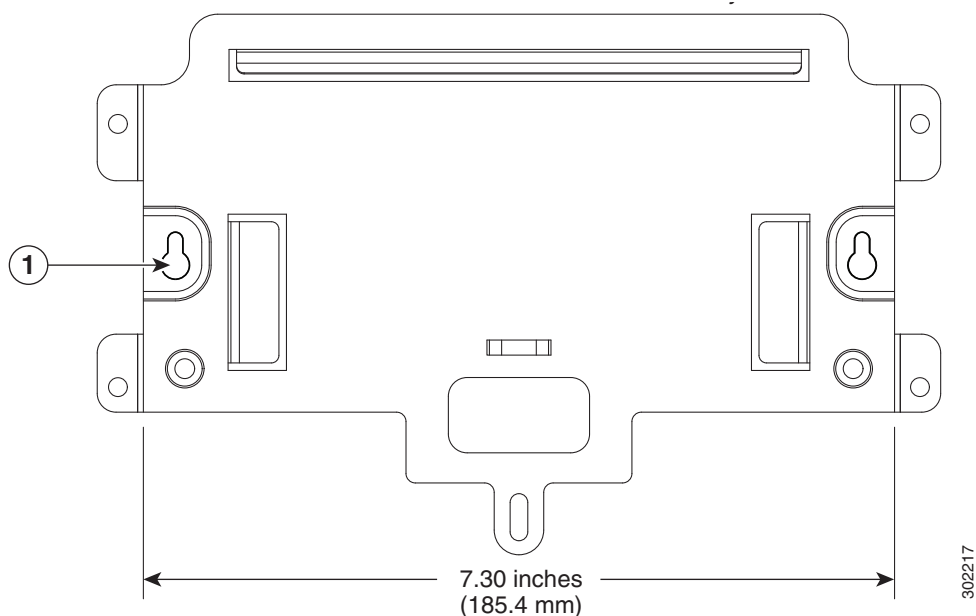
**Wall-Mount Height**

The router should be mounted at a height at which you are able to view the top of the module-side panel and at which the cables are able to be managed without adding stress to the router ports.

**Wall-Mount Hardware Distance**

The hardware you provide should be mounted the correct distance apart so that the router wall mount holes (Item 1, [Figure 4-6](#)) can be hung on the hardware **7.30 inches (185.4 mm)**.

**Figure 4-6** Distance for Wall-Mounting Hardware



## Ground the Router

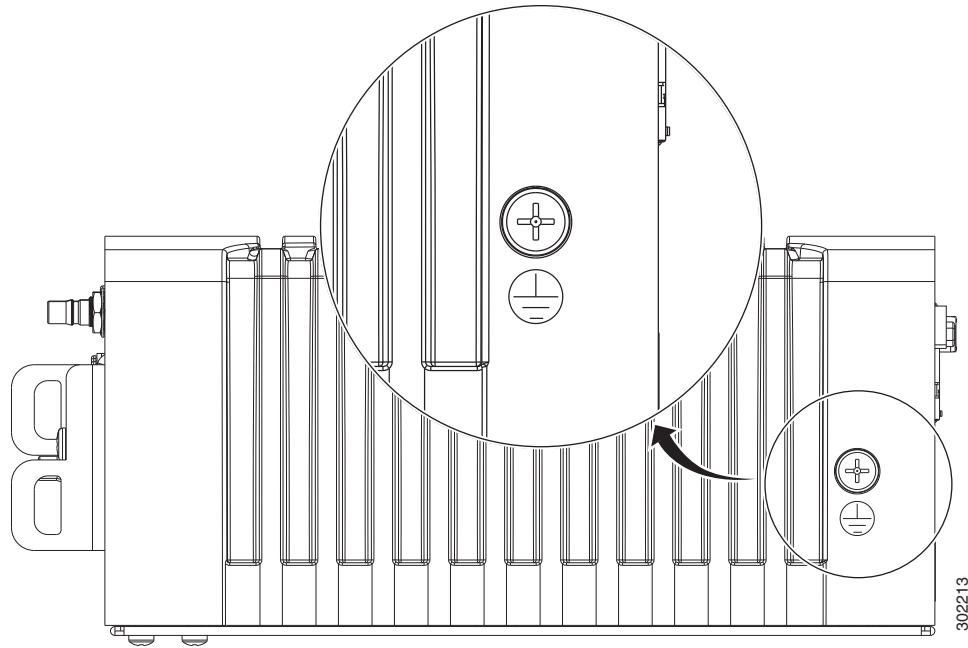
You must ground the router with the grounding lug on the chassis exterior as described in this section.



### Warning

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



**Figure 4-7 Router Grounding Lug Location**

To ground the router, follow these steps:

- 
- Step 1** Use the appropriate crimping tool or pliers to crimp a 6-gauge ground that will attach to the grounding lug on the router exterior. You must provide the wire.
- [Figure 4-6](#) shows the grounding lug location.
- Step 2** Connect the other end of the wire to the router grounding connectors, using the supplied grounding screws. Tighten the grounding screws to 10 to 12 foot-pounds of torque. Do not overtighten!
- Step 3** If necessary, strip the other end of the ground wire and connect it to a reliable earth ground, such as a grounding rod or an appropriate grounding point on substation equipment that is grounded.
-





## CHAPTER 5

# Connecting the Router to Power

---

This chapter describes how to connect the Cisco 1120 Connected Grid Router to AC and DC power source, and includes the following sections:

- [Before You Begin, page 5-1](#)
- [AC Power Connection Information, page 5-4](#)
- [Connect to AC Power, page 5-7](#)
- [Connect to DC Power \(Optional\), page 5-9](#)
- [Power Cycling the Router, page 5-10](#)

## Before You Begin

Before you connect power to the router, read the following topics in this section:

- [Verify Router Hardware Readiness, page 5-1](#)
- [Tools and Materials You Supply, page 5-2](#)
- [EMC Class A Notices and Warnings \(US and Canada\), page 5-2](#)
- [Safety Information, page 5-3](#)

## Verify Router Hardware Readiness

Before connecting the router to power, verify the following:

- The unit is grounded as described in the chapter [Mounting the Router](#)
- The SD flash memory module is installed correctly as described in the chapter [Using the SD Flash Memory Module](#)

## Tools and Materials You Supply

You must provide the following tools and materials to connect the router to AC power or optional DC power:

- Wire-stripping tool
- Flat-blade screwdriver
- AC power cable that meets the following requirements:
  - Wiring compatible with the power supply used at your site: single-phase or three-phase, rated 10A minimum
  - Plug that is compatible with the power source used at your site: single-phase or three-phase.
  - Correct length for your installation
- DC power cable that meets the following requirements:
  - The length and gauge of the DC power cable must be selected such that the voltage supplied to the terminals of the router does not drop below 10.6VDC, which is the minimum recommended operating voltage. *See* the Power Specifications section in the Router Hardware Description chapter.
  - The maximum input current at 9VDC input will be less than 7A and the wire size must be selected by considering the installation DC operating voltage. DC input on the router accommodates a 12AWG to 18AWG wire size.
  - Please consult your Cisco reseller, partner, or sales representative for unusual installation requirements of greater than 30 feet of cabling.

## EMC Class A Notices and Warnings (US and Canada)



Tip

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For a complete listing of all EMC Class A Notices and Warnings, refer to following document:

[Regulatory Compliance and Safety Information for the Cisco 1000 Series Connected Grid Routers](#)

---

### Class A Notice for FCC

Modifying the equipment without Cisco's authorization may result in the equipment no longer complying with FCC requirements for Class A digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## Class A Notice for Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This device complies with Industry Canada (IC) license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

## Safety Information

When connecting the router to AC power, you must ensure that the following conditions are met:

- AC power is available at the installation location.
- AC power can be readily and conveniently removed from the router. The power should not be removed by disconnecting the AC power connector on the unit.



**Warning**

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

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**Warning**

---

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

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**Warning**

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

---



**Caution**

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Before connecting or disconnecting the power cord, you must remove AC power from the power cord using a suitable service disconnect.

---

- When you install the unit outdoors, or in a wet or damp location, the AC branch circuit that powers the unit should have ground fault protection (GFCI), as required by Article 210 of the NEC.
- Ensure that the user-supplied AC power plug is certified for outdoor use and has a minimum IP67 rating, such as Interpower 84131251 or Hubbell HBL316P6W (IEC/EN60309 pin-and-sleeve type connectors).
- If the power cord goes through a metal cover, a bushing should be installed to prevent fraying of the cord. When using a strain relief bushing, you should follow these recommendations:
  - Use properly sized parts that are suitable for outdoor installation
  - Use bushings that are safety certified

# AC Power Connection Information

This section provides information you need to connect the router to AC power and includes the following topics:

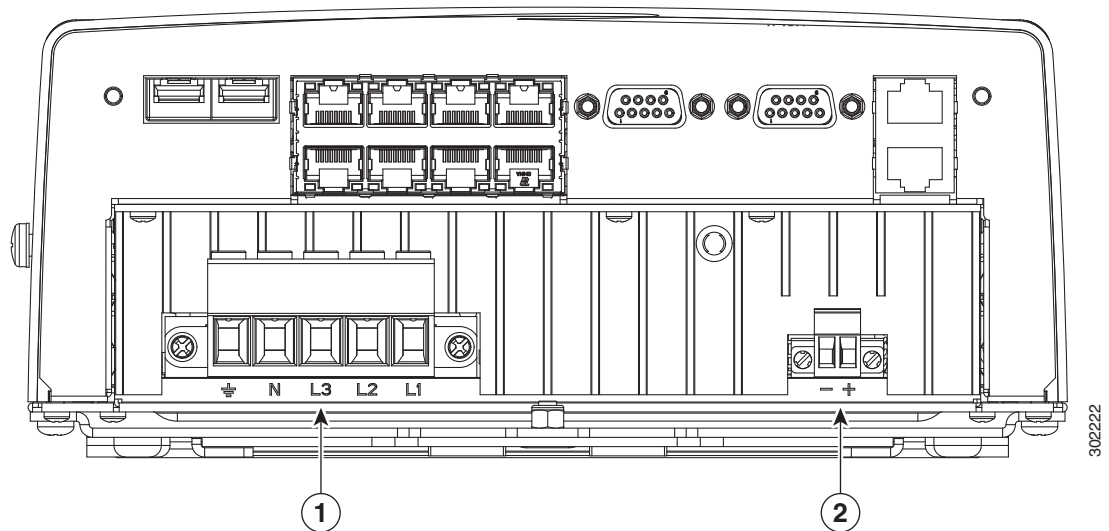
- [Router Power Source Input Terminals, page 5-4](#)
- [Electrical Wire Color Codes, page 5-5](#)
- [Terminal Blocks and Mating Connectors for Power Input Wiring, page 5-6](#)

## Router Power Source Input Terminals

The Cisco CGR 1120 Router has two sets of terminals for power input (see [Figure 5-1](#)):

- A set of five terminals for AC-input power source wires
- A set of two terminals for DC-input power source wires

**Figure 5-1 Router Power Source Input Terminals**



[Figure 5-1](#) shows the label for each terminal.

**Table 5-1 Power Input Terminals**

Item	Terminal Type	Description
1	<b>AC-Input Power Source Terminals</b>	
	⏏	Ground terminal To provide a protected earth ground, terminate either a green/yellow or green wire (region-specific) from the AC power cable on the external screw on the left side of the router.  See <a href="#">Table 5-2</a> for details on wiring colors by region
	N	Neutral wire terminal
	L3	Line terminal
	L2	Line terminal
L1	Line terminal	
2	<b>DC-Input Power Source Terminals</b>	
	-	Negative
	+	Positive

## Electrical Wire Color Codes

This section provides general information about the standard wire coloring used for AC and DC power connections. Use these colors as a guide when wiring the terminal block as part of the AC power and DC power connection procedure.



### Caution

You should verify power wire color information for your installation site with a qualified electrician before making any power connections to the router.

**Table 5-2 AC Power Electrical Wiring Colors by Region**

Region or Country	Standard	Ground (Protective Earth)	Neutral	Line (Phases)
European Union	IEC 60446	Green-and-yellow	Blue	Black, brown, gray
United States	–	Green	White	<b>120/208/240V:</b> Black, red, blue <b>277/480V:</b> Brown, orange, yellow
Canada	–	Green	White	<b>120/208/240V:</b> Red, black <b>Single-phase isolated systems:</b> orange, brown <b>Three-phase isolated systems:</b> orange, brown, yellow

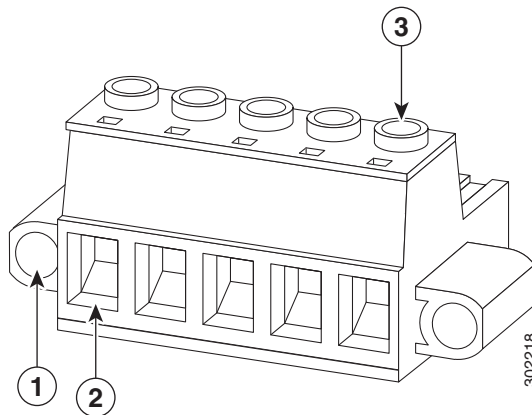
**Table 5-3 DC Power Electrical Wiring Colors**

Color	Description
Black	Negative
Red	Positive

## Terminal Blocks and Mating Connectors for Power Input Wiring

The router ships with two power terminal blocks that are used to connect power input wires to the power input mating connectors on the router.

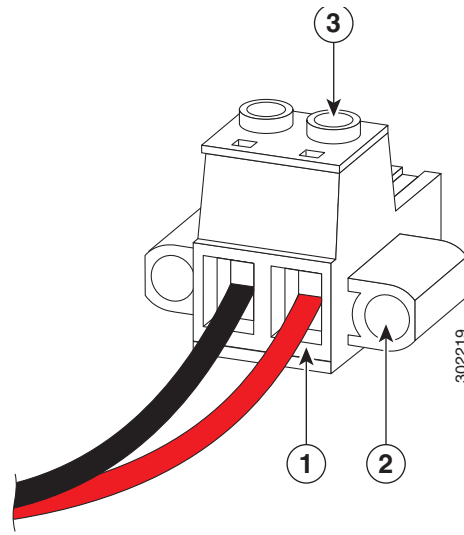
- [Figure 5-2](#) shows the AC-input terminal block.
- [Figure 5-3](#) show the DC-input terminal block.

**Figure 5-2 AC-Input Terminal Block**

Item	Description	Quantity
1	Captive screws, for connecting terminal block to mating connector on the router	2
2	Terminal openings for inserting AC-input source wires	5
3	Screws for tightening wires into terminal openings	5

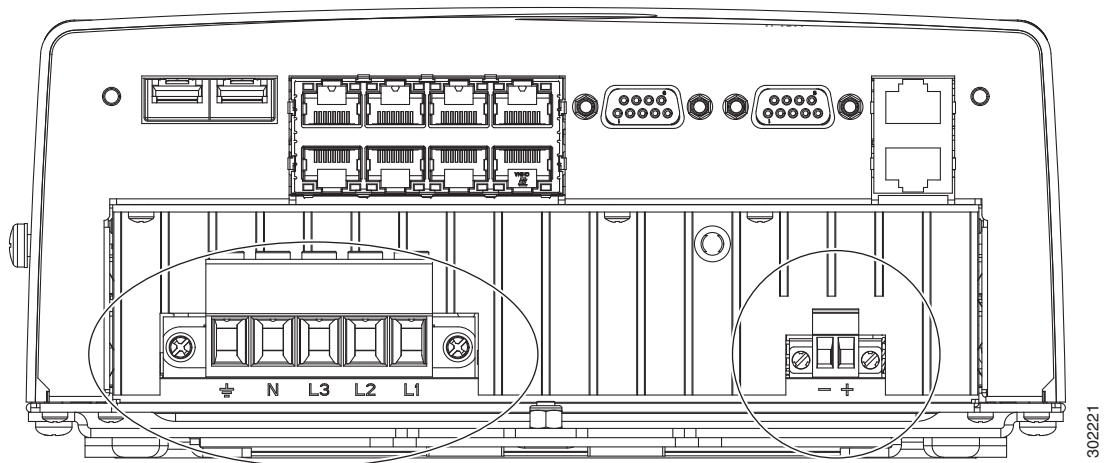


Figure 5-3 DC-Input Terminal Block



Item	Description	Quantity
1	Terminal openings for inserting DC-input source wires	2
2	Captive screws, for connecting terminal block to mating connector on the router	2
3	Screws for tightening wires into terminal openings	2

Figure 5-4 Terminal Block Mating Connectors on Router Chassis



## Connect to AC Power

This section describes how to make two the following types of AC power connections to the router:

- Single-phase AC
- Three-phase AC

To connect the router to AC power, follow these steps:

**Note**

The router will power on as soon as it is connected to an AC power source. You are not required to press a power button to power on the router.

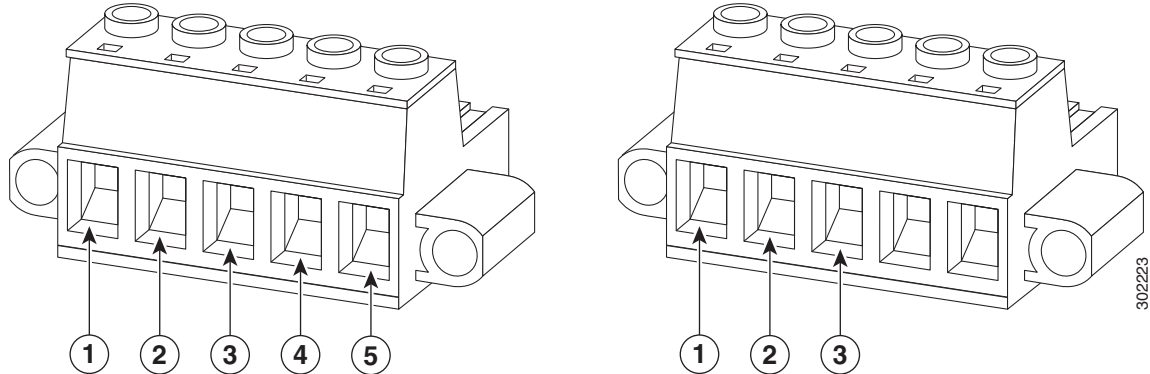
接続ケーブル、電源コード、ACアダプタ、バッテリーなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外の部品をご使用になると故障や動作不良、火災の原因となります。また、電気用品安全法により、当該法の認定（PSEとコードに表記）でなくUL認定（ULまたはCSAマークがコードに表記）の電源ケーブルは弊社が指定する製品以外の電気機器には使用できないためご注意ください。

**Caution**

When connecting the router AC power connector, always connect the router end of the cable first. When removing the AC power connector, always disconnect the router end of the cable last.

- Step 1** Turn off power to the AC power source at the designated circuits.
- Step 2** Use a wire-stripping tool to strip each of the wires from the AC-input power source. Expose the wire to the appropriate length for the terminal block, about 0.25 inches.
- Step 3** Insert the wires into the terminal block openings that correspond to the labeled AC terminals shown in [Figure 5-1](#) and described in [Table 5-1](#).

Insert wires that correspond to your installation (three-phase or single-phase), as shown here:



3-Phase AC Power

Single-Phase AC Power

- Step 4** After the wires are inserted in the terminal block, use the screwdriver to tighten the terminal block wire screws to keep the wires in place. The screws are shown in [Figure 5-2](#).
- Step 5** Taking care not to place strain on the wires, insert the terminal block into the mating connector on the router. The mating connector is shown in [Figure 5-4](#).
- Step 6** Use the screwdriver to tighten the two captive screws on the terminal block to the mating connector. The terminal screws are shown in [Figure 5-2](#). Torque the terminal block screws to 11 lbf-in.
- Step 7** Turn on AC power by plugging in an AC power cord to the power source, or enabling power at the designated circuit. The router will power on and run a series of bootup tests, indicated by blinking LEDs.

## Verify AC Power Connection

After you connect the router to AC power, verify that the power is being supplied to the router by checking the status of the SYS (System) LED. As the router starts up, the SYS LED will show these states:

Sequence	State	Description
1	Yellow	System is receiving power.
2	Green blinking	The system is starting up or power cycling, and loading system software, including BIOS and operating system.
3	Green solid	The system is functioning normally.

For the SYS LED location, see [Figure 10-1](#) in the chapter [Router LED Locations and States](#).

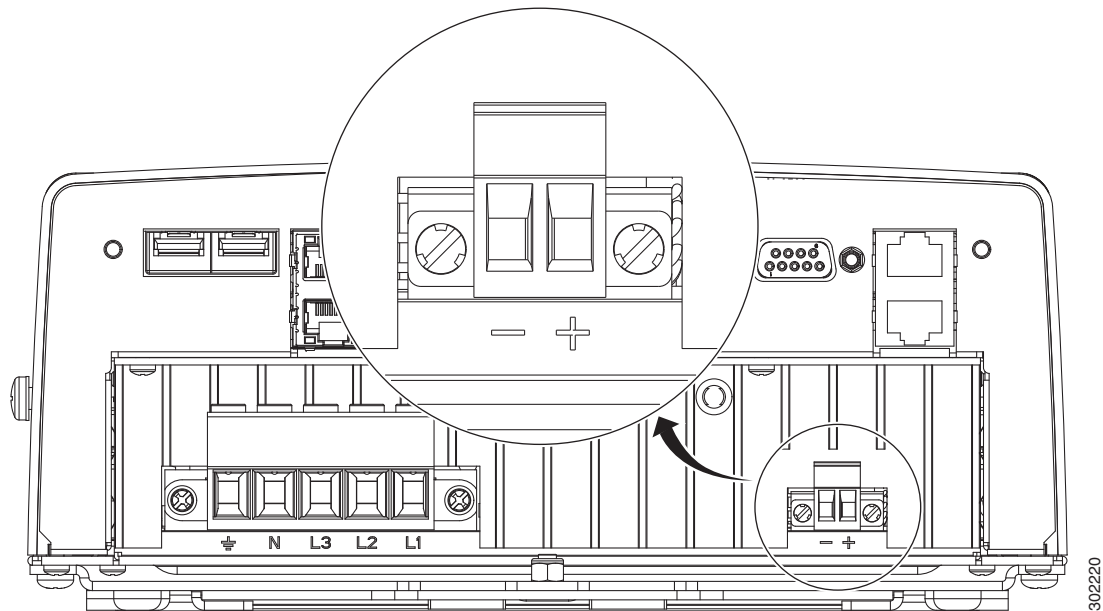
## Connect to DC Power (Optional)

You can connect the router to a DC power source that provides backup power to the router in cases when AC power is disrupted or fails. You must provide the DC power source and ensure that it is compliant with the installation site requirements.

To connect a DC-input power source to the router, follow these steps:

- 
- Step 1** Turn off power to the DC power source at the designated circuits.
  - Step 2** Using a wire-stripping tool to strip both of the wires from the DC-input power source. Expose the wire to the appropriate length for the terminal block, about 0.25 inches.
  - Step 3** Insert the wires into the terminal block openings that correspond to the labeled DC terminals shown in [Figure 5-1](#) and described in [Table 5-1](#).

Make sure to match the polarity (negative-to-negative and positive-to-positive) when you connect the wires to the terminal block openings:



- Step 4** After the wires are inserted in the terminal block, use the screwdriver to tighten the terminal block wire screws to keep the wires in place. The screws are shown in [Figure 5-2](#).
- Step 5** Taking care not to place strain on the wires, insert the terminal block into the mating connector on the router. The mating connector is shown in [Figure 5-4](#).
- Step 6** Use the screwdriver to tighten the two captive screws on the terminal block to the mating connector. The terminal screws are shown in [Figure 5-2](#). Torque the terminal block screws to 11 lbf-in.
- Step 7** Enable DC power by plugging in the DC power supply cord to the power source, or by enabling power at the designated circuit.

## Power Cycling the Router

There are two reset buttons on the router cable panel, which can be used to power cycle the router and to reset the router system software to the default configuration. Use the reset buttons as described in this section.



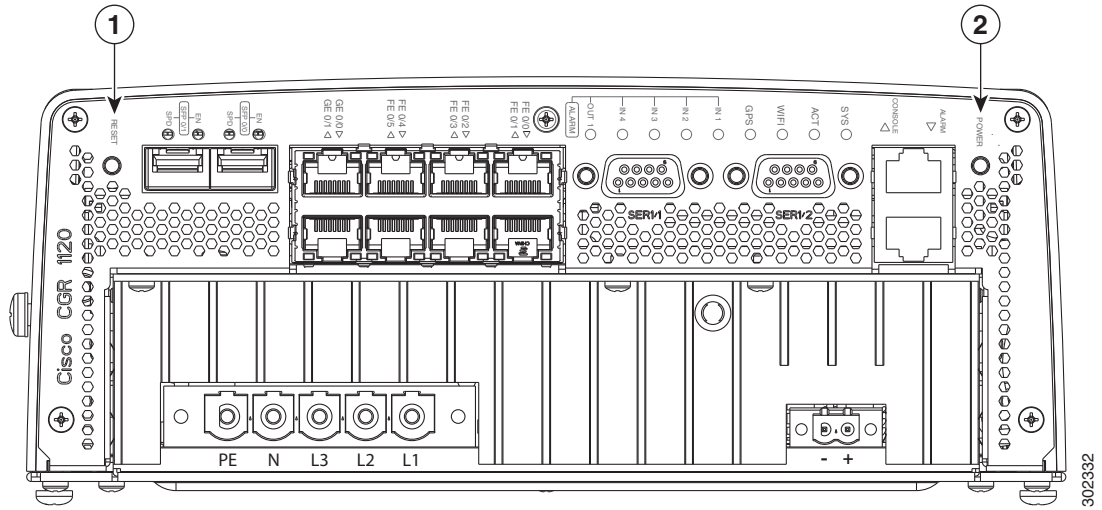
### Caution

When you use the CONFIG Reset button to restore the router to the factory default software configuration, the current software configuration is permanently deleted from the router.

## Accessing the Buttons

You must provide a pin, paper clip, or other thin metal tool to access and press these buttons.

Figure 5-5 Router Power and Reset Buttons



Item	Button	Description
1	<b>CONFIG Reset</b>	Press the CONFIG Reset button for at least 5 seconds to return the router software configuration to the factory default, and power cycle the router. Power cycling the router turns the router off, then immediately back on. The router will temporarily stop operating on the network during the power cycle, then resume operating when the power cycle process is complete.
2	<b>PWR RESET</b>	Press the PWR RESET button for at least 5 seconds to power cycle the router. Power cycling the router turns the router off, then immediately back on. The router will temporarily stop operating on the network during the power cycle, then resume operating when power cycle process is complete.





# CHAPTER 6

## Making Network Connections

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This chapter describes how to connect network and other connections when installing the Cisco 1120 Connected Grid Router, and includes the procedures for basic router network connections and for optional installation steps. The procedures you follow depend on your network environment and requirements. This chapter contains the following sections:

- [Before Installing, page 6-1](#)
- [Basic Network Connections, page 6-2](#)
- [Additional Router Connections, page 6-7](#)
- [Installing Modules and Antennas, page 6-13](#)



**Note**

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This chapter describes router installation procedures. For detailed, technical information about the router hardware, including hardware specifications and connector and cable descriptions, see the [Router Hardware Description](#) chapter and the [Connector and Cable Specifications](#) appendix.

---

## Before Installing

Before following any installation procedures in this chapter, read the following topics in this section:

- [Installation Site Preparation, page 6-1](#)
- [Installation Safety Information, page 6-2](#)
- [Connecting the Router to Power, page 6-2](#)
- [Preventing Electrostatic Discharge Damage, page 6-2](#)
- [Cabling Guidelines, page 6-2](#)

## Installation Site Preparation

The procedures in this chapter assume that you have prepared the installation site according to the information in the [Installation Safety and Site Preparation](#) chapter.

## Installation Safety Information

Before performing any of the tasks in this chapter, read the safety warnings in this section and in the [Installation Safety and Site Preparation](#) chapter.

## Connecting the Router to Power

Before you make network connections, your router should be connected to the AC power source and powered on as described in the chapter, [Connecting the Router to Power](#).

## Preventing Electrostatic Discharge Damage

Many of the components discussed in this chapter are sensitive to electrostatic discharge (ESD) damage, which can occur when electronic cards or components are handled improperly, which can result in complete or intermittent failures.

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- Place a removed memory card on an antistatic surface or in a static shielding bag. If the card will be returned to the factory, immediately place it in a static shielding bag.
- Avoid contact between the card and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- Do not remove the wrist strap until the installation is complete.

## Cabling Guidelines

Follow these guidelines for using cables with the router:

- Follow the recommended [Router Orientation When Mounting, page 4-3](#), to prevent cable strain.
- Position cables so that they do not place strain on the router connectors.
- Organize cables into bundles when necessary to avoid intertwining.
- Inspect cables to ensure adequate routing and bend radius.
- Install cable ties that comply with your site requirements.

## Basic Network Connections

This section describes basic router installation steps. These are the minimum installation steps required for the router to begin operating within the field area network.



## Connect to the Ethernet Network

The steps in this section require that an Ethernet network connection is available at the installation location.

There are two options for connecting to the Ethernet network:

1. [Connecting the Ethernet Ports, page 6-3](#)
2. [Connecting the SFP Ports, page 6-4](#)

### Connecting the Ethernet Ports

The router features four Fast Ethernet (FE) ports and two Gigabit Ethernet (GE) ports for connecting the router to an Ethernet network through a hub or switch.

- See [Figure 6-1](#) for the Ethernet port locations.
- One or two Ethernet cables are typically provided with the router. Additional cables and transceivers can be ordered from Cisco. For ordering information, contact your reseller or Cisco customer service.
- The GE ports (ETH 2/1 and ETH 2/2) have identical labels to the SFP ports because the SFP ports share physical ports with the GE ports. For detailed information about how to use these ports (called combo ports), see [Combo Ports, page 3-15](#), in the chapter [Router Hardware Description](#).

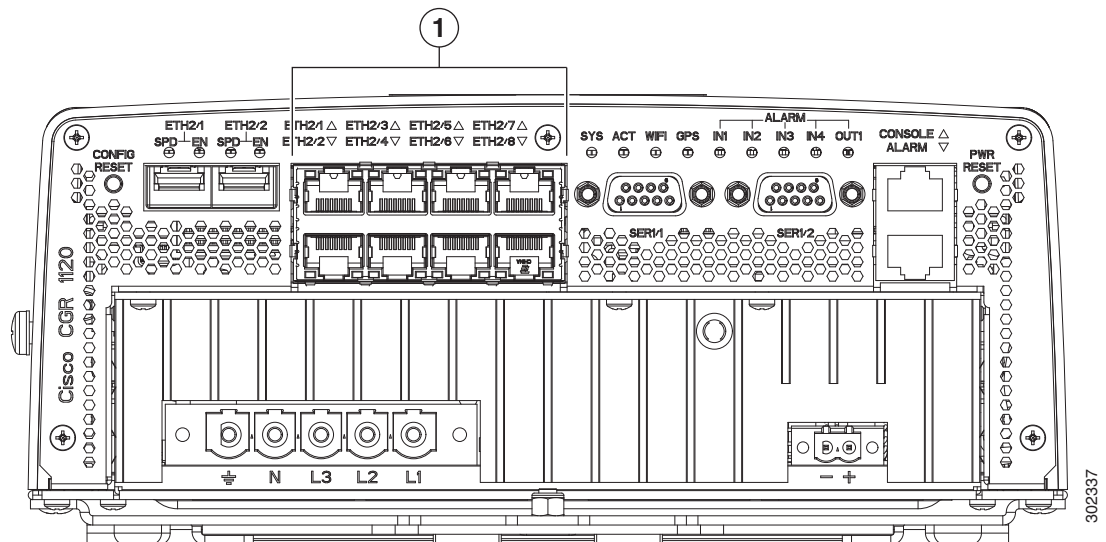


**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity.**

Statement 1001

**Figure 6-1 Ethernet Ports (Item 1)**



Item	Description
1	4–Fast Ethernet ports <ul style="list-style-type: none"> <li>• ETH 2/3</li> <li>• ETH 2/4</li> <li>• ETH 2/5</li> <li>• ETH 2/6</li> </ul>
2	2–Gigabit Ethernet port (combo ports) <ul style="list-style-type: none"> <li>• ETH 2/1</li> <li>• ETH 2/2</li> </ul>

## Connecting the SFP Ports

Small Form-Factor Pluggable (SFP) modules are devices that plug into the router SFP connectors shown in [Figure 6-2](#). The transceiver connects the electrical circuitry of the module with the optical or copper network.

The SFP module used on each port must match the wavelength specifications on the other end of the cable, and the cable must not exceed the stipulated cable length for reliable communications.

Use only Cisco SFP transceiver modules with the router. Each SFP transceiver module supports the Cisco Quality Identification (ID) feature which allows a Cisco switch or router to identify and validate that the transceiver module is certified and tested by Cisco.



### Warning

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**Class 1 laser product.** Statement 1008

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### Caution

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

---



### Caution

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Cisco recommends that you not install or remove the SFP module while the fiber-optic cable is attached to it because of the potential damage to the cables, to the cable connector, or to the optical interfaces in the SFP module. Disconnect the cable before you remove or install an SFP module.

---

## Materials and Tools You Supply

You must provide these tools and materials to install the SFP transceiver module:

- Wrist strap or other personal grounding device to prevent ESD occurrences.
- Antistatic mat or antistatic foam to set the transceiver on.
- Fiber-optic end-face cleaning tools and inspection equipment. For complete information on inspecting and cleaning fiber-optic connections, see the white-paper document at this URL:

[http://www.cisco.com/en/US/tech/tk482/tk876/technologies\\_white\\_paper09186a0080254eba.shtml](http://www.cisco.com/en/US/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml)

## Connecting

This section describes how to install SFP modules. SFP modules are inserted into the SFP ports shown in [Figure 6-2](#).

You can connect SFP modules to these ports while the router is operating normally. The SFP ports are labeled **ETH 1/2** and **ETH 2/2**.

When installing or removing SFP modules, observe these guidelines:

- Removing and installing an SFP module can shorten its useful life. Do not remove and insert any module more often than is absolutely necessary.
- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.

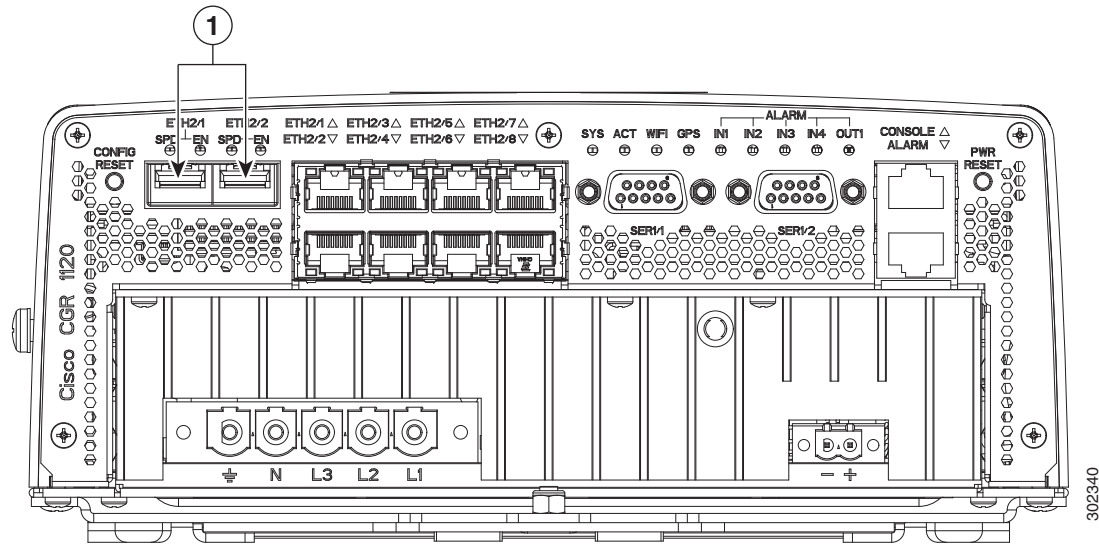
To install SFP modules, follow these steps:

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface.   |
| <b>Step 2</b> | For fiber-optic SFP modules, remove the dust plugs and store them in a clean location for reuse.  |
| <b>Step 3</b> | Position the SFP transceiver module in front of the socket opening, and insert the SFP into the socket until you feel the connector latch into place. |
| <b>Step 4</b> | Remove the dust plugs from the network interface cable LC connectors.   |
| <b>Step 5</b> | Inspect and clean the LC connector's fiber-optic end-faces.   |
| <b>Step 6</b> | Remove the dust plugs from the SFP transceiver module optical bores.  |
| <b>Step 7</b> | Attach the network interface cable connector to the SFP transceiver module.   |
- 

## Related Information

- For supported SFP modules, see the chapter [Router Hardware Description](#).
- For detailed information on connecting the SFP module cables to the network, see Cisco.com for the documentation for your SFP module.

Figure 6-2 SFP Ports (Item 1)



## Verify Ethernet Connection with System Software CLI

To verify that the router has been successfully installed and connected to the network, use the **show interface** command to confirm that the router Ethernet interface is up.

```
CGR1120> show interface
```

```
Ethernet0 is up, line protocol is up
```

```
Hardware is Cisco, address is 0019.076c.1a78 (bia 0019.076c.1a78)
Internet address is 192.0.2.111/23
MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
Encapsulation ARPA, loopback not set, keepalive set (10 sec)
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 5/75, 32 drops
5 minute input rate 10000 bits/sec, 27 packets/sec
5 minute output rate 10000 bits/sec, 26 packets/sec
 16076431 packets input, 1280716531 bytes, 27 no buffer
  Received 1809290 broadcasts, 0 runts, 0 giants
  1105 input errors, 0 CRC, 0 frame, 0 overrun, 1105 ignored, 0 abort
  0 input packets with dribble condition detected
 16196175 packets output, 1011044938 bytes, 0 underruns
  19 output errors, 184 collisions, 3 interface resets
  0 babbles, 0 late collision, 1474 deferred
  19 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out
Serial0 is administratively down, line protocol is down
Hardware is HD64570
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/64/0 (size/threshold/drops)
Conversations 0/0 (active/max active)
Reserved Conversations 0/0 (allocated/max allocated)
```

```
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  0 packets output, 0 bytes, 0 underruns
  0 output errors, 0 collisions, 1 interface resets
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
DCD=down DSR=down DTR=down RTS=down CTS=down
```

For more information about using the **show interface** command, see the *Cisco 1000 Series Connected Grid Routers Software Configuration Guide*.

## Additional Router Connections

This section provides information about making other, additional router cable connections. Follow the procedures in this section based on your network configuration and requirements. This section contains these procedures:

- [Connecting the Console Port, page 6-8](#)
- [Connecting the Serial Port, page 6-9](#)
- [Connecting the USB Port, page 6-10](#)
- [Connecting the Alarm Port, page 6-11](#)
- [Installing Modules and Antennas, page 6-13](#)

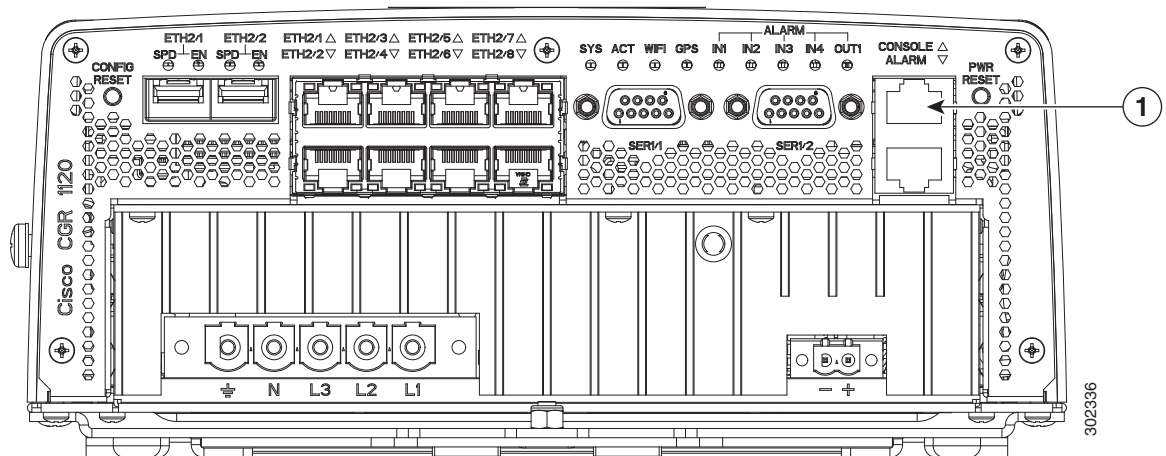
## Connecting the Console Port

### About

To configure the router through the Cisco IOS command-line interface (CLI), you must establish a connection between the router console port and either a terminal or a PC. The console port is located on the router exterior (Figure 6-3) and is labeled **CON**.

Use this port to connect a PC terminal, enabling you to log directly into the router system software to perform configuration or other commands.

**Figure 6-3 Console Port (Item 1)**



### Connecting

This section describes how to connect a PC terminal to the console port.

When a terminal is connected to the console port, you can connect directly to the router and configure it. You can connect a PC terminal to this port while the router is operating normally.

To connect a PC terminal to the router, you must provide:

- RJ-45-to-RJ-45 rollover cable
- One of the following adapters, depending on the port type of the terminal device: RJ-45-to-DB-25 female DTE adapter or RJ-45-to-DB-9 female DTE adapter (labeled **TERMINAL**).

Follow these steps to connect a PC or PC terminal to the console port:

- 
- Step 1** Connect one end of the RJ-45-to-RJ-45 rollover cable to the console port on the router.
  - Step 2** Connect the adapter you provide to the other end of the RJ-45 cable.
  - Step 3** Connect the adapter end of the cable to the router.
-

## Related Information

- For information about starting a terminal session over the console port with Microsoft Windows, Mac OS X, or Linux, see the appendix [Starting a Router Terminal Session](#).
- For more information about this port, see the chapter [Router Hardware Description](#).

## Connecting the Serial Port

### About

Before you connect a device to the router serial port ([Figure 6-4](#)), you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface
- Type of connector, male or female, required to connect to the device
- Signaling standard required by the device

These are the most common devices connected to the router serial ports:

Serial Device	Network Options	Network Encapsulation (Framing)	Network Type
Asynchronous modem	Asynchronous dial-up line	Point-to-Point (PPP)	Remote location to data center
Channel service unit/data service unit (CSU/DSU)	Synchronous leased line	High-Level Data Link Control (HDLC) or PPP	Remote location to data center
	Frame Relay	Frame Relay	
	X. 25	X. 25	

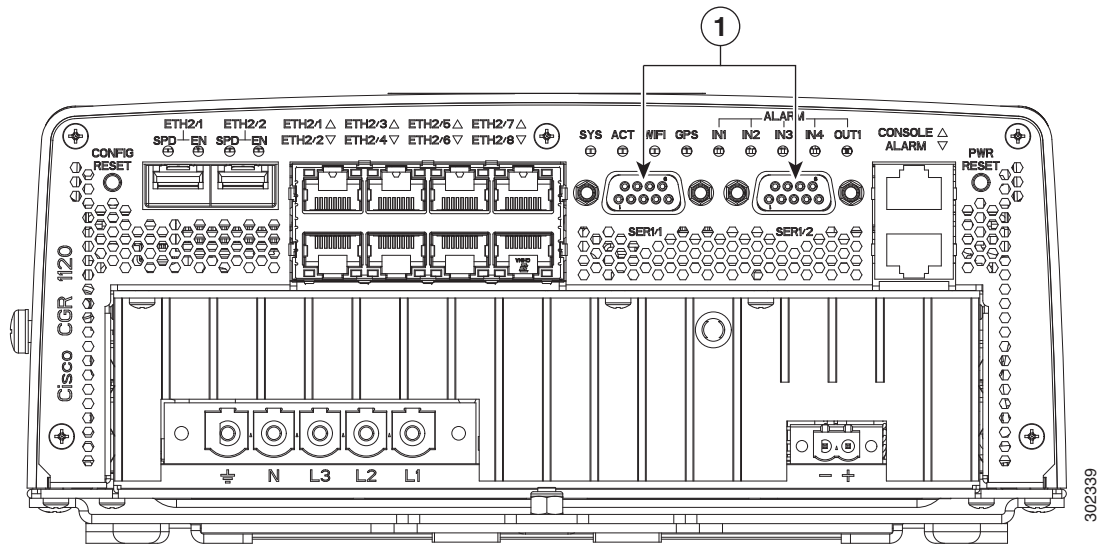
### Connecting

- You must provide or purchase separately the correct serial cable. The cable does not ship with the router. Contact your Cisco reseller to purchase the correct cable from Cisco.
- You can connect a device to this port while the router is operating normally.
- The serial ports are labeled **SER 1/1** and **SER 1/2**.

### Related Information

For more information about this port, including supported standards and signaling, see the chapter [Router Hardware Description](#).

Figure 6-4 Serial Ports (Item 1)



## Connecting the USB Port

### About

You can connect an optional USB device to the router USB port (Figure 6-5), which will provide power to the USB device. You can also connect USB devices that are powered by an external source, such as an AC adapter or batteries.

### Connecting

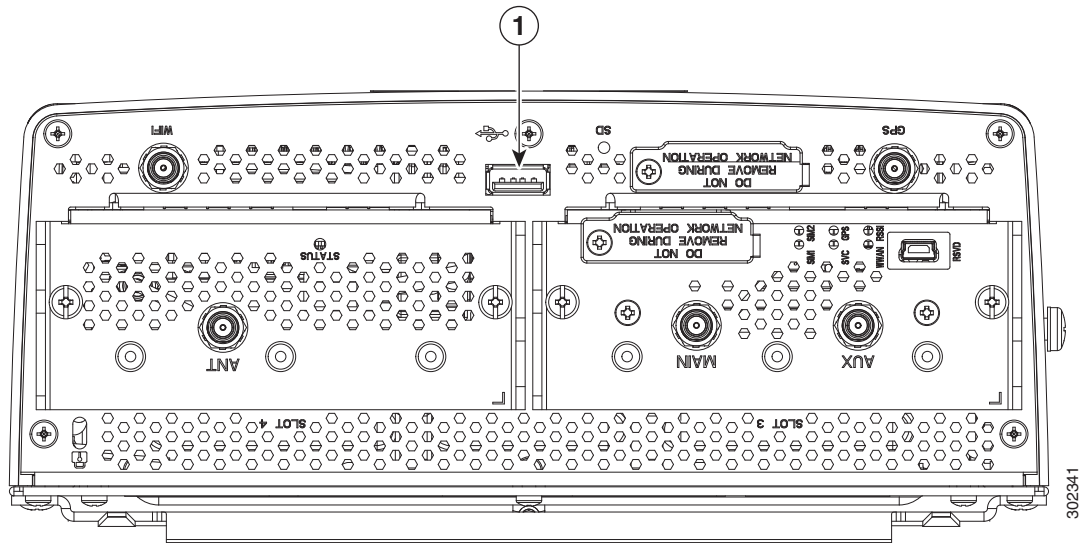
- You can connect devices to the USB port while the router is operating normally.
- The USB port is labeled with universal USB icon.
- Depending on the USB devices you connect to these ports, you might require a USB extension cable to connect devices to these ports.
- To prevent connected USB devices from being stolen or accidentally removed, secure any connected USB device with a locking mechanism designed for this purpose.

### Related Information

For detailed information about these ports, including supported USB standards and power output, see the chapter [Router Hardware Description](#).



Figure 6-5 USB Port (Item 1)



## Connecting the Alarm Port

### About

The alarm port provides data about fatal or severe errors that can cause the system software to crash.

The alarm port is connected to a normally closed solid state relay. Cisco CG-OS writes to a hardware port and the relay contact opens. If the system enters into a ROM monitor (ROMmon) or watchdog reset state, the relay contacts close. The closing contacts alert the alarm annunciator or monitor that a Cisco CG-OS crash has occurred.

If interfaces fail or other non-fatal errors occur, the alarm port does not respond. Continue to use SNMP to manage these types of errors.

### Connecting

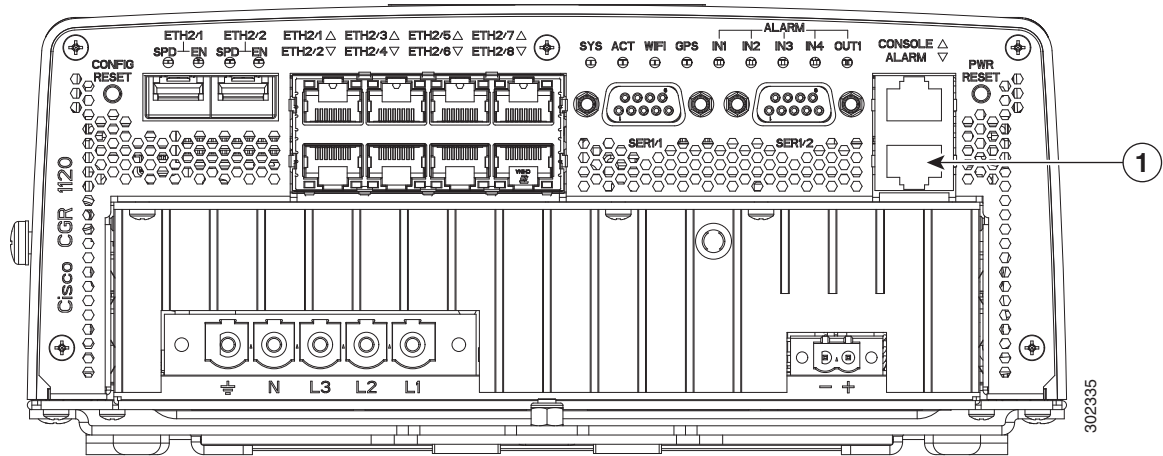
- You can connect this port while the router is operating normally.
- If you use an alarm system on your network, connect the alarm port to an alarm system with an alarm cable that you provide.

### Related Information

[Router Hardware Description](#) includes detailed information about this port, including:

- Alarm input and output
- Location on the router
- Link to pinout information

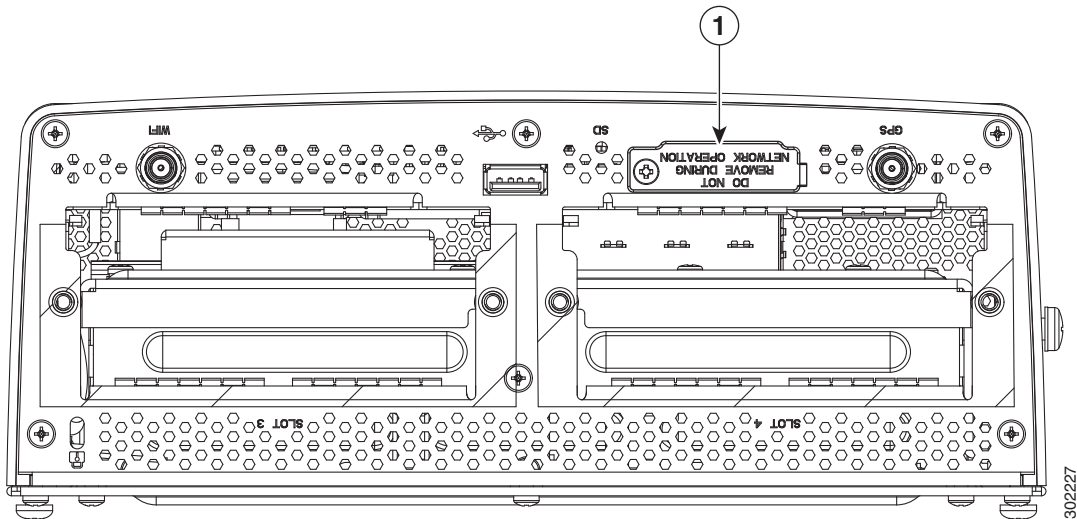
Figure 6-6 Alarm Port (Item 1)



## SD Flash Memory Module Card

For detailed information about the router SD Flash Memory Module card, including specifications, supported SD cards, and installation procedures, see the chapter [Using the SD Flash Memory Module](#). For information about the antennas that ship with the router, see the chapter [Using the SD Flash Memory Module](#).

Figure 6-7 SD Card Slot (Item 1)



# Installing Modules and Antennas

The router supports up to two Cisco Connected Grid modules. Each module requires one or two antennas, which are installed on the module or near the router.

## Related Information

- For information about supported router antennas, see the chapter [About Connected Grid Antennas](#).
- For information about supported modules, see the chapter [About Connected Grid Modules](#).
- For detailed installation instructions for all Connected Grid modules and antennas, see the documentation on Cisco.com at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)





## CHAPTER 7

# About Connected Grid Modules

---

This chapter describes how to find installation information for the Cisco Connected Grid modules that support the Cisco 1120 Connected Grid Router, and contains the following sections:

- [Installing or Replacing Modules, page 7-1](#)
- [Where to Find Additional Module Information, page 7-4](#)

## Installing or Replacing Modules

The router supports up to two Cisco Connected Grid modules to enable network connections from the router to field devices, such as smart meters, and from the router to the utility or data management center.

Depending on the configuration, your router could arrive in the shipping container with all required modules already installed. However, you might need to install a module when you:

- Add modules to your current installation.
- Must replace a faulty module.

## Installing Modules in the Router

This section provides general instructions for installing modules in the router. For information specific to a particular module, refer to the module installation and configuration guides on Cisco.com, at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules).

This section contains the following topics:

- [Preparing to Install Modules, page 7-2](#)
- [Module Installation Locations, page 7-2](#)
- [Install Modules, page 7-3](#)
- [Remove Modules, page 7-4](#)

## Preparing to Install Modules

Before installing modules in the router, verify the following guidelines have been met:



**Caution**

You must power down the router to install or remove Connected Grid modules. The modules do not support online insertion and removal (OIR).

- Verify that there is adequate airflow around the module slots and through the router vents. For more information, see the chapter [Installation Safety and Site Preparation](#).
- The ambient installation environment temperature must not exceed 140°F (60° C). If the module is installed in a closed or multi-rack assembly, the temperature around it might be higher than normal room temperature.
- The installation environment humidity must not exceed 95% (non-condensing).
- The installation site altitude must be no higher than 10,000 feet.
- After replacing or installing a module in the router, you must update the label (on the router exterior) that lists the module types contained in the router. The label must list the FCC ID number and the IC Certification number for each module installed in the router.

## Installation Warning Statements

This section includes the installation warning statements. Translations of these warning statements appear in the *Regulatory Compliance and Safety Information for Cisco Connected Grid Router 1000 Series Routers* documents on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).



**Warning**

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



**Warning**

**To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 140°F (60°C)** Statement 1047



**Warning**

**To prevent airflow restriction, allow clearance around the ventilation openings to be at least: 1.75 in. (4.4 cm)** Statement 1076

## Module Installation Locations

Connected Grid modules can be installed in either module slot, regardless of module type. Empty module slots must be covered with a blank faceplate.

## Install Modules

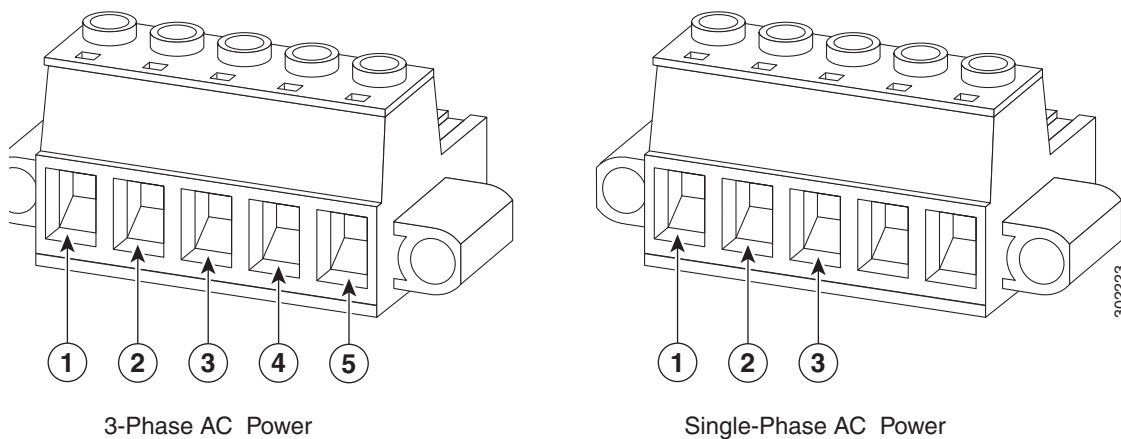
**Tip**

This section provides general module installation steps. For detailed steps for the module type that you are installing, see the installation and configuration guide for your module at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).

To install a module in an available router slot, follow these steps:

- Step 1** Power down the router as described in the router hardware installation guide on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).
- Step 2** Insert the module in the slot as shown in [Figure 7-1](#).
- Step 3** Using a screwdriver, secure the module captive screws (two per module) into the connectors on the router front panel.
- Step 4** Power on the router as described in the router hardware installation guide on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).

**Figure 7-1** Insert Modules into Router



Item	Description
1	Module captive screws, 2 per module
2	Router captive screw connectors (4)

## Remove Modules

To remove a module from the router:

- 
- Step 1** Power down the router as described in the router hardware installation guide on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).
  - Step 2** Insert the module in the slot as shown in [Figure 7-1](#).
  - Step 3** Using a screwdriver to loosen the module captive screws (two per module) from the connectors on the router front panel.
  - Step 4** Use your hands to gently pull the module from the router.
  - Step 5** If needed, power on the router as described in the router hardware installation guide on Cisco.com, at: [www.cisco.com/go/cgr1000-docs](http://www.cisco.com/go/cgr1000-docs).
- 

## Where to Find Additional Module Information

For instructions on how to install, replace, and configure the modules, see these installation and configuration guides on Cisco.com, at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

**Table 7-1** Connected Grid Modules for CGR 1000 Series Routers Documentation

Connected Grid Module	Related Documentation
Cisco Connected Grid Modules for CGR 1000 Series – WiMax	Cisco Connected Grid WiMAX Module for CGR 1000 Series Installation and Configuration Guide
Cisco Connected Grid Modules for CGR 1000 Series – Cellular 3G	Cisco Connected Grid Cellular 3G Module for CGR 1000 Series Installation and Configuration Guide
Cisco Connected Grid Modules for CGR 1000 Series – WPAN	Cisco Connected Grid WPAN Module for CGR1000 Series Installation and Configuration Guide





## CHAPTER 8

# About Connected Grid Antennas

---

This chapter describes the Cisco 1120 Connected Grid Router antennas, and describes how to find product and installation information for all Cisco Connected Grid antennas. This chapter includes these sections:

- [Router Antennas Overview, page 8-1](#)
- [Installing or Replacing Module Antennas, page 8-5](#)
- [Antenna Specifications, page 8-6](#)

## Router Antennas Overview

This section describes the antennas used with the router.

### Router Antennas

The router ships with two antennas that support router functionality:

- [GPS Antenna, page 8-2](#)
- [WiFi Antenna, page 8-4](#)

### Module Antennas

The router also supports [Connected Grid Module Antennas, page 8-4](#).

Figure 8-1 Router WiFi and GPS Antenna Locations

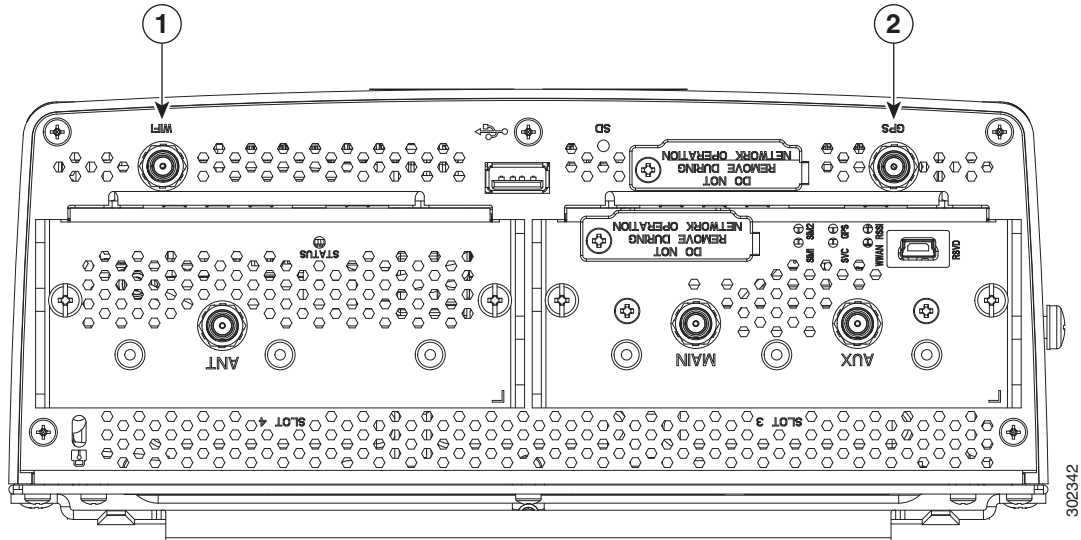


Table 8-1 Router WiFi and GPS Antenna Locations

Item	Feature
1	WiFi antenna port
2	GPS antenna port

## GPS Antenna

The Connected Grid GPS Antenna kit (optional) includes the following items:

- GPS antenna with integrated 15-foot coaxial cable (see [Figure 8-2](#))
- Male QMA connector adapter, to connect the cable to the router GPS antenna port
- Hardware required to mount the antenna, for example on the substation or utility cabinet exterior

This antenna provides connectivity to the GPS system, from which the router derives precise time and location information while operating on the network.

### GPS Antenna Information



#### Caution

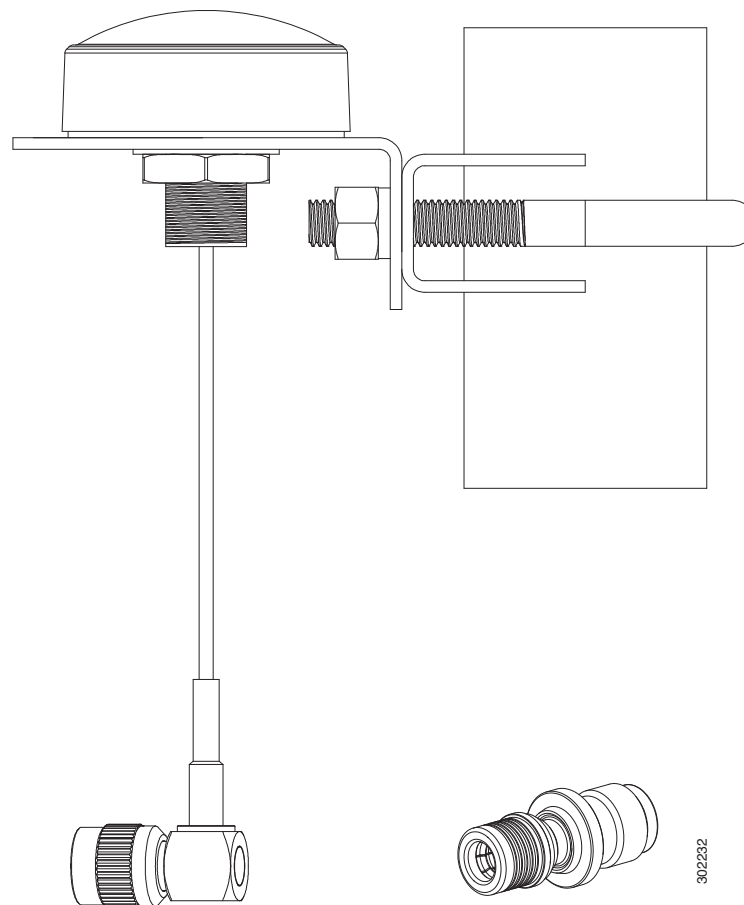
If the antenna is mounted outside, the antenna assembly must be grounded either at the bracket or at the external building point where the cabling enters the building. This is critical because if it's not grounded, the CGR 1120 chassis would be isolated on the antenna card very close to AC isolation requirements. Also see Statement 1052 below.

**Warning**

**Do not locate the outdoor antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada:Canadian Electrical Code, Section 54). Statement 1052**

- The GPS antenna is a field-replaceable component.
- For detailed technical information about the GPS antenna, see [GPS Antenna Specifications, page 8-6](#).
- For information about the GPS status LED, see the chapter [Router LED Locations and States](#).
- For more information about the [Internal GPS Module](#), see the chapter [Router Hardware Description](#).

**Figure 8-2** GPS Antenna with Mounting Hardware and Male QMA Adapter



## WiFi Antenna

The Connected Grid 4GE LTE WiFi antenna kit (optional) includes the following items:

- 4G LTE indoor swivel-mount antenna (see [Figure 8-3](#))
- Male QMA connector adapter, to connect the antenna to the router WiFi antenna port

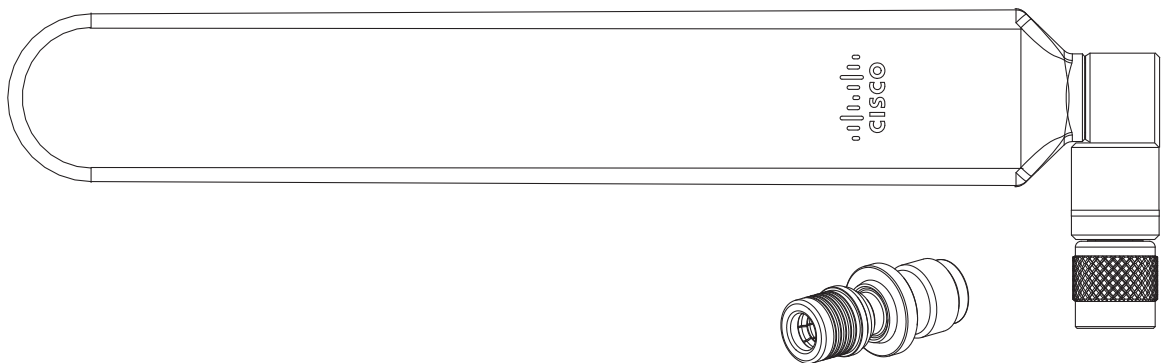
The WiFi antenna provides connectivity to the router internal short-range access point.

The short-range access point enables a WiFi link so users can connect to the router from anywhere within WiFi range. For example, a technician can check the status of the router from outside the substation or utility cabinet by connecting to the router over the WiFi link.

### WiFi Antenna Information

- The Cisco order number of the WiFi antenna kit is: ANT-4G-DP-IN-TNC.
- The WiFi antenna is a field-replaceable component.
- For detailed technical information about the WiFi antenna, see [WiFi Antenna Specifications](#), page 8-7.
- For information about the WiFi status LED, see the chapter [Router LED Locations and States](#).
- For more information about the [Short-Range Access Point](#), which provides the WiFi connection to the router, see the chapter [Router Hardware Description](#).

**Figure 8-3** 4G LTE WiFi Antenna and Male QMA Adapter



## Connected Grid Module Antennas

In addition to the two fixed antennas (GPS and WiFi), the router supports additional antennas that provide connectivity to the Connected Grid modules installed in the router.

The router supports up to two Cisco Connected Grid modules. Each module requires one antenna or two antennas (one main antenna and one diversity antenna). The total number of antennas installed with the router depends on:

- Number of modules installed in the router.
- Module types that are installed in the router

For detailed information about the Connected Grid module antennas, see the Connected Grid antennas documentation, at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

# Installing or Replacing Module Antennas

Depending on the configuration you specified, the router could arrive in the shipping container with all required antennas already installed and connected to the corresponding Cisco Connected Grid modules, also installed in the router.

However, you might need to install an antenna when:

- You purchase a module separately from the router. The antenna is included with the module, and must be installed on the router to complete the module installation.
- You purchase an antenna separately to replace a faulty or damaged antenna.
- The antenna form factor prevents requires that it be installed after the router has shipped.

## Where to Find Antenna Installation Information

For instructions on how to install or replace antennas on the router, see the Cisco Connected Grid antenna documentation on Cisco.com, at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

**Table 8-2** *Connected Grid Modules for CGR 1000 Series Routers Documentation*

Title	Description
Cisco Connected Grid Antennas Installation Guide	Installation procedures and safety information for all models of Cisco Connected Grid antennas.
Cisco Connected Grid Antennas Overview	An overview of antenna technology, antenna types, and Cisco Connected Grid antennas and accessories.
Choosing Your Cisco Connected Grid Antenna	A decision tree to help you choose the correct antennas for your platform and physical environment.

# Antenna Specifications

This section contains specifications for the fixed antennas that ship with the router.

For all technical details and specification for these and other Cisco Connected Grid antennas, see the Cisco Connected Grid antenna documentation on Cisco.com at: [www.cisco.com/go/cg-modules](http://www.cisco.com/go/cg-modules)

## GPS Antenna Specifications

Specification	Value
Dimensions	Cable length: 15 feet (460.8 cm) Diameter of antenna rodome: 1.97 inches (50 cm)
Connector (cable to router)	TNC male
Frequency	1575.42 MHz +/-5MHz
Nominal Impedance	50 Ohms nominal
VSWR	2.0 Max. in band
Peak Gain	4.0 dBi min. @ zenith
Minimum Gain	1 dBi @ 10 degrees elevation
Pattern Type	Hemispherical
Polarization	Circular RHCP
LNA Gain	26 dB +/-2 dB DC Voltage: 3–5VDC
Out of Band Attenuation	20 dB min. at 1575+ / -50MHz
Max. Input Power	20 mA max @ 3.3VDC +/-0.3VDC
Operating Temperature	-40° C to +85° C
IP Code Rating	IP67 (Outdoor use)
Wind Speed Rating	165 MPH
Compliance	RoHS

## WiFi Antenna Specifications

Specification	Value
Dimensions	9.0 x 1.2 x 0.6 inches (229 x 30.5 x 15 mm)
Weight	1.73 ounces (49 grams)
Connector	TNC male
Frequency	698 to 806 MHz 824 to 894 MHz 880 to 960 MHz 1710 to 1880 MHz 1850 to 1990 MHz 1920 to 2170MHz 2100 to 2500 MHz 2500 to 2690 MHz
Nominal Impedance	50 ohms
VSWR	< 2.5:1
Peak Gain	0.5 dBi (698-960 MHz) 2.2 dBi (1710-2700 MHz)
Average Efficiency	55% (698-960 MHz) 73% (1710- 2700 MHz)
Polarization	Linear
Max. Input Power	3W
Operating Temperature	-35° C to +70° C
Compliance	RoHS







## CHAPTER 9

# Using the SD Flash Memory Module

---

This chapter describes the Secure Digital (SD) flash memory module (or SD card) that is used with the Cisco 1120 Connected Grid Router, and includes instructions for installing and removing the SD card.

This chapter contains the following sections:

- [SD Card Overview, page 9-1](#)
- [Supported SD Cards, page 9-2](#)
- [Inserting the SD Card, page 9-2](#)
- [SD Card Status, page 9-5](#)
- [Related Commands, page 9-6](#)

## SD Card Overview

The router features an SD card connector, which supports a single Cisco SD card. The SD card stores router data and software, including:

- Router operating software
- Running configurations
- Network management software configuration
- Network registration data
- Router firmware
- Billing data
- Outage data
- Event data

### SD Card File System

The SD card uses a Linux-based EXT2/3 file system. The router configuration is stored in a binary file in an invisible partition on the card.

### Sharing SD Cards Across Systems

The card cannot be used to configure or operate any system other than the system with which it is shipped.

## Supported SD Cards

Table 9-1 lists the SD cards that can be used with the router.

**Table 9-1 Supported SD Flash Memory Modules**

<b>Size</b>
2-GB



**Note**

For detailed specifications about the SD flash memory module, refer to [Router Hardware Description](#).

## Accessing the SD Card

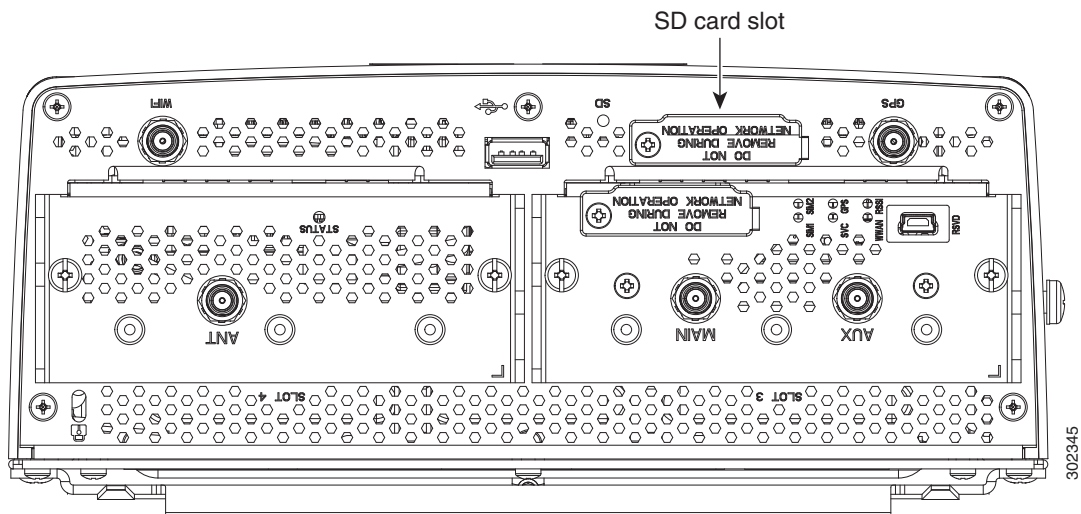
The SD card is accessed from the router exterior, though the router SD card port, shown in Figure 9-1.



**Caution**

Removing the SD card during normal router operation will cause the router to stop operating. Do not remove the SD card while the router is operating.

**Figure 9-1 SD Card Slot (with Cover) on Router Exterior**



## Inserting the SD Card

Depending on the configuration, the router could arrive in the shipping container with the SD card already installed.

However, you might need to install an SD card in the router when:

- You are upgrading the router with software or firmware stored on the SD card.

- The router requires an SD card with greater memory capacity.
- You must replace a faulty or damaged SD card.

## Online Insertion and Removal (OIR)

The SD card can be installed and removed while the router is operating normally.



### Caution

Do not replace the SD card if the LED is blinking green. A blinking green state indicates that a data transfer between the router and the SD card is in progress. Removing the card during a data transfer will interrupt this process and could damage system data.

## Safety Warnings

Before performing any of the tasks in this chapter, read the safety warnings in the [Installation Safety and Site Preparation](#) chapter.

## Preventing Electrostatic Discharge Damage

SD flash memory modules are sensitive to electrostatic discharge (ESD) damage, which can occur when electronic cards or components are handled improperly, results in complete or intermittent failures.

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- Place a removed the memory card on an antistatic surface or in a static shielding bag. If the card will be returned to the factory, immediately place it in a static shielding bag.
- Avoid contact between the card and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- Do not remove the wrist strap until the installation is complete.

## Tools You Supply

You must provide a #2 Phillips screwdriver to remove the cover over the SD card slot.

## Removing and Inserting the SD Card

To install or remove a SD card:

- 
- Step 1** Use a Phillips screwdriver to remove the cover over the SD card slot ([Figure 9-1](#)).
- Step 2** Confirm that the SD card LED ([Figure 9-2](#)) displays one of the following states:
- Green—Installed SD card is operating normally.
  - Amber blinking—An unsupported card is installed in the router SD card slot.

- Amber flashing—No SD card is installed in the router SD card slot.

**Caution**

---

Do not replace the SD card if the LED is blinking green. A blinking green state indicates that a data transfer between the router and the SD card is in progress. Removing the card during a data transfer will interrupt this process and could damage system data.

---

**Step 3**

To remove an SD card from the router:

- a. Press the SD card in slightly. The card moves outward so that it projects from the slot.
- b. Pull the SD card out of the slot.
- c. Place the SD card in an antistatic bag to protect it from static discharge.

**Step 4**

To install an SD card in the router:

- a. Insert the SD card by sliding it into the SD card slot, with the connector first and the notched corner facing up. The card is keyed so that you cannot insert it the wrong way.
- b. Ensure that the card is seated in the slot connector and the edge of the card is flush with the edge of the slot.

**Step 5**

Replace and tighten the cover you removed in Step 1, using the Phillips screwdriver.

---

**Caution**

---

You must replace the SD card slot cover when not using the card slot. If the card slot is not covered, the router interior could be exposed to environmental elements that can damage the router.

---

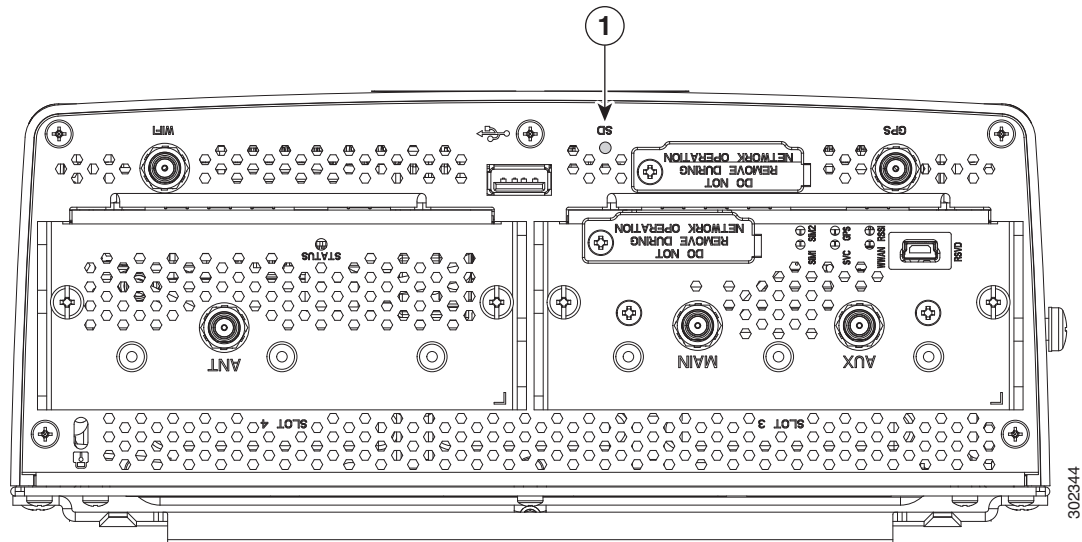
# SD Card Status

You can check the SD card status by viewing the [SD Card LED](#).

## SD Card LED

The SD card LED is located next to the SD card slot (see [Figure 9-2](#)).

**Figure 9-2** SD Card LED (Item 1)



**Figure 9-3** SD LED – SD Flash Memory Module LED States

Label Description	Color and State	Description
SD0 SD flash card status	Green solid	SD flash card is installed and operating normally.
	Green blinking	A data transfer between the router and the SD card is in progress.
	Amber solid	<ul style="list-style-type: none"> <li>An error occurred when the router accessed the SD flash card.</li> <li>The router could not find a system software image.</li> </ul>
	Amber blinking	An unsupported SD card is installed in the slot.
	Amber flashing	No SD card is installed in the slot.

## Related Commands

Use the **copy running-config startup-config** command to save the router current software configuration to the SD card:

```
cgr1120# copy running-config startup-config  
[#####] 100%  
Copy complete, now saving to disk (please wait)...
```



# CHAPTER 10

## Router LED Locations and States

---

View the Cisco 1120 Connected Grid Router LEDs to determine the overall state of the system and to verify the status of specific connections, ports, and system components.

In addition to viewing the LEDs on the router hardware, you can use the router command line interface as described in the section [Related Commands, page 10-6](#) to check the system status LED state from remote locations.

This chapter includes the sections:

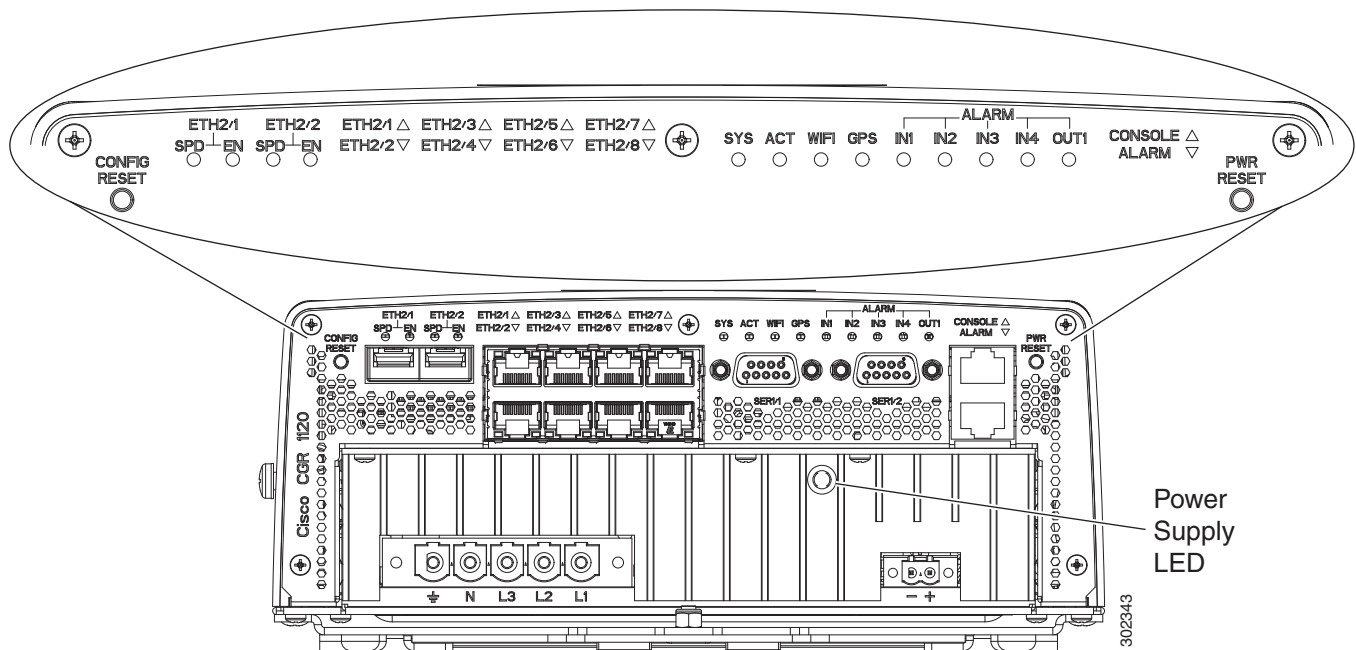
- [Rear Panel LED Locations, page 10-2](#)
- [Power Supply LED, page 10-2](#)
- [SYS LED – System Status, page 10-3](#)
- [ACT LED – System Activity, page 10-3](#)
- [WIFI LED – WiFi Link Status, page 10-3](#)
- [GPS LED – GPS Link Status, page 10-3](#)
- [ALM LEDS – Alarm Port Status, page 10-4](#)
- [Ethernet LEDs – Network Links Status, page 10-4](#)
- [SD Card LED Location, page 10-6](#)
- [SD LED – SD Card Status, page 10-6](#)
- [Related Commands, page 10-6](#)

# Rear Panel LED Locations

Most of the router LEDs are located on the router cable panel (rear panel) as shown in [Figure 10-1](#).

The SD card status LED is located on the router module panel (front panel). See [SD Card LED Location](#), page 10-6.

**Figure 10-1** Cable Panel (Rear Panel) LEDs



## Power Supply LED

The power supply LED indicates the operating state of the router.

LED Label	Color	Description	Location	Drvr
AC/DC Power Supply	Green/Red	Off: PSU no present Green: DC output is OK Red: DC output failed, but AC/DC input is good	PSU and wiring side	HW



## SYS LED – System Status

The power status LED indicates when the router has power.

System LED		
LED Label	Color and State	Description
SYS	Green	Normal system operating status
	Green blinking	The system is starting up or power cycling, and loading system software, including BIOS and operating system
	Amber	System receiving power but there is an error condition
	Off	System not receiving power

## ACT LED – System Activity

The system activity (ACT) LED indicates the state of the router CPU.

Activity LED		
LED Label	Color and State	Description
ACT	Green blinking	The router CPU is operating normally.
	Green solid	The router CPU is not operating, or is not operating normally.
	Off	The router CPU is not operating.

## WIFI LED – WiFi Link Status

The WiFi link status (WIFI) LED indicates the state of the router short-range access point link.

WiFi LED		
LED Label	Color and State	Description
WIFI	Green	WiFi link established
	Green blinking	WiFi link established and data transfer in progress
	Yellow	No WiFi link

## GPS LED – GPS Link Status

The GPS link status (GPS) LED indicates the state of the link between the router and the GPS satellite.

GPS LED		
LED Label	Color and State	Description
GPS	Green	GPS link established
	Yellow blinking	Establishing link with GPS (in progress)
	Yellow solid	No GPS link

## CONSOLE LED – Console Port Status

CONSOLE LED		
LED Label	Color and State	Description
CONSOLE	Green	Active console connection to the router
	Off	No console connection

## ALM LEDS – Alarm Port Status

The router has five alarm port LEDs.

Alarm LEDs		
LED Label	Color and State	Description
IN $x$ (1 to 4)	Green/red	Alarm input status Off: Alarm not configured Green: No alarm Red: Alarm is present
OUT 1	Green/red	Alarm output status Off: Alarm not configured Green: No alarm Red: Alarm is present

## Ethernet LEDs – Network Links Status

This section describes the router LEDs that indicate Ethernet network connection states and speeds, and includes these topics:

- [SFP LEDs – SFP Port States, page 10-5](#)
- [GE LEDs – Gigabit Ethernet Port States, page 10-5](#)
- [FE LEDs – Fast Ethernet Port States, page 10-5](#)

## SFP LEDs – SFP Port States

The router has two SFP ports (labeled ETH 2/1 and ETH 2/2). Each SFP port has the following two LEDs associated with it:

- **SPD**—Indicates SFP port link speed
- **EN**—Indicates SFP port status

SFP LEDs		
LED Label	Color and State	Description
SPD	Green, 2 blinks/pause	100 MB/s link speed on the corresponding SFP port
	Green, 3 blink/pause	1000 MB/s link speed
	Off	No link established
EN	Green	SFP is installed in the port and the link is active
	Amber	SFP is installed but there is an error condition
	Green blinking, then off	SFP module can be removed from the router
	Off	No SFP installed in the port

## GE LEDs – Gigabit Ethernet Port States

The router has two GE ports (labeled ETH 2/1 and ETH 2/2). Each GE port has a corresponding LED that indicates the GE link speed for the port.

GE LEDs	
Color and State	Description
Off	No link established
Green, 3 blinks/pause	1000 MB/s link speed
Green, 2 blinks/pause	100 MB/s link speed
Green, 1 blink/pause	10 MB/s link speed

## FE LEDs – Fast Ethernet Port States

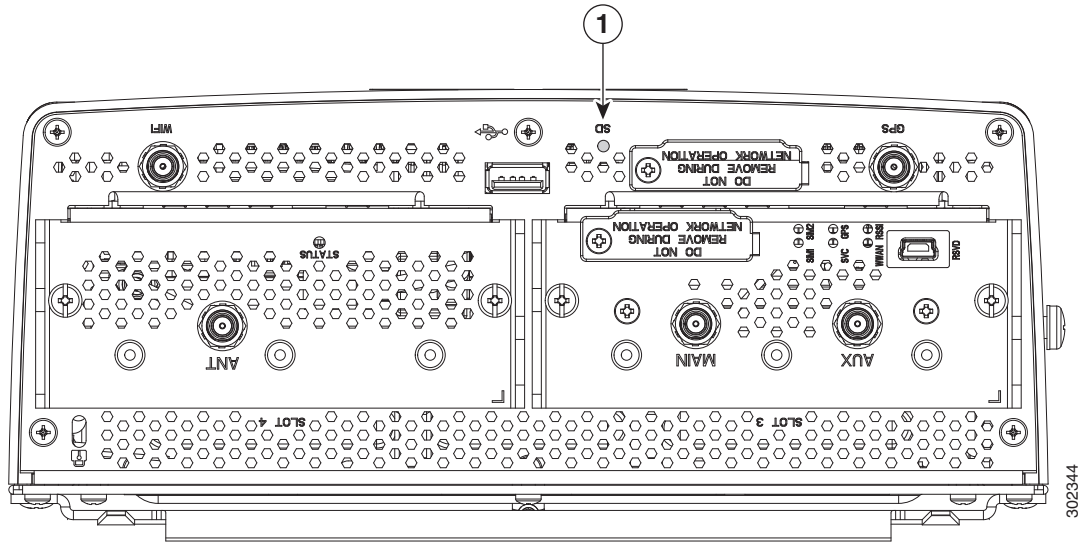
The router has six FE ports (labeled ETH 2/3 through ETH 2/8). Each FE port has a corresponding LED that indicates the FE link speed for the port.

Fast Ethernet LEDs	
Color and State	Description
Off	No link established
Green, 2 blinks/pause	10 MB/s link speed
Green, 1 blink/pause	100 MB/s link speed

## SD Card LED Location

The SD card LED (item 1 in [Figure 10-2](#)) is located on the router module panel (front panel) and indicates the state of the router SD card.

**Figure 10-2** SD Card LED (Item 1)



## SD LED – SD Card Status

Label	Color and State	Description
SD0	Green	SD flash card installed and operating normally
	Green blinking	SD flash card data transfer in process
	Amber	<ul style="list-style-type: none"> <li>Error when system accesses the SD flash card</li> <li>Router cannot locate a system software image</li> </ul>
	Amber blinking	Unsupported SD card installed in the slot
	Amber flashing	No SD card installed in slot

## Related Commands

You can use router software command line interface (CLI) to view the status of System Status LED described in the section [SYS LED – System Status](#), page 10-3. During normal operation, the router can be installed in a substation, utility box, or other hard-to-access location, and you might not be able to view SYS LED. In this case, you can view the status of the LED from a remote location using the router CLI.

## show led

Use the **show led** command in any command mode to view the status of the router SYS LED.

The SYS LED is located on the router exterior (see [Figure 10-1](#)),

The values displayed in the **System LED** field are described in the section [SYS LED – System Status, page 10-3](#).

This example shows the **show led** command output:

```
CGR-1120> show led
System LED: green, solid

Summary of LED status provider:
Client      | State
-----
cellular 3/1 | Blinking

--- end of list ---
CGR-1120>
```

Related Commands



# APPENDIX **A**

## Starting a Router Terminal Session

---

This appendix describes how to start a terminal session with the Cisco 1120 Connected Grid Router using the console port. Start a terminal session with the router when you are at the router installation location and want to administer the router with a direct connection using the command-line interface (CLI) software.

### Before You Begin

Before you start a terminal session with the router, you must connect a PC or PC terminal to the router console port following the instructions in [Connecting the Console Port, page 6-8](#) in the chapter [Making Network Connections](#).

### About the Console Port

The console port is an asynchronous serial port that allows you to connect to the device for initial configuration through a standard RS-232 port with an RJ-45 connector. Any device connected to this port must be capable of asynchronous transmission.

### Console Port Settings

Configure the following parameters for the console port:

Parameter	Console Port Setting	Description
Baud	9600	Specifies the transmission speed for the connection.
Data bits	8	Specifies the number of bits in an 8-bit byte that is used for data.
Parity	None	Specifies the odd or even parity for error detection.
Stop bits	1	Specifies the stop bits for an asynchronous line.

### Using the Ctrl-C Command

The router console port is located on the router exterior. (For details, see [Console Port, page 3-16](#) in the chapter [Router Hardware Description](#).)

On many Cisco routers, you can enter **Ctrl-C** to interrupt the router startup process and then delete or change the admin password, or view or delete the router configuration.

**Note**

To prevent unauthorized access to the router configurations and passwords, the **Ctrl-C** command is disabled on the router while it is booting up and loading the system software.

## Connecting to the Console Port with Microsoft Windows

This section describes how to connect to the router console port using Microsoft Windows.

- 
- Step 1** Start a terminal emulator application, such as Windows HyperTerminal (included with some versions of Windows OS) or PuTTY: [www.putty.org](http://www.putty.org)
  - Step 2** Configure the terminal emulation software with the parameters described in [About the Console Port, page A-1](#).
  - Step 3** Connect to the router.
- 

## Connecting to the Console Port with Mac OS X

This procedure describes how to connect a Mac OS X system USB port to the console using the built-in OS X Terminal utility.

- 
- Step 1** Use the Finder to go to **Applications > Utilities > Terminal**.
  - Step 2** Connect the OS X USB port to the router.
  - Step 3** Enter the following commands to find the OS X USB port number:
 

```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw-  1 root  wheel      9,  66 Apr  1 16:46 tty.usbmodem1a21
DT-macbook:dev user$
```
  - Step 4** Connect to the USB port with the following command followed by the router USB port speed:

```
macbook:user$ screen /dev/tty.usbmodem1a21 9600
```

### To Disconnect the OS X USB Console from the Terminal Window

Enter **Ctrl+A** followed by **Ctrl+\**

---



# Connecting to the Console Port with Linux

This procedure shows how to connect a Linux system USB port to the console using the built-in Linux Terminal utility.

---

**Step 1** Open the Linux Terminal window.

**Step 2** Connect the Linux USB port to the router.

**Step 3** Enter the following commands to find the Linux USB port number:

```
root@usb-suse# cd /dev
root@usb-suse /dev# ls -ltr *ACM*
crw-r--r--  1 root   root    188,  0 Jan 14 18:02 ttyACM0
root@usb-suse /dev#
```

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

```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

## To Disconnect the Linux USB Console from the Terminal Window

Enter **Ctrl+A** followed by **;**, then type **quit**.

---





# APPENDIX **B**

## Connector and Cable Specifications

---

This appendix includes specifications for the Cisco 1120 Connected Grid Router connectors, adapters, and compatible cables, and is organized into the following sections:

- [Connector Specifications, page B-1](#)
- [Cable and Adapter Specifications, page B-4](#)

### Connector Specifications

- [Alarm Port, page B-1](#)
- [Console Port, page B-2](#)
- [Combo Ports, page B-2](#)
- [SFP Ports, page B-3](#)
- [Serial Port, page B-4](#)
- [Power Connectors, page B-4](#)

### Alarm Port

For detailed information about the alarm ports, see the chapter [Router Hardware Description](#).

**Table B-1**      *Alarm Port Specification*

Pin	Signal Description
1	Alarm1_IN
2	Alarm2_IN
3	Alarm1_OUT_NC
4	Alarm2_OUT_NC
5	Alarm2_OUT_NO
6	Alarm1_OUT_NO
7	Alarm_OUT_Common
8	Alarm_IN_Common

## Console Port

For detailed information about the console port, see the chapter [Router Hardware Description](#).

**Table B-2 Console/Auxiliary Port Specification**

Pin	Signal Name	Signal Description
1	RTS	Output
2	DTR	Output
3	TXD	Output
4	GND	–
5	GND	–
6	RXD	Input
7	DSR/DCD	Input
8	CTS	Input

## Combo Ports

For detailed information about the combination ports, see the chapter [Router Hardware Description](#).

### Copper Interface—Combination Port (SFP and GE Ethernet)

**Table B-3 Combination Port Specification – Copper Interface**

Pin	1000Base-T	100Base-TX/10Base-T
1	TX A+	TX DATA+
2	TX A-	TX DATA-
3	RX B+	RX DATA+
4	TX C+	N/C
5	TX C-	N/C
6	RX B-	RX DATA-
7	RX D+	N/C
8	RX D-	N/C

## SFP Ports

### SFP Interface—Combination Port (SFP and GE Ethernet)

For detailed information about the combination ports, see the chapter [Router Hardware Description](#).

**Table B-4 SFP Port Specification**

Pin	Signal Name	Input/Output	Signal Description
1	VeeT	–	GND
2	TxFault	Output	Connects to GPIO
3	TxDisable	Input	Driven from GPIO
4	MOD-DEF(2)	Bidir	Bidirectional. Connects to I2C data
5	MOD-DEF(1)	Input	Connects to I2C Clock
6	MOD-DEF(0)	Output	Grounded in SFP, indicates SFP is present
7	Rate Select <sup>1</sup>	–	–
8	LOS	Output	Connects to GPIO
9	VeeR	–	GND
10	VeeR	–	GND
11	VeeR	–	GND
12	RD-	Output	Connects to PHY
13	RD+	Output	Connects to PHY
14	VeeR	–	Gnd
15	VccR	–	3.3V
16	VccT	–	3.3V
17	VeeT	–	GND
18	TD+	Input	Driven from PHY
19	TD-	Input	Driven from PHY
20	VeeT	–	GND

1. Rate Select is an optional SFP input that controls receiver bandwidth when used with Fibre Channel applications. This pin is unconnected.

## Serial Port

For detailed information about the combination ports, see the chapter [Router Hardware Description](#).

**Table B-5** Serial Port Specification

RS-232 <sup>1</sup>				RS-485 Full Duplex		RS-485 Half Duplex		Ethernet	
Pin	Signal Description (Abbreviation)	DTE	DCE	Signal	Dir	Signal	Dir	10/100	10000
1	DCE ready, ring indicator (DSR/RI)	<—	—>	—	—	—	—	RX+	TX/RX1+
2	Received line signal detector (DCD)	<—	—>	—	—	—	—	RX-	TX/RX1-
3	DTE ready (DTR)	—>	<—	—	—	—	—	TX+	TX/RX2+
4	Signal ground (COM)	—	—	COM	—	COM	—	—	TX/RX3+
5	Received data (RxD)	<—	—>	TX+	—>	TX/RX+	<—>	—	TX/RX3-
6	Transmitted data (TxD)	—>	<—	RX+	<—	—	—	TX-	TX/RX2-
7	Clear to send (CTS)	<—	—>	RX-	—>	TX/RX-	<—>	—	TX/RX4+
8	Request to send (RTS)	—>	<—	TX-	<—	—	—	—	TX/RX4-

1. The RS232 pinouts use the EIA-561 standard.

## Power Connectors

For detailed information about the router power supply terminal connectors (AC and DC input terminals), see the chapter [Router Hardware Description](#).

## Cable and Adapter Specifications

### SFP Cable

For detailed information about the SFP ports, see the chapter [Router Hardware Description](#).

**Table B-6** SFP Port Cabling Specification

SFP Module	Wavelength (nm)	Cable Type	Core size/ Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-SX	850	MMF	62.5/125	160	722 feet (220 m)
			62.5/125	200	902 feet (275 m)
			50/125	400	1640 feet (500 m)
			50/125	500	1804 feet (550 m) 3281 ft (1000 m)

**Table B-6 SFP Port Cabling Specification (continued)**

SFP Module	Wavelength (nm)	Cable Type	Core size/ Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
1000BASE-LX/LH	1310	MMF <sup>1</sup>	62.5/125	500	1804 feet (550 m)
			50/125	400	1804 feet (550 m)
			50/125	500	1804 feet (550 m)
		SMF	G.6522	—	32,808 feet (10,000 km)
1000BASE-EX	1310	SMF	—	—	131,234 feet (40,000 km)
1000BASE-ZX	1550	SMF	G.652 <sup>2</sup>	—	43.4 to 62 miles (70 to 100 km) <sup>2</sup>
1000BASE-BX-U	1310	SMF	—	—	32,808 ft (10,000 m)
1000BASE-BS-D	1490	SMF	—	—	32,808 ft (10,000 m)

1. A mode-conditioning patch cord is required. Using an ordinary patch cord with MMF or 1000BASE-LX/LH SFP modules and a short link distance can cause transceiver saturation and an elevated bit error rate (BER). When using the LX/LH SFP module with 62.5-micron diameter MMF, you must also install a mode-conditioning patch cord between the SFP module and the MMF cable on both the sending and receiving ends of the link. The mode-conditioning patch cord is required for link distances greater than 984 feet (300 m).
2. 1000BASE-ZX SFP modules can send data up to 62 miles (100 km) by using dispersion-shifted SMF or low-attenuation SMF; the distance depends on the fiber quality, the number of splices, and the connectors.

