Use the show interface Command

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.

```
CGR1240> 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:

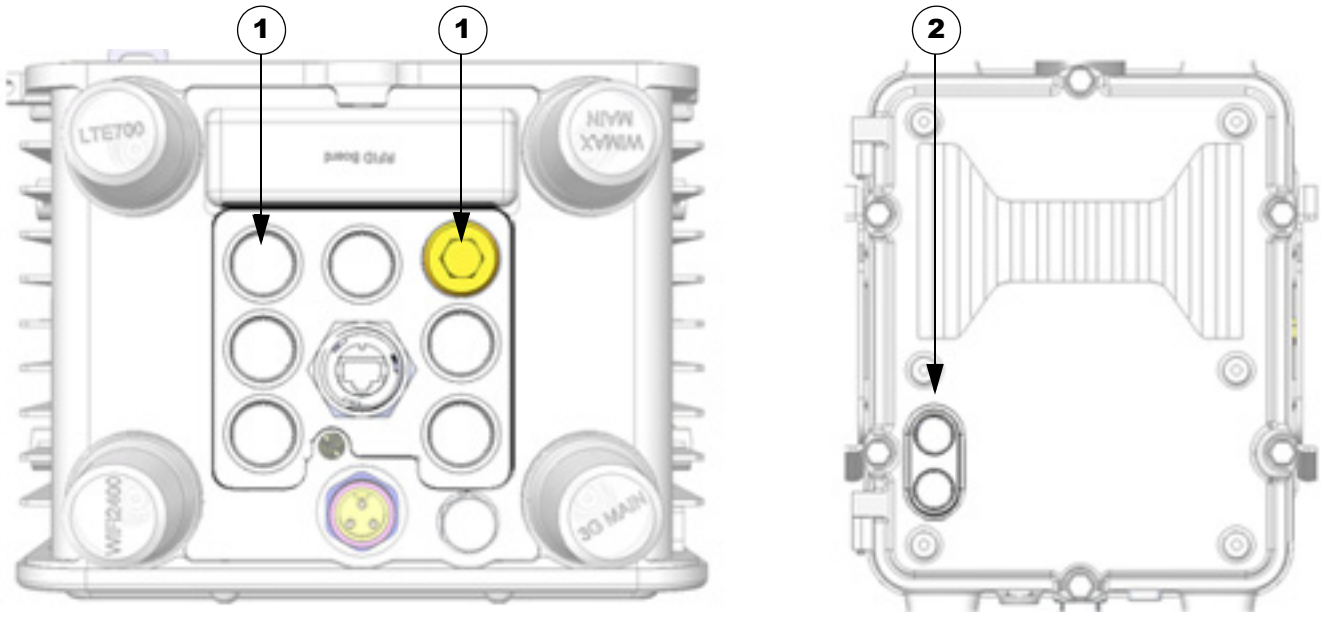
External Connections and Chassis Cable Ports

When connecting the router internal ports to external cables or exterior devices, you must thread the router cables through the chassis cable ports designated for this purpose. Some chassis ports are reserved for specific cables and remaining ports can be used based on your network configuration and cabling requirements.

There are nine cable ports on the chassis base and two ports on the chassis door (Figure 6-8). Some ports are reserved for a specific cables types, as indicated Figure 6-8.

Caution When you make router cable connections through these ports, you must use cable glands as described in Using Cable Glands, page 6-11, to protect the router interior from environmental elements, including moisture, heat, cold, and dust. Failure to use cable glands with the chassis cable ports can result in damage to the router.

Figure 6-8 Chassis Cable Ports—For Cabling to External Connectors or Devices



Item	Description	Item	Description
1	These two ports on the router base are reserved for SPF module cables. One of these ports is shown with the liquid tight seal that must be used when the port is not in use.	2	These two ports on the router door are reserved for non-Cisco module cables.

Using Cable Glands

This section describes how to use cable glands with router cables that are threaded through the chassis cable ports that are described in External Connections and Chassis Cable Ports, page 6-10.

Caution The cable glands must be used for all cables that are threaded through the router chassis cable ports to prevent exposing the router interior to environmental elements.

Ordering Cisco Cable Glands

You can order a cable gland kit from Cisco using the model number CGR-IP67GLAND. Each kit contains one cable gland. See the chapter Router Hardware Description for detailed information about this part.

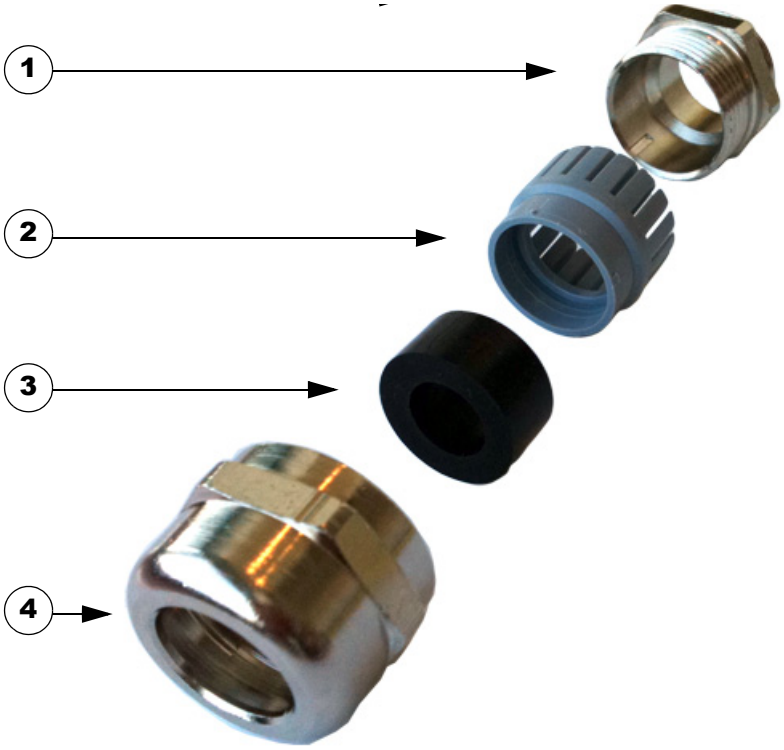
Tools You Supply

You must supply a 13-mm box-end wrench or socket set to install the cable glands on the router.

Cable Glands Description

Figure 6-9 Cable Glands, Assembled

Figure 6-10 Cable Gland Components



Item	Name	Description
1	Adapter	Connects directly to the chassis cable port on the router.
2	Grommet	Secures the split gasket over the cable
3	Split gasket	Fits over the cable and creates an liquid-tight seal inside the glands.
4	Cap	Fits over gasket-and-cable assembly and connects it to the chassis cable port.

Cable Requirements

Cables used with the cable glands should meet the following criteria:

- Outdoor-rated
- UV-stabilized
- Plenum-rated
- Minimum 1/2 in. (12.7 mm) in diameter

Caution Cables must be a minimum of 1/2 in. in diameter to create an adequate seal within the cable glands. Using smaller cables could result in an inadequate seal and therefore expose the router interior to environmental elements.

Cable Glands Installation Steps

Follow these steps for every cable that you will connect through the chassis cable ports on the router. Step 4 and Step 5 can be done ahead of time and the prepared cable gland assembly can be transported to the router installation site.

The cable glands components referred to in this section are shown in Figure 6-10.

Note Figure 6-12 shows an Ethernet cable but the steps are the same for all cable types.

Step 1 Verify the cable you are using meets the requirements described in Cable Requirements, page 6-13.

Step 2 Remove the liquid tight-seal from the port on the router. Use the 13-mm wrench if needed.

The router is shipped with liquid tight seals in unused ports. Figure 6-8 illustrates a liquid tight seal.

Step 3 Use your hands to attach the cable glands adapter (item 1 in Figure 6-10) into the chassis cable port on the router (Figure 6-11).

Step 4 Thread the following cable glands components over the cable in this order (Figure 6-12):

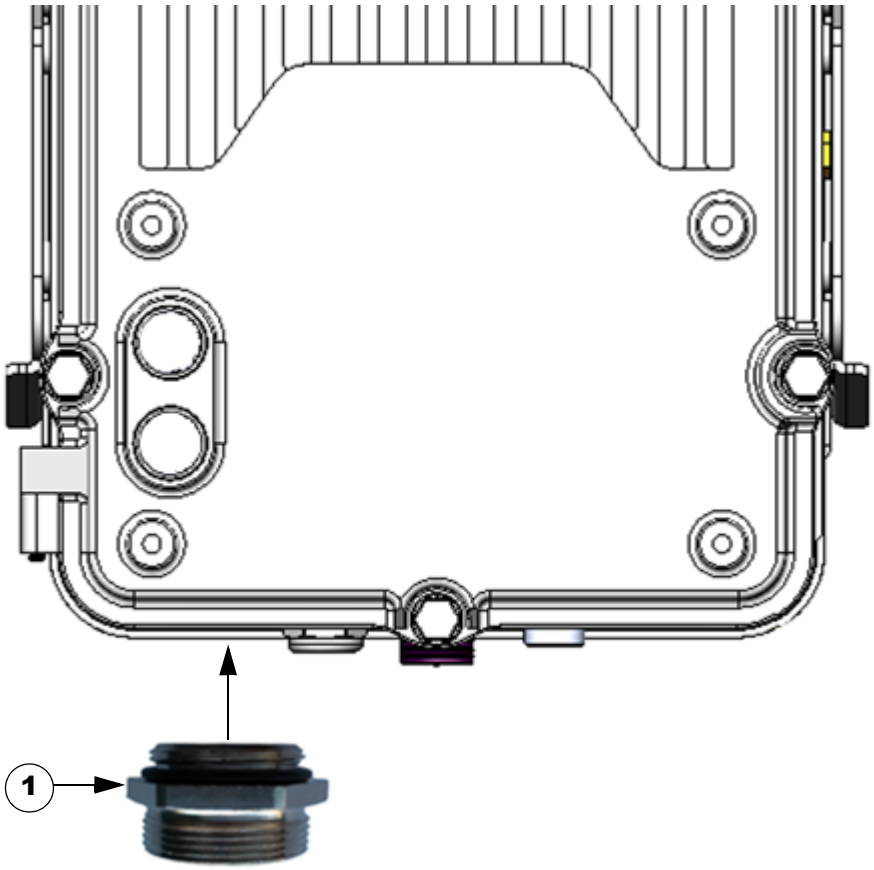
1. Cap
2. Split gasket
3. Grommet

Step 5 Slide the split gasket along the cable and into the grommet, pressing firmly to ensure the gasket is completely seated in the grommet.

Step 6 Thread the connector-end of the cable through the router port and insert it into the corresponding router connector.

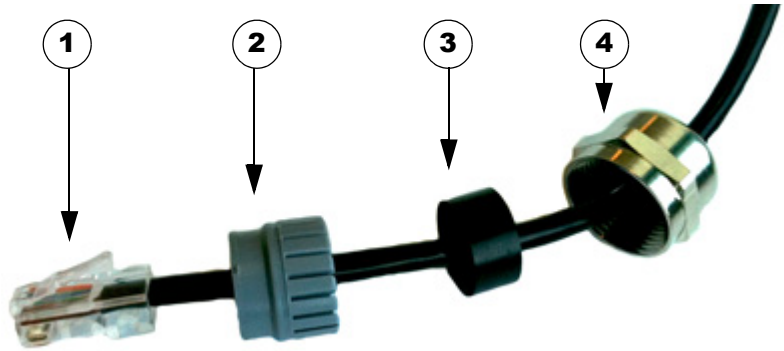
Step 7 Slide the cap along the cable, over the grommet, and then over the router port. Hand-tighten, then use the 13-mm wrench to tighten to 6-7 foot-pounds of torque.

Figure 6-11 Attach Adapter to Chassis Cable Port on Router Base



Item	Description
1	Attach cable glands adapter to any compatible cable port on the router.

Figure 6-12 Cable Glands Components Threaded on Cable



Item	Description	Item	Description
1	Cable connector (to router)	3	Split gasket
2	Grommet	4	Cap

Connecting the Console Port

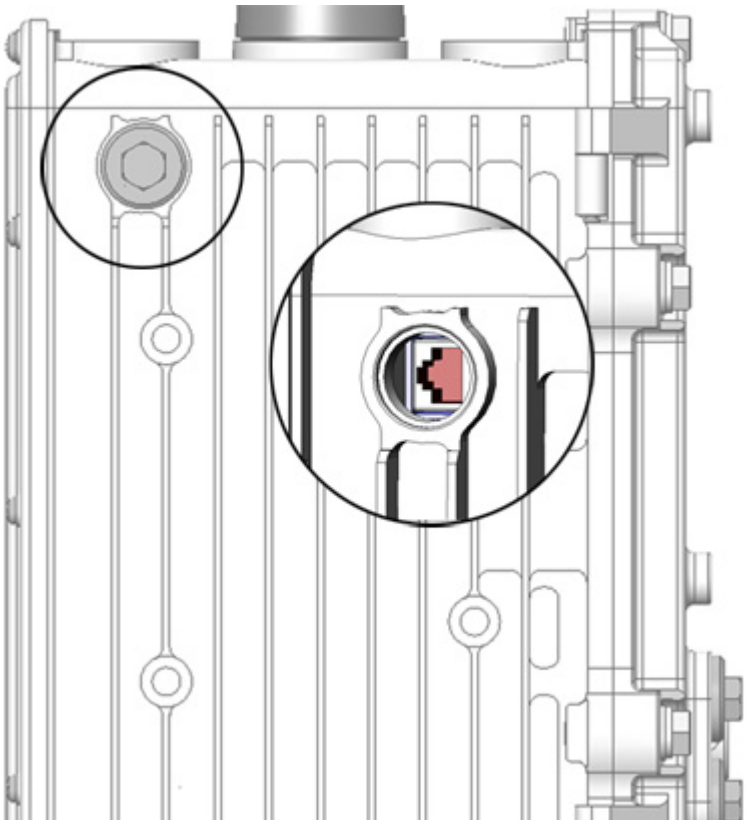
About

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 6-13) 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.

Caution The console port does not support cable glands. When a cable is connected to this port, the router interior is exposed to environmental elements, which can damage the port and the router interior. This port should be exposed only during terminal sessions, when a cable is connected to the port. This port should never be left unattended when in use.

Figure 6-13 Console Port Location



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 device port: RJ-45-to-DB-25 female DTE adapter, RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL), or USB-to-DB-9 adapter.

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

Step 1 Connect one end of the RJ-45 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

Note Currently not supported. This hardware feature will be supported in a future software release.

About

Before you connect a device to the router serial port (Figure 6-14), 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

Serial Device	Network Options	Network Encapsulation (Framing)	Network Type
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	

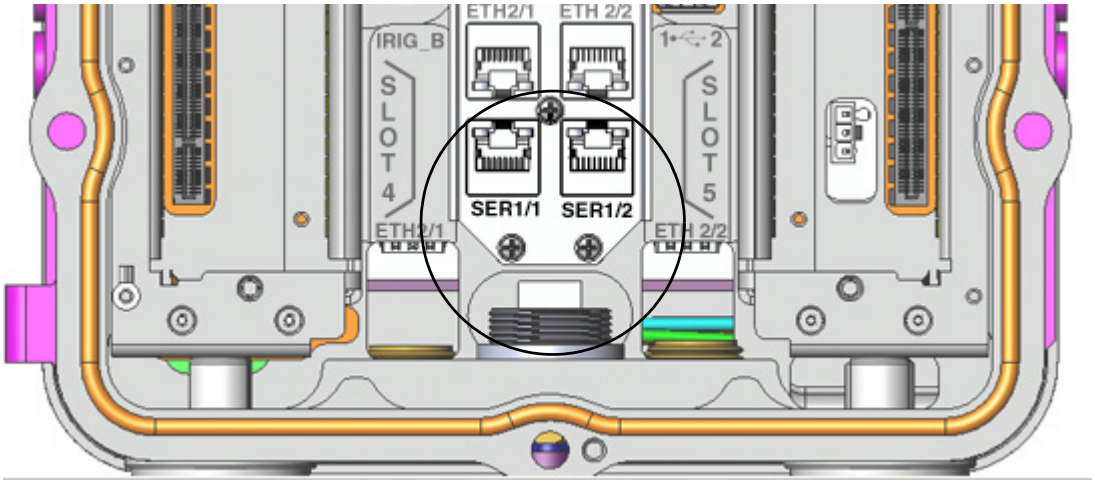
Connecting

- 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**.
- When connecting the serial ports to devices, you must use cable glands and thread cables through the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10 for more information.

Related Information

For more information about this port, including supported standards and signaling, see the chapter Router Hardware Description.

Figure 6-14 Serial Port Location



Connecting the USB Ports

Note Currently not supported. This hardware feature will be supported in a future software release.

About

You can connect up to two optional USB devices to the router USB ports (Figure 6-15), which will provide power to the USB devices. You can also connect USB devices that are powered by an external source, such as an AC adapter or batteries.

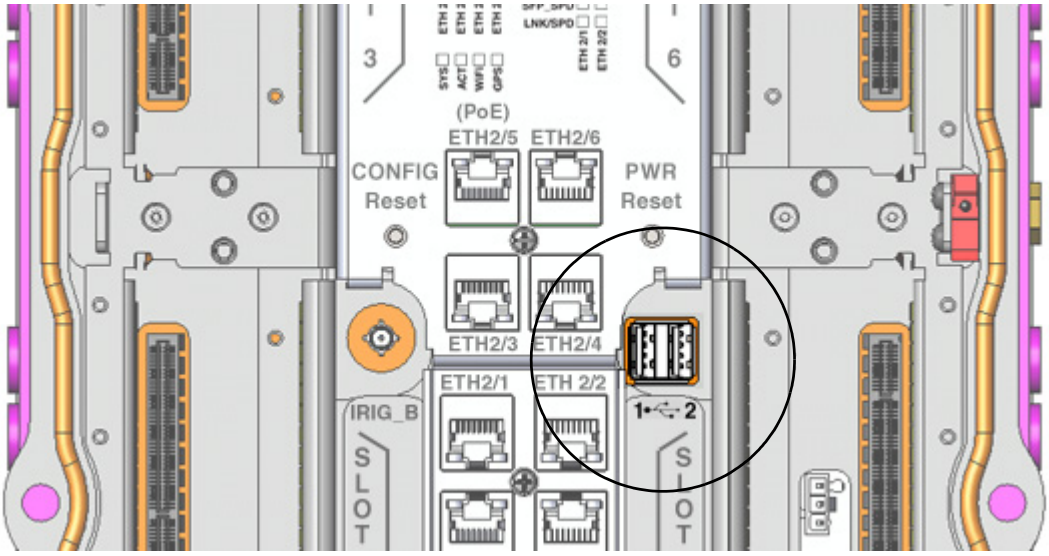
Connecting

- You can connect devices to these ports while the router is operating normally.
- The USB ports are labeled **1** and **2** (with a 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 accidently removed, secure any connected USB device with a locking mechanism designed for this purpose.
- When connecting to external USB devices, you must use cable glands and thread USB cables through the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10 for more information

Related Information

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

Figure 6-15 USB Port Location



Connecting the SFP Ports

About

Small Form-Factor Pluggable (SFP) modules are devices that plug into the router SFP connectors shown in Figure 6-16. 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 **Class 1 laser product.** Statement 1008

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

Caution 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

Connecting

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.

This section describes how to install SFP modules. SFP modules are inserted into the SFP ports shown in Figure 6-16.

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

Step 2 For fiber-optic SFP modules, remove the dust plugs and store them in a clean location for reuse.

Step 3 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.

Step 4 Remove the dust plugs from the network interface cable LC connectors.

Step 5 Inspect and clean the LC connector's fiber-optic end-faces.

Step 6 Remove the dust plugs from the SFP transceiver module optical bores.

Step 7 Thread the SFP cable through the chassis cable ports that are reserved for the SFP cables (Figure 6-8).

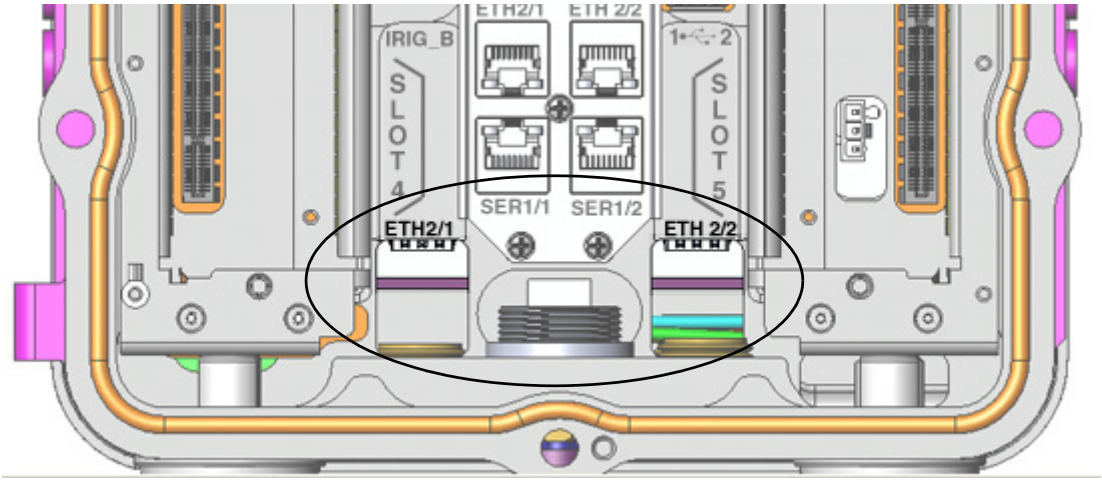
Note You must use cable glands with the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10.

Step 8 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 cable to the network, see Cisco.com for the documentation for your SFP module.

Figure 6-16 SFP Port Location



Connecting the Ethernet Ports

About

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 (Figure 6-17).

Connecting

- See Figure 6-17 for the Ethernet port labels.
- You can connect SFP modules to these ports while the router is operating normally.
- One or two Ethernet cables are typically provided with the router. Additional cables and transceivers can be ordered from Cisco. For ordering information, contact customer service.
- When the Ethernet ports, you must use cable glands and thread cables through the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10 for more information
- 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, see Hot Swapping SFP Modules, page 2-25, in the chapter Router Hardware Description, page 2-1.

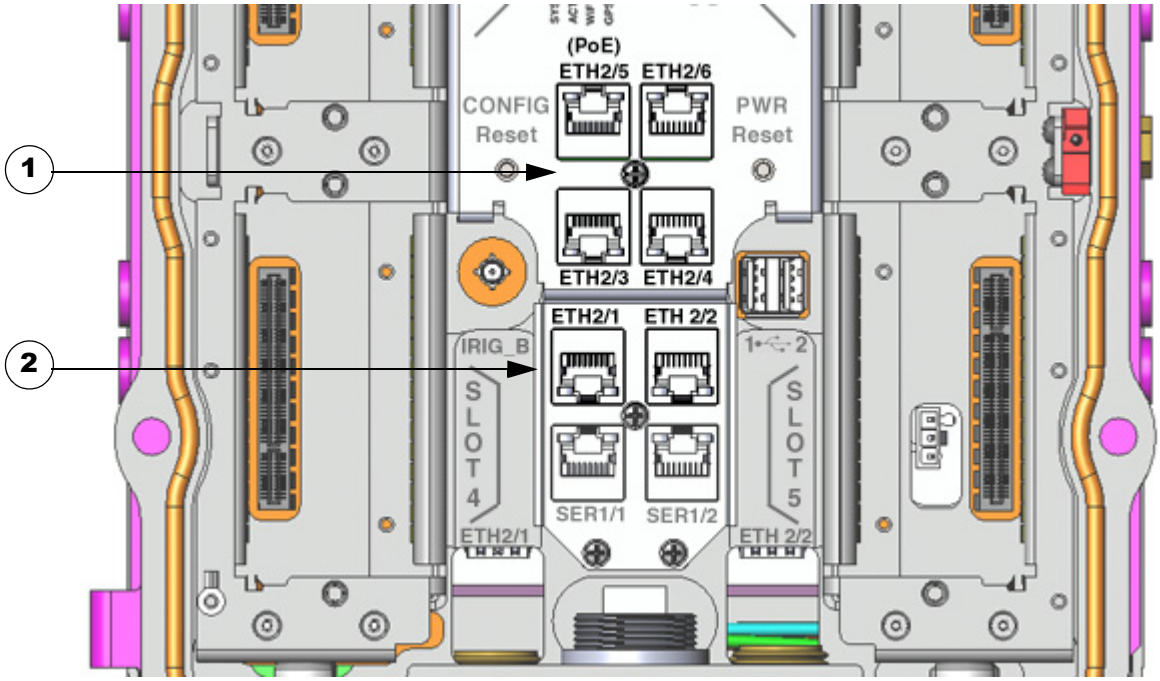
Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Related Information

Router Hardware Description includes detailed information about these ports, including:

- Specifications
- Standards
- Link to pinout information

Figure 6-17 Ethernet Port Locations



Item	Description
1	Fast Ethernet ports (4): • ETH 2/3 • ETH 2/4 • ETH 2/5 • ETH 2/6
2	Gigabit Ethernet Combo ports (2): • ETH 2/1 • ETH 2/2

Connecting the Alarm Port

Note Currently not supported. This hardware feature will be supported in a future software release.

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 IOS 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 IOS 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

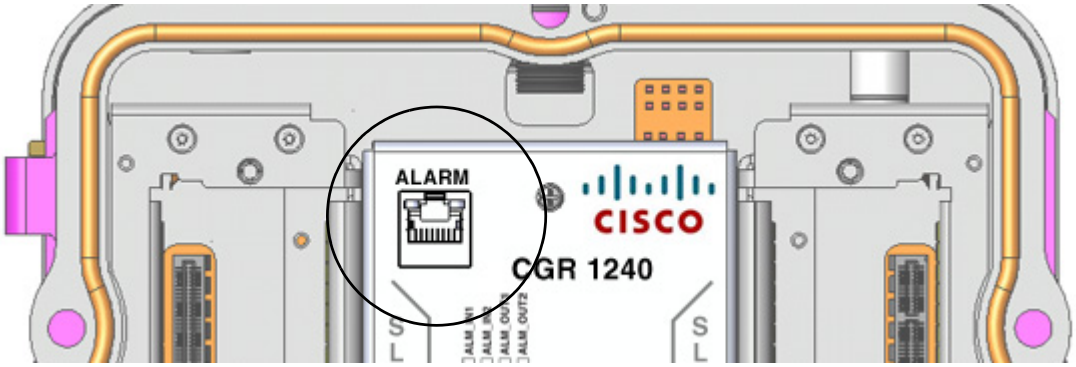
- You can connect this port while the router is operating normally.
- If you use an alarm system on your network, connect the alarm port to an alarm system, using an alarm cable that you provide.
- When connecting this port to an external alarm system, you must use cable glands and thread cables through the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10 for more information

Related Information

Router Hardware Description includes detailed information about this port, including:

- Specifications
- Location on the router
- Link to pinout information

Figure 6-18 Alarm Port Location



Connecting the IRIG-B Port

Note Currently not supported. This hardware feature will be supported in a future software release.

About

The IRIG-B port provides precise time data. The source of the time is the GPS to which the router is connected. This port provides time output only.

Connecting

- You can connect this port while the router is operating normally.

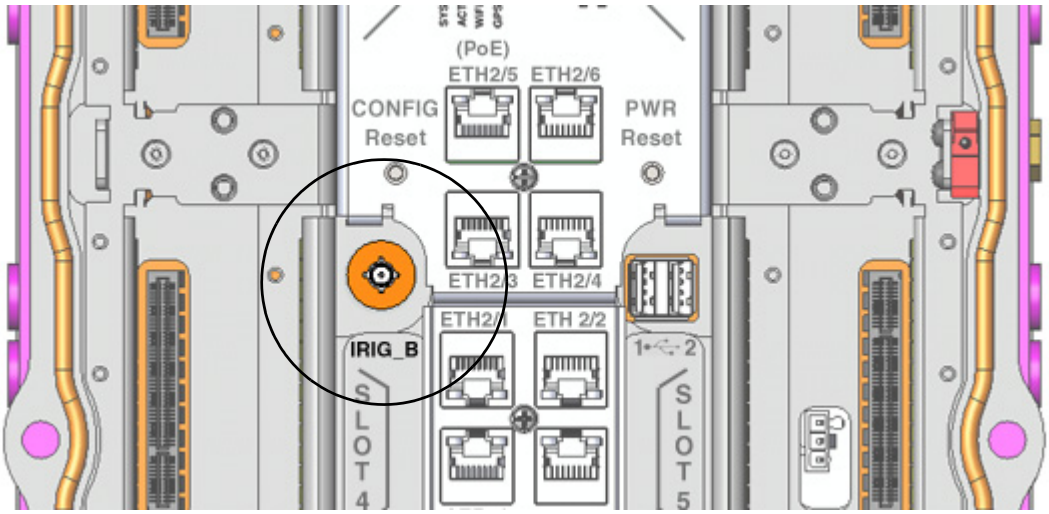
- Connect the IRIG port to an external device that requires precise time-of-the day information for synchronizing data with time.
- You must provide the device and the cable for this connection.
- When connecting this port to an external device, you must use cable glands and thread cables through the chassis cable ports on the router. See External Connections and Chassis Cable Ports, page 6-10 for more information

Related Information

Router Hardware Description includes detailed information about this port, including:

- Supported serial time code formats
- Location on the router

Figure 6-19 IRIG-B Timing Port



Installing Modules and Antennas

The router supports up to four Cisco Connected Grid modules. Each module requires one or two antennas, which are installed on or near the router. See these documents for detailed information about installing Connected Grid modules and antennas:

URLs for these documents are TBD

- Connected Grid Antenna Installation Guide
- Cisco Connected Grid Cellular 3G Module for CGR1000 Series Installation and Configuration Guide
- Cisco Connected Grid WiMAX Module for CGR1000 Series Installation and Configuration Guide
- Cisco Connected Grid WPAN Module for CGR1000 Series Installation and Configuration Guide

CHAPTER 7

About Router Connected Grid Modules

The Cisco 1240 Connected Grid Router supports up to four Cisco Connected Grid modules to enable wireless connections from the router to field devices, such as smart meters, and from the router to the utility or data management center.

Module Installation and Configuration Information

Depending on the configuration, your router could arrive in the shipping container with all required modules already installed.

For instructions on how to install, replace, and configure the modules, see the corresponding installation and configuration guide for each Cisco Connected Grid module.

URLs for these documents TBD.

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 Router Antennas

This chapter contains detailed information about the antennas for the Cisco 1240 Connected Grid Router. Router antennas provide connectivity to the router internal GPS and access point, as well as to any Cisco Connected Grid modules installed in the router.

This chapter contains the following sections:

Installing or Replacing 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.

Procedures and safety information required to install or replace antennas are in the Connected Grid Antennas Installation Guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

Lightning Arrestor

Every external Connected Grid antenna that is installed on the router requires a lightning arrestor. External antennas are any antennas that are connected to the router antenna port N-connector with a cable.

You can order lightning arrestors from Cisco using Product ID (PID): CGR-LA-N-N.

For information about the lightning arrestor and how to install it, see the Connected Grid Antennas Installation Guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

Cisco Connected Grid Modules

See the installation and configuration guide for each Connected Grid module for instructions on how to install or replace modules in the router:

Module Documentation - Cisco.com URL TBD

Antennas Overview

This section is an overview of the type of antennas used with the router.

Fixed Antennas

The router ships with two fixed antennas:

- GPS Antenna, page 8-2
- WiFi Antenna, page 8-3

Module Antennas

The router also supports up to seven Connected Grid Module Antennas, page 8-4.

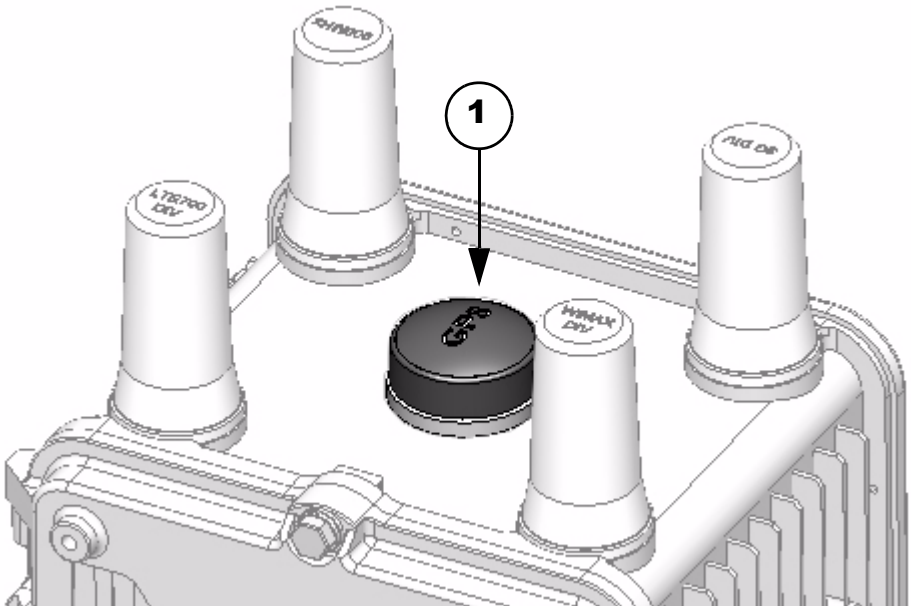
GPS Antenna

The router ships with one outdoor GPS antenna already installed and connected internally to the router on-board GPS Module. The GPS is used to identify the router location after the router is installed and is in use.

The GPS antenna is not a field-replaceable component.

- For detailed technical information about the GPS antenna, see the section GPS Antenna Specifications, page 8-8.
- For information about the GPS status LED, located inside the router chassis, see the chapter Router LED Locations and States.
- For more information about the GPS Module, see the chapter Router Hardware Description.

Figure 8-1 GPS Antenna—Cisco CGR 1240 Router



Item	Description
1	GPS antenna

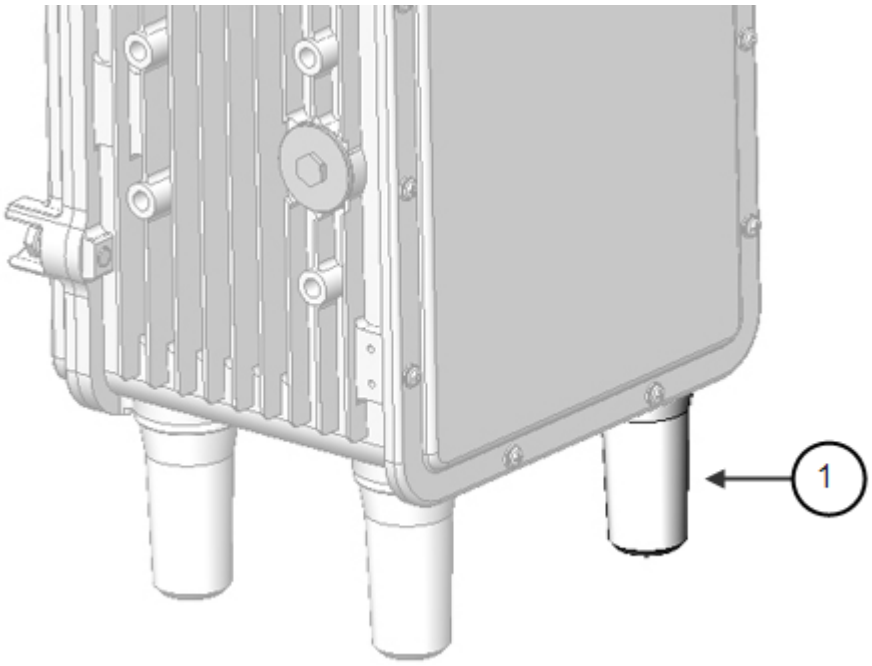
WiFi Antenna

The router ships with one omni-directional, monopole WiFi antenna already installed and connected internally to the router internal short-range access point. The router WiFi link enables users to connect to the router from anywhere within WiFi range. For example, a technician can check the status of the router from the ground (instead of having to physically open the router on its poletop installation) by remotely connecting to the router over the WiFi link.

The WiFi antenna is a field replaceable component. The Cisco Product ID (PID) for the Wifi antenna is ANT-MP-INT-OUT-M.

- For detailed technical information about the WiFi antenna, see the section WiFi Antenna Specifications, page 8-9.
- 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 8-2 WiFi Antenna—Cisco CGR 1240 Router



Item	Description
1	WiFi antenna location

Connected Grid Module Antennas

In addition to the two fixed antennas (GPS and WiFi), the router supports up to seven additional antennas, which provide connectivity to the Connected Grid modules installed in the router. Each module requires one or two antennas, which are mounted on the exterior of the router and connected through chassis antenna ports to the module installed inside the router.

The router supports up to four Cisco Connected Grid modules**.** Each module requires one antenna or two antennas (one main antenna and one diversity antenna). Diversity antennas improve the quality and reliability of the wireless connection. Because they are placed in different locations on the router, main and diversity antennas detect different amounts of interference. The router uses the antenna with the least interference to obtain the best signal.

The total number of antennas installed on 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 Installation Guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

Antenna Ports

This section describes the antenna ports, and includes the following topics:

Unused Antenna Ports

Liquid-tight, female N-connectors are installed in any unused antenna ports. The N-connector protects the router interior from environmental elements including water, heat, cold, and dust. The N-connectors are installed in unused antenna ports before the router is shipped.

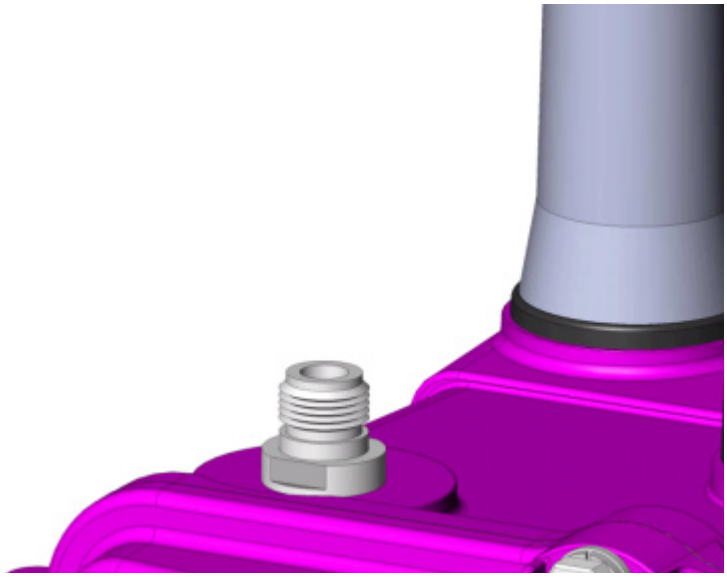
When you install or replace an antenna in a port with an N-connector:

- Chassis-mounted antennas—Remove the N-connector before installing a chassis-mounted antenna.
- External antennas—Connect the supported Cisco lightning arrestor to the N-connector, then connect the antenna cable to the lightning arrestor.

For detailed instructions for installing antennas, Connected Grid Antennas Installation Guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

Figure 8-3 N-Connector Installed in Unused Antenna Port



Antenna Port Numbering

This section illustrates the antenna port locations on the router. Each antenna port is numbered. The antenna port numbers should be referenced by installers, support technicians, and other end users when installing, replacing, or troubleshooting the antennas.

Antenna Installation Location

Caution Supported Connected Grid antennas can be installed in any of the router antenna ports, however Cisco recommends that antennas be installed in the locations recommended in the antenna installation guide. Installing antennas in the recommend locations optimizes ease of installation, antenna performance. and antenna cable management.

The recommended location for each antenna depends on several factors, including:

- The type and number of Connected Grid modules installed in the router
- The type and number of antennas required to support the installed modules

The procedures in the antenna installation guide refer to the port numbers illustrated in this section.

Figure 8-4 Top of Router—Antenna Port Numbering

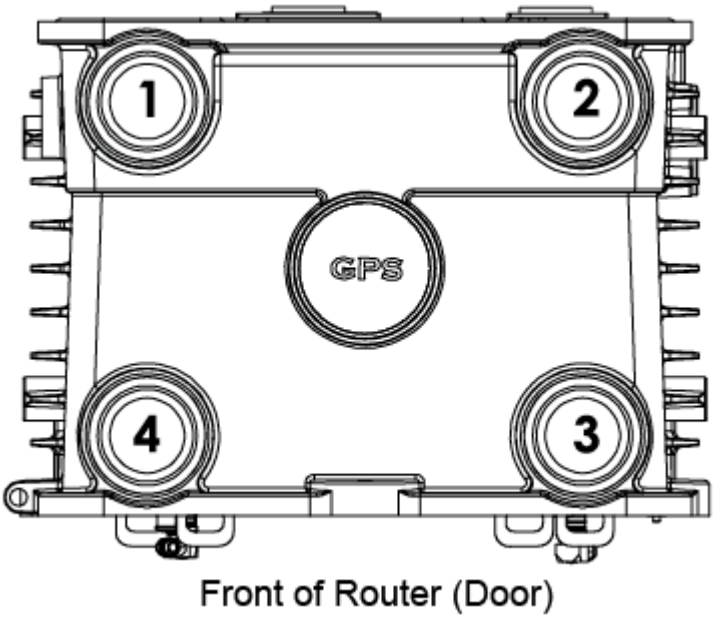
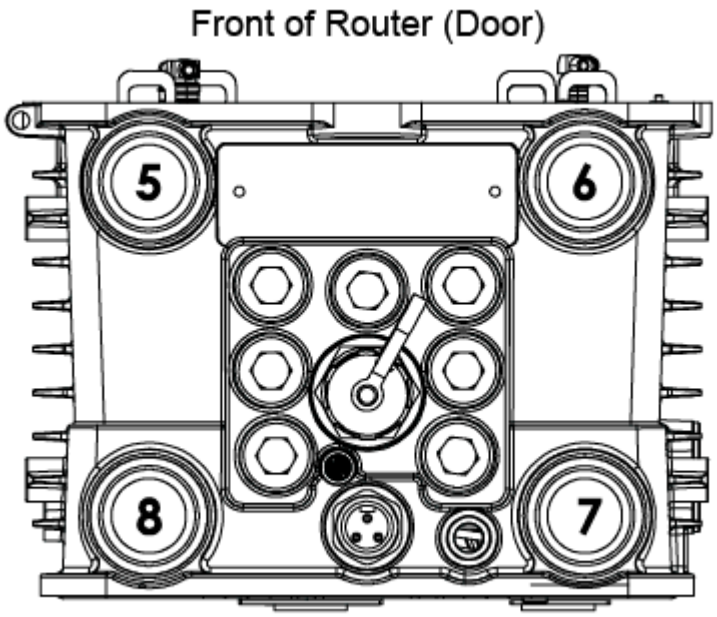


Figure 8-5 Bottom of Router—Antenna Port Numbering



Note The router integrated WiFi Antenna is always installed in port 8, and should not be removed or replaced with another antenna model.

Safety Information

Read the information in the antenna installation guide before installing or replacing antennas.

Antenna Technical Specifications

This section lists the technical information for the GPS and WiFi antennas:

- GPS Antenna Specifications, page 8-8
- WiFi Antenna Specifications, page 8-9

For specifications for Connected Grid module antennas, see the Connected Grid Anennas Installation Guide:

http://www.cisco.com/en/US/docs/routers/connectedgrid/antennas/installing/cg_antenna_install_guide.html

GPS Antenna Specifications

Specification	GPS Antenna
Type	Active GPS, chassis mounted
Frequency	1575.42 MHz
Height	22.1 mm
Base diameter	50 mm
Maximum gain (dBi)	5
Polarization	RHCP
Coaxial cable length	10 in. (25.4 cm)
Coaxial cable type	50 ohm, double-shielded
Connector	SMA-male
Environment	Outdoor
Temperature range, operational	-40 to 185° F (-40 to 85° C)
Temperature range, storage	-40 to 185° F (-40 to 85° C)

WiFi Antenna Specifications

Specification	Wife Antenna
Type	Monopole
Environment	Outdoor
Height	3.2 in. (8.13 cm)
Width (maximum, at base)	1.75 in. (4.45 cm)
Operating frequency range	806-960 MHz 1710-2170 MHz
Characteristic impedance	50 ohm
VSWR	**Nominal (Maximum)** 806 - 960 MHz (2.5:1) 1710 - 2170 MHz (2.3:1) 2300 - 2700 MHz (2.2:1)
Peak gain	**Nominal (Maximum)** 806-960 MHz (2.5 dBi +/- 1.0 dB) 1710-2170 MHz (1.0 dBi +/- 1.0 dB) 2300-2500 MHz (1.0 dBi +/- 1.0 dB) 2500-2700 MHz (2.5 dBi +/- 1.2 dB)
Polarization	Linear Vertical
Coaxial cable length	14.5 in. (5.7 cm)
Coaxial cable type	LMR195 double-shielded
Connector	Right angle QMA-male
Temperature range, operational	-40 to 185° F (-40 to 85° C)
Temperature range, storage	-40 to 185° F (-40 to 85° C)
Maximum input power	10 W (avg.)
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 1240 Connected Grid Router, and includes instructions for installing and removing the SD card.

This chapter contains the following sections:

SD Card Overview

The Cisco 1240 Connected Grid 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 is it shipped.

Supported SD Cards

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

Table 9-1 Supported SD Flash Modules

Cisco Part Number[1]	Size
16-3704-01	1 GB
16-3795-01	2 GB
16-3798-01	4 GB

1. At FCS, these internal part numbers must be replaced with customer-facing Product ID (PID) numbers. (PIDs not available yet in InBiz. November 29, 2011.)

Note For detailed specifications about the SD flash memory module, refer to Router Hardware Description.

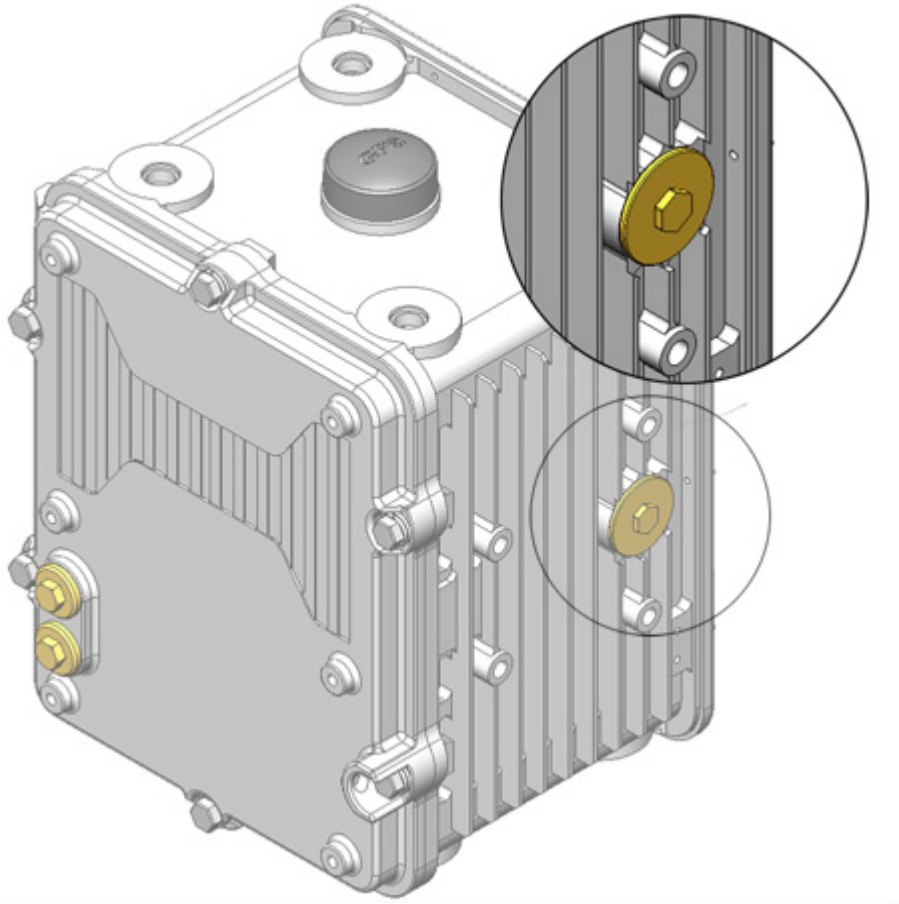
Accessing the SD Card

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.

Note When the Cisco mounting bracket is attached the router, the bracket blocks access to the SD card port slot the router exterior. To access the SD card slot without removing the router from the bracket or any mounting installation that uses the bracket, refer to the instructions in Mounting the Router.

Figure 9-1 SD Card Port Location 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 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.

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 13-mm box-end wrench or socket set to access the SD card.

Removing and Inserting the SD Card

To install or remove and SD card:

Step 1 Use the wrench to loosen the seal that covers the SD card slot (Figure 9-2).

Step 2 Confirm that the SD card LED (Figure 9-3) 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:

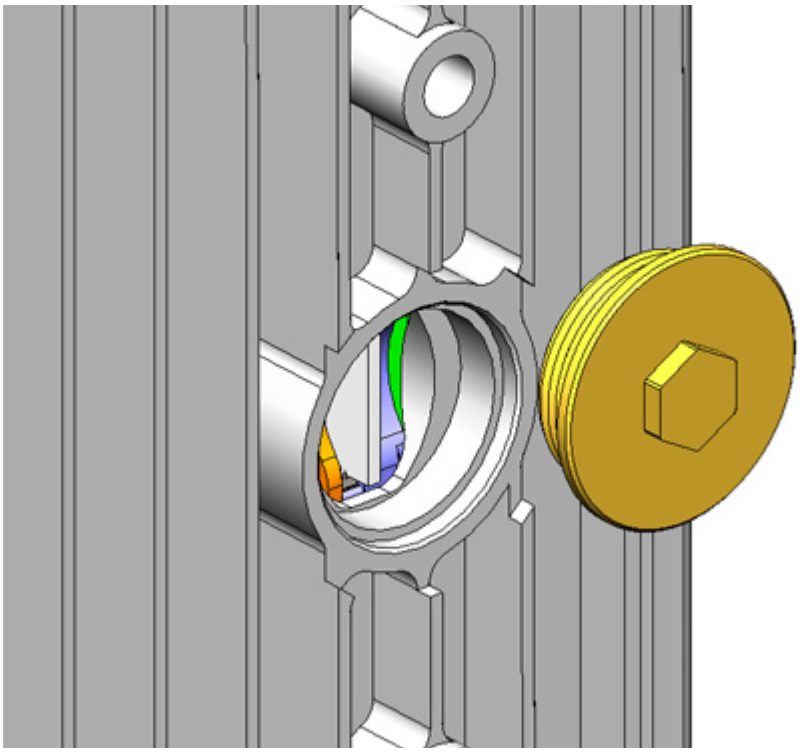
a. Insert the SD card by sliding it into the SD card slot, with the connector first and the notched corner facing up. The card is keyed so that you cannot insert it the wrong way.

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 seal that you removed in Step 1, using the wrench you supply.

Caution You must replace and tighten the seal that covers the SD card port when not using the port. If the card port is not sealed, the router interior could be exposed to environmental elements, such as water, heat, cold, and dust, that can permanently damage the router.

Figure 9-2 SD Card Slot with SD Card Inserted



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 directly next to the SD card slot, and is visible when the SD card slot seal is removed. This section describes the LED states and descriptions.

Figure 9-3 SD Card LED Location

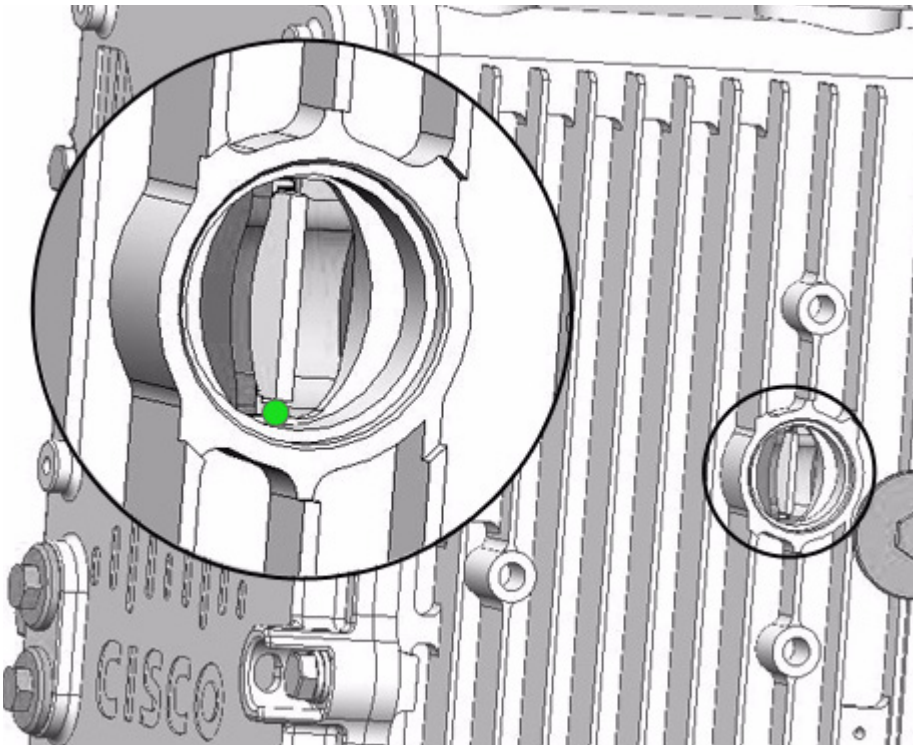


Figure 9-4 SD Flash Memory Module (SD0) LED States

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	• An error occurred when the router accessed the SD flash card. • The router could not find a system software image.
	Amber blinking	An unsupported SD card is installed in the slot.
	Amber flashing	No SD card is installed in slot.

Related Commands

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

```
cgr1240# copy running-config startup-config
[########################################] 100%
Copy complete, now saving to disk (please wait)...
```

CHAPTER 10

Installing Battery Backup Units

The Cisco 1240 Connected Grid Router supports up to three installed battery backup units, which provide power to the router if the AC power fails. This chapter describes the Cisco Connected Grid Battery Backup Unit features and how to install the battery backup unit in the router.

This chapter includes the following sections:

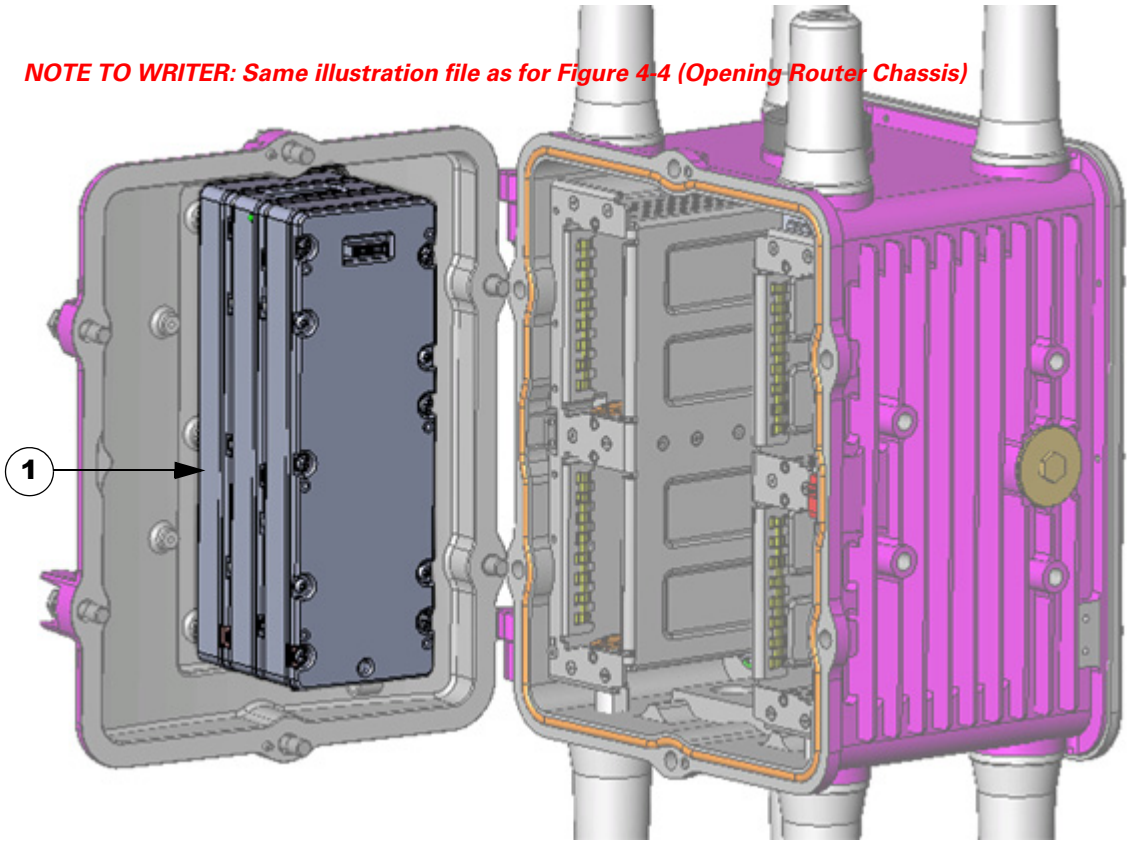
Battery Backup Unit (BBU) Description

The battery backup unit (BBU) provides the router with an emergency power source if the AC power source is unavailable. The router supports up to three installed BBU units at one time. The total amount of time that the installed BBUs can supply power to the router depends on how many BBUs are installed in the router. The BBU can be installed in the router while the router is powered on and operating normally.

The BBU is mounted on the router door interior (Figure 10-1). The BBU internal components include battery cells, a primary protection circuit, a fuel gauge, and a charger. For detailed, illustrated descriptions of the BBU, see BBU Components, page 10-5.

Figure 10-1 Battery Backup Units Mounted on Router Door

NOTE TO WRITER: Same illustration file as for Figure 4-4 (Opening Router Chassis)



Item	Cisco Product ID (PID)	Description
1	CGR-BATT-4AH	Battery backup units. The router supports up to three BBUs, as shown here.

Enabling the BBU

The BBU is automatically enabled and begins supplying power to the router when the router detects that power is not being received from the AC power supply. The BBU continues to supply power to the router until at least one of the following conditions is met:

- The BBU is completely discharged
- AC power to the router is enabled
- The BBU battery cable is disconnected from the router
- The BBU is disabled with the system software (see BBU Technical Specifications, page 10-16)

Note BBU Technical Specifications, page 10-16, contains technical details about the router power path selection and the conditions that trigger the BBU to begin operating.

Battery Backup Mode

This section describes impact to the router configuration and operating capabilities when the router switches from AC power to BBU power.

Event Messages

When the router detects that the power supply has changed from AC power to BBU power, the BBU is enabled and the following syslog message is sent to the network management system:

```
Power mode changed to battery mode.
```

Router Configuration

The router software configuration is not impacted when the router switches from AC power to BBU power.

Ethernet Switch and Connected Grid Module Operation

By default, the Ethernet switch module (module 2) and any Connected Grid modules installed in slots 3, 4, 5, and 6 continue to operate normally when the router switches from AC power to BBU power.

You can configure the router to automatically power off specific modules when the router switches to BBU power. See Related Commands, page 10-15 for information on how to use the **poweroff module** *number* **backup-battery** command to configure the modules (including the Ethernet switch) that shut down when the router switches to BBU power.

Router Interface Operation

To conserve power, the router will power off some interfaces when AC power is not available, and the router is being powered by the BBU. When these interfaces are in power off mode, you cannot configure them with the system software; however, you can display information about each interface using the **show** commands for the interface. These include:

- **show running config**
- **show hardware**
- **show interface**

The following interfaces and router components switch to power off mode when the BBU is supplying power to the router:

- Both SFP interfaces
- Both external USB ports
- Both serial (S232/485) ports
- IRIG-B port

BBU Charging and Discharging

This section will discuss BBU charging/discharging cycles. Behavior is TBD. 5-October-11. Per George Madden on Jan 9, check with software team.

BBU Capacity

The router supports up to three BBUs at one time. You should install as many BBUs as needed, up to three, to meet your emergency power requirements.

If all installed batteries fully discharge while providing backup power to the router, the router will send a dying gasp message and then shut down.

Note The BBU provides power durations shown in Table 10-1 when the router is in a reduced power consumption state, as described in Router Interface Operation, page 10-3. The durations in Table 10-1 are valid for 5 years.

Table 10-1 Cisco Connected Grid Battery Backup Unit Model Number

Backup Power (Hours)	Number of BBUs
4	1
8	2
12	3

Preparing to Install the BBU

Tools You Supply

You must provide a #1 Phillips screwdriver to install the BBU.

Safety Information for Installation

Safety Warnings

Before performing any of the tasks in this chapter, read the safety warnings in the Installation Safety and Site Preparation chapter.

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

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

Preventing Electrostatic Discharge Damage

The BBUs are sensitive to electrostatic discharge (ESD) damage which can occur when electronic cards or components are handled improperly, and 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 the BBU on an antistatic surface or in a static shielding bag. If the BBU will be returned to the factory, immediately place it in a static shielding bag.
- Avoid contact between the battery and clothing. The wrist strap protects the battery 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.

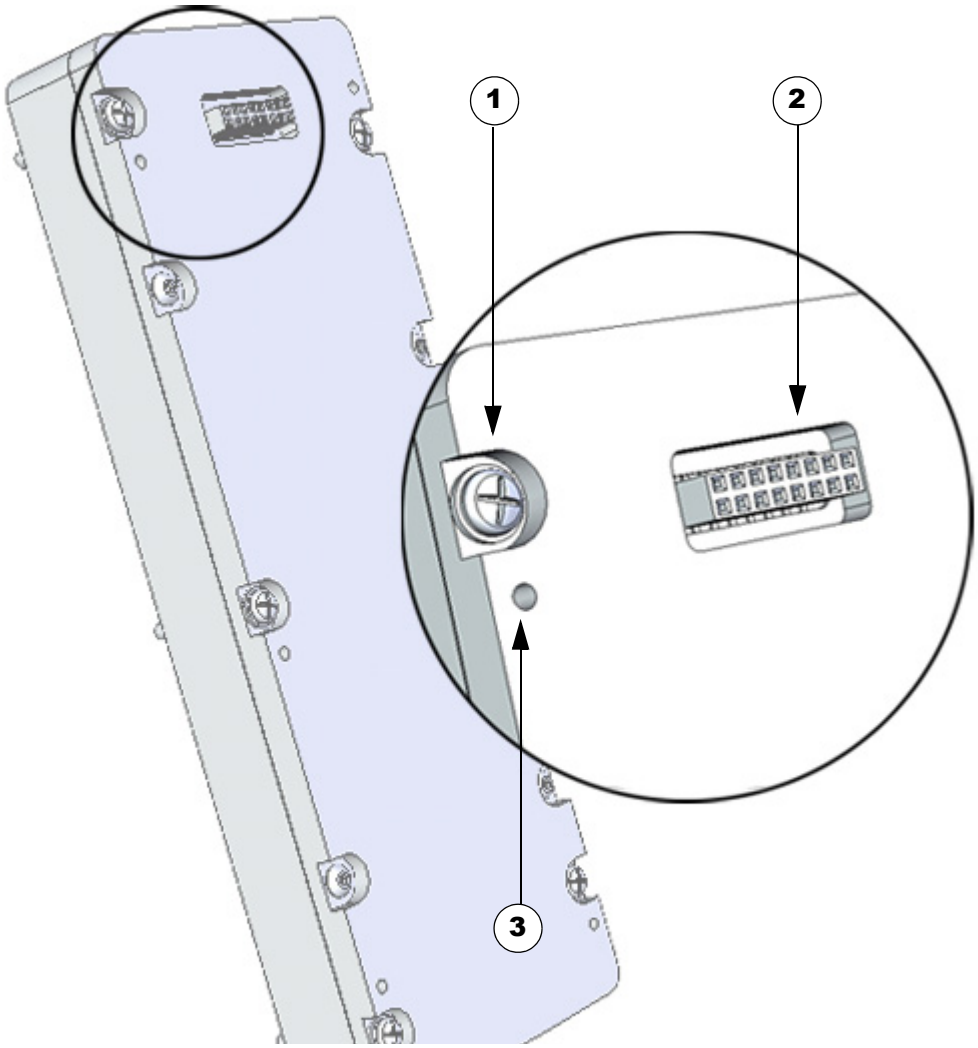
BBU Components

This section illustrates and describes the BBU components you should be familiar with when installing the BBU.

Note For technical specifications of the components described in this section, see BBU Technical Specifications, page 10-16.

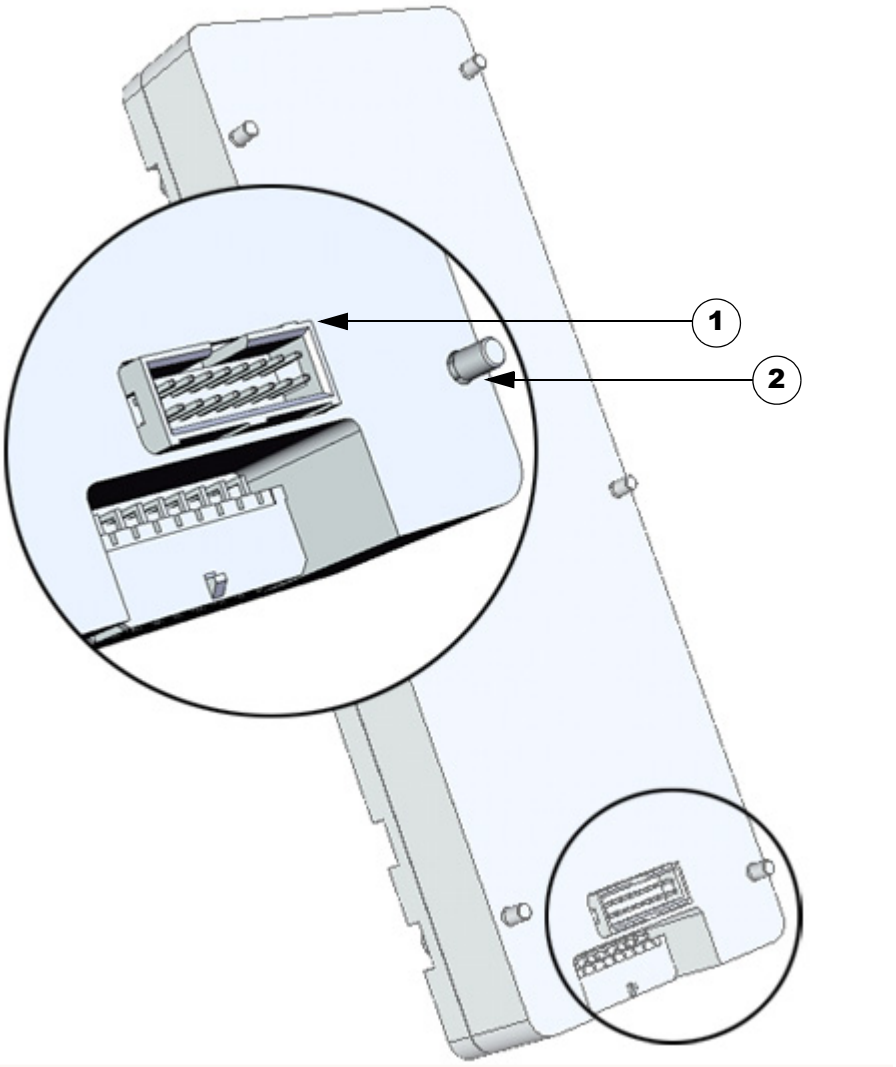
Battery-to-Battery Connectors

Figure 10-2 Front of Battery Backup Unit



Item	Description
1	Captive screws (6) for installing the BBU directly to the router door or to another BBU already installed on the router door.
2	Battery-to-battery connector, female. The BBU features two battery-to-battery connectors: one male and one female, which are used to connect batteries together when two or more batteries are installed in one router.
3	Threaded connectors, to attach an additional BBU (6)

Figure 10-3 Rear of Battery Backup Unit

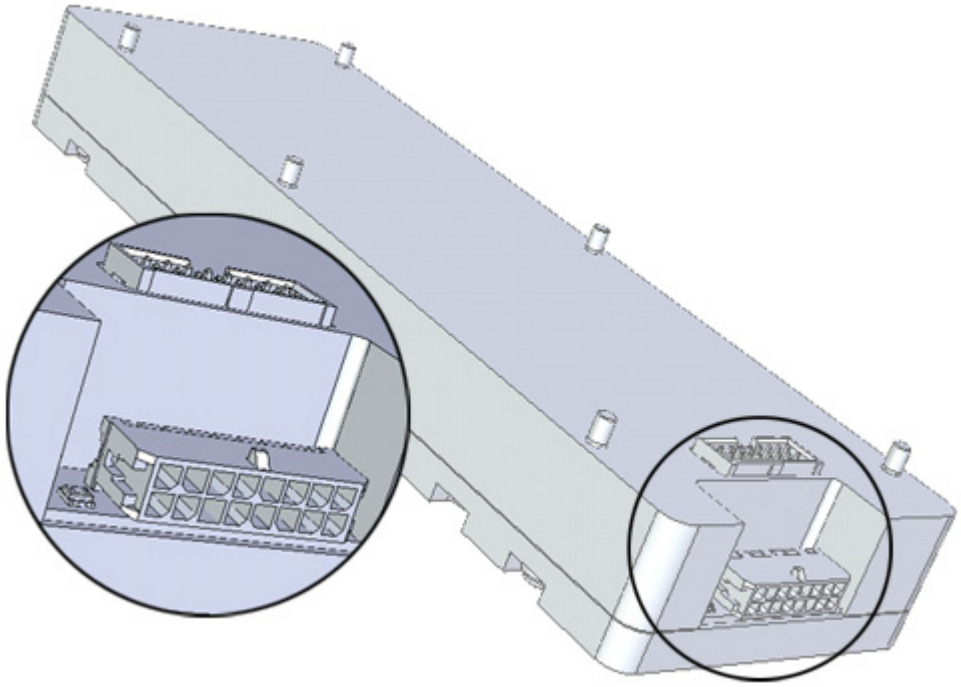


Item	Description
1	Battery-to-battery connector, male. The BBU features two battery-to-battery connectors: one male and one female, which are used to connect batteries together when two or more batteries are installed in one router.
2	Captive screws (6)

Battery-to-Router Connector

The BBU features a single battery-to-router connector at the base, which connects to the the BBU cable inside the router (shown in Figure 10-6).

Figure 10-4 Battery-to-Router Connector

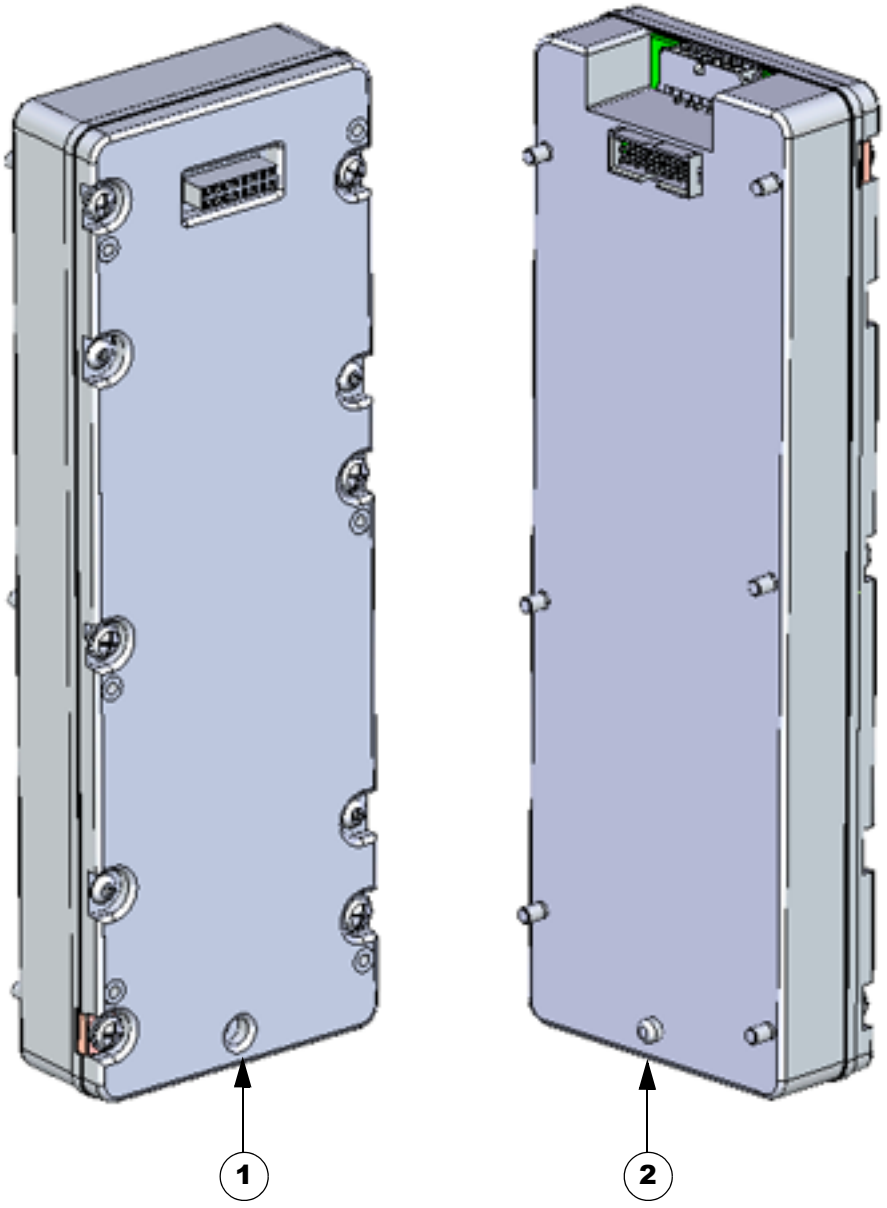


Locating Pin and Notch

When you connect a second or third battery to a battery already installed in the router, as described in Installing a BBU in the Router, page 10-10, use the locating pin and notch to ensure correct battery position and align the battery connectors.

Figure 10-5 illustrates the pin and notch location on the BBU.

Figure 10-5 Locating Pin and Notch



Item	Description
1	Locating notch (back of BBU)
2	Locating pin (front of BBU)

Installing a BBU in the Router

Online Insertion and Removal (OIR) or "Hot Swapping"

BBUs can be installed in the router while the router is powered on and operating normally.

Installation Illustrations

The procedures in this section refer to the following illustrations:

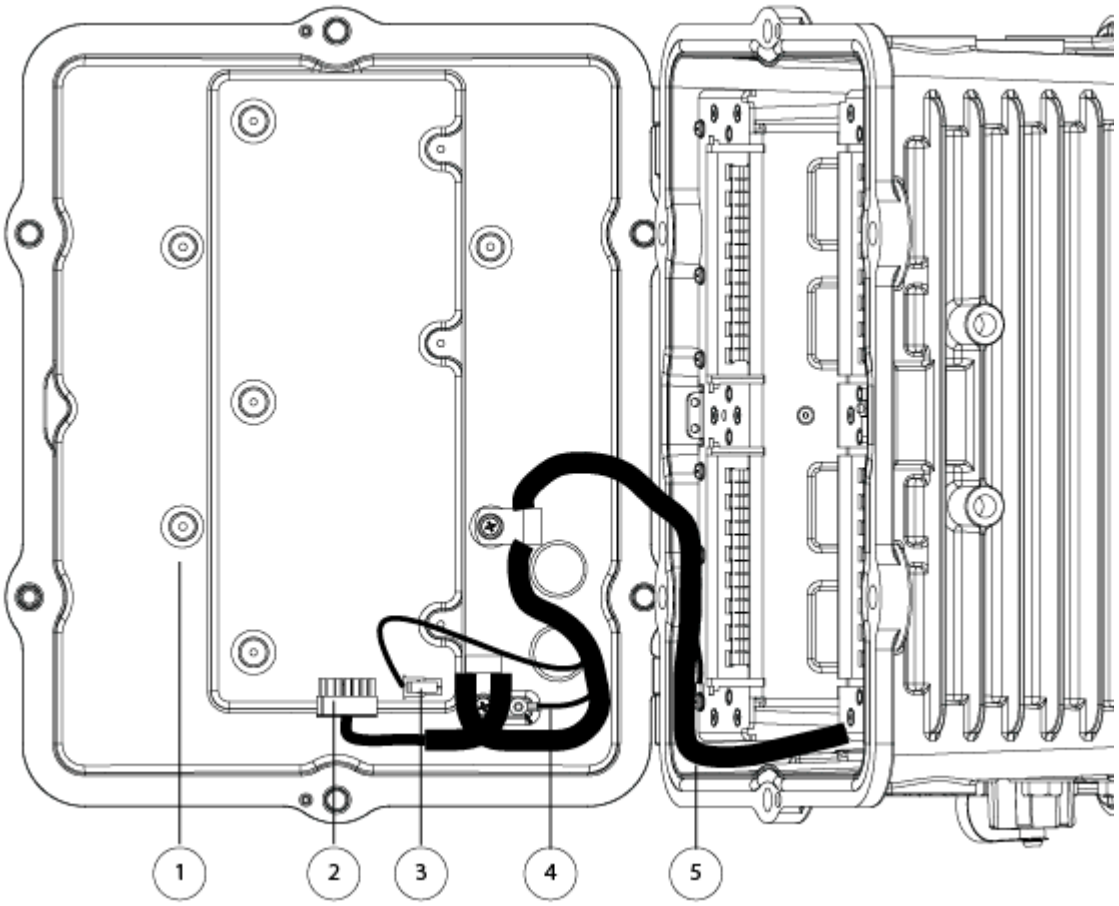
- BBU components illustrated in BBU Components, page 10-5
- Router installation features shown in Figure 10-6
- BBU installation assembly shown in Figure 10-7

Installation Procedures

This section includes steps for the following procedures:

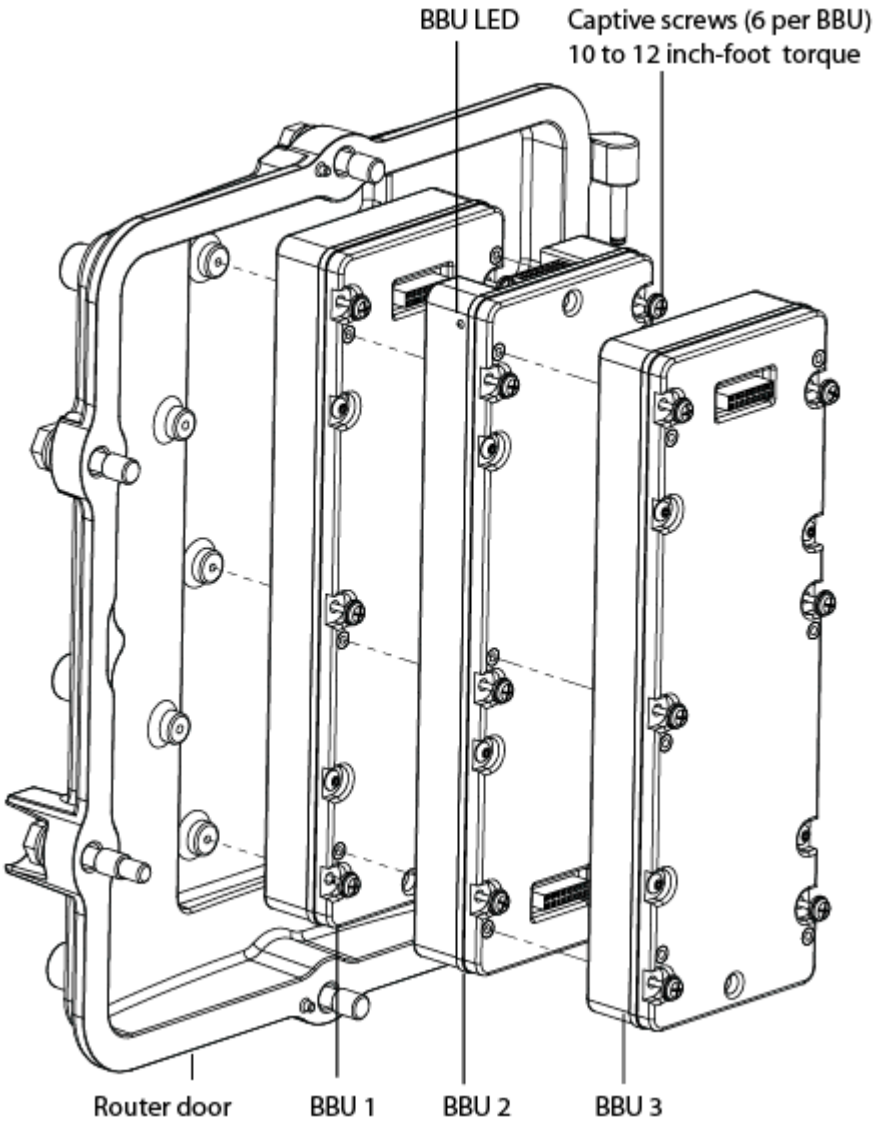
- Installing BBU 1, page 10-12
- Installing BBU 2 or BBU 3, page 10-13

Figure 10-6 Router Features for BBU Installation



Item	Description
1	Mounting bosses, for installing first BBU to router (6)
2	BBU cable connector. The BBU is connected to the router cable harness with this connecctor.
3	Non-Cisco module power connector (12 V). If you install a non-Cisco module on the router exterior, you can optionally use this connector to provide power to the module. See the chapter Installing Non-Cisco Modules for details.
4	Ground lug (door to chassis)
5	BBU cable harness. The cable harness connects the BBU(s) to the router and is the physical connection over which BBU power is supplied to the router when AC power is not available. The router is shipped with this cable even if the router is not shipped with a BBU installed.

Figure 10-7 BBU Installation



Installing BBU 1

Follow these steps to install BBU 1 (the first BBU) in the router. If you are Installing BBU 2 or BBU 3, you take different steps.

Step 1 Open the chassis door by following the steps in the chapter Opening the Router Chassis.

Step 2 Align the BBU so that the locating notch and the female battery-to-battery connector are facing out and the connector is at the top of the router (Figure 10-7).

Step 3 Align the six captive screws on the BBU to the mounting bosses on the router door (Figure 10-7).

Step 4 Use your hand to loosely and evenly install the six captive screws into the mounting bosses, then use the #1 Phillips screwdriver to tighten the screws using 10 to 12 inch-pounds of torque.

Step 5 Connect the BBU cable connector to the battery-to-router connector on the BBU. The connector is shown in Figure 10-6.

Step 6 Verify that the BBU has been successfully installed and is operating normally by viewing the status of the Battery Backup Unit LED, page 10-14. The LED will display the following sequence:

a. Red fast blinking—BBU is powered on and is initializing.

b. Red and green alternate blinking— BBU is synchronzing with the router.

c. The final BBU LED state is one of the following:

- Blinking amber—BBU detects that there is no AC power supplied to the router and begins discharging (supplying power to the router).
- Blinking green—The BBU was not fully charged when installed and is charging to full capacity. The router is powered by the AC power supply.
- Solid green—The BBU is fully charged. The router is powered by the AC power supply.

Step 7 Close the chassis door by following the steps in the chapter Opening the Router Chassis.

Installing BBU 2 or BBU 3

Follow these steps to install BBU 2 or BBU 3 (a second or third BBU) in the router. Installing BBU 1 requires a different set of steps.

Step 1 Open the chassis door by following the steps in the chapter Opening the Router Chassis.

Step 2 Align the BBU so that thelocating pin and the female battery-to-battery connector are facing out and the locating notch is at the top of the router.

Step 3 Slide the locating notch on the new BBU over the locating pin on the installed battery, and verify that the BBU male connector on the new BBU is aligned with the female connector on the installed BBU.

Step 4 Press firmly against the new BBU to seat the connectors and connect the new BBU to the installed BBU.

Step 5 Use your hand to loosely and evenly tighten the six captive screws on the new BBUinto the corresponding six threaded connectors on the installed BBU. Then use the #1 Phillips screwdriver to tighten the screws to the installed BBU using 10 to 12 inch-pounds of torque

Step 6 Verify that the BBU has been successfully installed and is operating normally by viewing the status of the Battery Backup Unit LED, page 10-14. The LED will display the following sequence:

a. Red fast blinking—BBU is powered on and is initializing.

b. Red and green alternate blinking— BBU is synchronzing with the router and the other BBUs.

c. The final BBU LED state is one of the following:

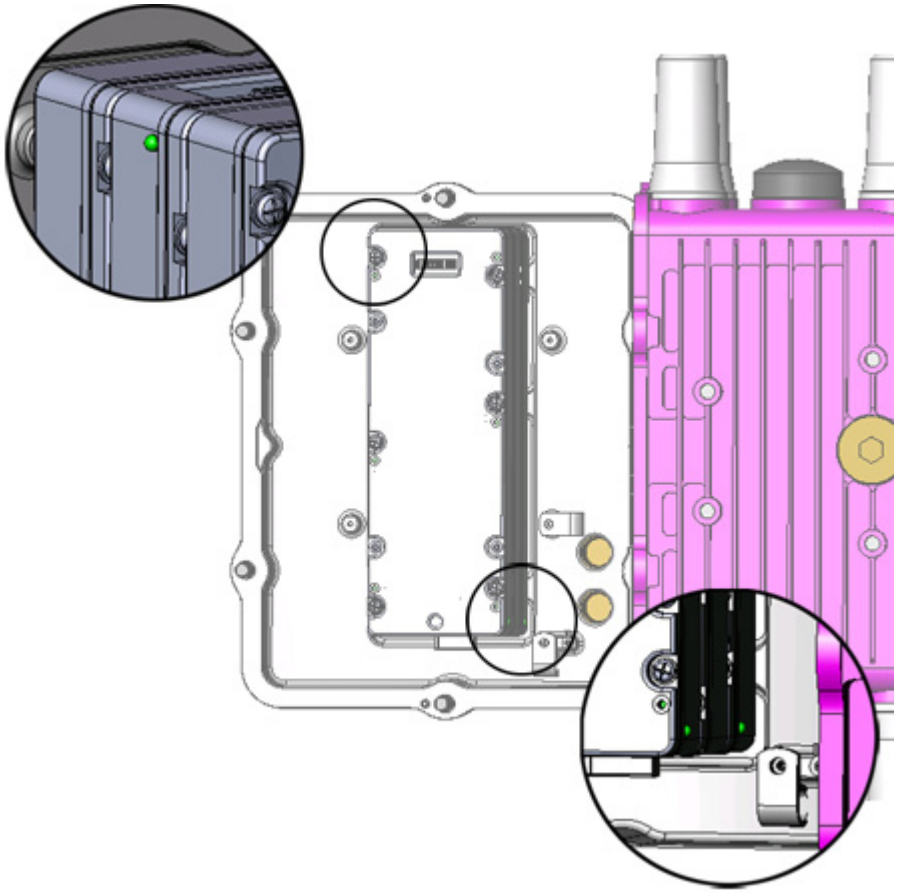
- Blinking amber—BBU detects that there is no AC power supplied to the router and begins discharging (supplying power to the router).
- Blinking green—The BBU was not fully charged when installed and is charging to full capacity. The router is powered by the AC power supply.
- Solid green—The BBU is fully charged. The router is powered by the AC power supply.

Step 7 Close the chassis door by following the steps in Opening the Router Chassis.

Battery Backup Unit LED

The BBU features a single LED that indicates the status of the BBU when it is installed in the router.

Figure 10-8 Battery Backup Unit LED Location



LED	Color and State	Description
BBU LED (no label)	Green solid	Idle state
	Green blinking	Charging
	Amber blinking	Discharging (providing power to the system)
	Amber slow blinking	Disabled with the system software
	Red/green blinking	Initializing
	Red fast blinking	Resetting
	Red blinking	Bootloader mode
	Red slow blinking	Test mode
	Red solid	BBU failure
	Off	Disabled (disconnected from router or completely discharged)

Related Commands

This section describes system software command that support BBU operation, and includes the following commands:

backup-battery reset

Use the **backup-battery reset** EXEC command to power the BBU off, then back on:

```
CGR1240# battery-backup reset
```

This command is functional only when AC power is supplying power to the router. If you enter this command when the router is powered by the BBU, an error message is displayed.

This command resets all BBUs installed in the router.

backup-battery inhibit discharge

Use the **backup-battery inhibit discharge** EXEC command to disable the BBU automatic discharge feature. Use this command when you must disconnect the router from AC power and want to prevent the BBU from automatically discharging, for example when you must service the router or transport it between locations.

This command is functional only when the BBU is supplying power to the router. If you enter this command when the router is powered by AC power, an error message is displayed.

Caution Entering the **backup-battery inhibit discharge** command disables the BBU immediately. You are not prompted to confirm the command. If you enter this command when the router is operating on the network and powered by the BBU, the router will immediately power down and no longer operate on the network.

backup-battery un-inhibit discharge

Take these step to reset the BBU to the default behavior (automatically begin discharging when the router is not receiving AC power):

Step 1 Connect the router to an AC power source.

Step 2 Enter the **backup-battery un-inhibit discharge** EXEC command:

```
CGR1240# battery-backup un-inhibit discharge
```

poweroff module number backup-battery

Use the **poweroff module** *number* **backup-battery** global configuration command to configure the router to power off specific modules (including the Ethernet switch) when the router switches to BBU power. By default, all modules continue to operate normally when the router is powered by the BBU. Enter this command for each module that you want to automatically shut down.

Syntax	Description
poweroff module *number* **backup-battery**	Configures the router to power down the indicated module when the router switches to BBU power. *number*—The number of module that is powered down: • **2**: Ethernet switch module (all ports) • **3-6**: Module inserted in the slot with corresponding number. Slot numbering is described and illustrated in the chapter Router Hardware Description.

For example, to configure the router to shut down the Ethernet switch (all Ethernet ports) when the router is powered by the BBU, enter this command:

```
CGR1240(config)# poweroff module 2 backup-battery
```

For example, to configure the router to shut down the module installed in Slot 6 when the router is powered by the BBU, enter this command:

```
CGR1240(config)# poweroff module 6 backup-battery
```

Use the **no** form of the command to reset a module to the default behavior: continue to operate normally when the router switches to BBU power. For example:

```
CGR1240(config)# no poweroff module 2 backup-battery
```

For detailed information on configuring the router, including configuration modes and saving configurations, see the Cisco 1000 Series Connected Grid Routers software configuration guides.

BBU Technical Specifications

This section describes the specifications and standards supported by the BBU.

Note For BBU connector and cable specifications, see the appendix Connector and Cable Specifications.

Router Power Path Selection

During normal operation, the router is powered by the integrated AC power supply. The BBU is enabled when the AC power is interrupted outside a range of 85V to 250V for more than 20 ms.

Table 10-2 Battery Backup Unit—Power Path Selection

Behavior	Operating Condition
BBU Charge/Discharge	Supports charging or discharging only (not both simultaneously)
Total power provided	AC power provides up to 60W of power to the router as follows: • 40W for router operation • 20W for heater and BBU charging

Discharge Conditions

Table 10-3 Battery Backup Unit—Discharging Specifications

Discharge Conditions	Description
Power load	10 W
Duration	4 hours
Entry to discharge[1]	• BBU cable harness is installed • AC power (range of 85V to 250V) not detected for more than 20 ms • Remaining BBU capacity >5% • Ambient temperature is within -20 to 60 C
Exit discharge[2]	• AC power restored in the range of 85V to 250V for more than 20 ms. • Remaining BBU capacity <5% • Ambient temperature not within -20 to 60 C

1. All conditions met.
2. Any condition met and system is detected.

Charge Conditions

Table 10-4 Battery Backup Unit—Charge Specification s

Charge Conditions	Description
Power draw	No more than 20 W when charging
State of charge	No more than 90%
Entry to charging[1]	• BBU cable harness is installed • Charge is enabled • SoC <90% • Ambient temperature is within 0 to 50C • AC power detected in the range of 85V to 250V for more than 20 ms.
Exit charging[2]	• BBU cable harness not installed • Charge is disabled • AC power (range of 85V to 250V) not detected for more than 20 ms. • Ambient temperature is not within 0 to 50 C

1. All conditions are met.
2. Any condition is met

Operating and Storage Temperatures

Table 10-5 Battery Backup Unit—Operating and Storage Temperatures

BBU State	Temperature Range
Battery charging	0 to 50 C (32 to 122 F)
Battery discharging	-20 to 60 C (-4 to 140 F)
Operating	-40 to 85 C (-40 to 185 F)
Storage and shipping	-40 to 70 C (-40 to 158 F)

Battery Life

Table 10-6 Battery Backup Unit — Battery Life

Product ID	Battery Life	Charge-Discharge Cycles
CGR-BATT-4AH	5 years	500

Battery Standards

Table 10-7 lists the equipment standards that the BBU supports.

Table 10-7 Supported Safety Standards

Name	Description of Standard
UL2054	Household and Commercial Batteries
UL60950-1	Information Technology Equipment

CHAPTER 11

Installing Non-Cisco Modules

The Cisco 1240 Connected Grid Router provides support for a compatible, non-Cisco wireless module, installed on the router exterior and connected to the router integrated switch module. Wireless connections send data from the router to field devices, such as smart meters, and from the router to the utility or data management center.

This chapter contains the following sections:

Non-Cisco Module Support

This section describes the support for, and requirements for, installing a non-Cisco module on the router.

Caution Cisco does not provide technical support for issues related to non-Cisco products. You must contact the module supplier or your reseller to obtain technical support for the non-Cisco module.

Caution Installing a module that does not meet these requirements can negatively affect router performance.

Non-Cisco Module Requirements

Non-Cisco modules installed on the router exterior must meet the following requirements:

- Must comply with Type 4X and IP67 standards.
- External devices must have one of the following sets of dimensions:
  - 7 x 4 x 2.5 inches (17.78 x 10.16 x 6.35 cm)

Reviewers: Provide the supported dimensions for the configuration shown in Figure 11-2.

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Online Installation and Removal

A non-Cisco module can be installed or removed while the router is installed (usually on a pole top) and operating normally.

Reviewers: Please confirm the above statement.

Certification

A non-Cisco module that is installed on the router does not interact with the router chassis. Connecting a non-Cisco module to the router does not certify the module. Before installing the module, verify that it is certified for use in your environment.

Power

The router interior features a 4-pin, Micro-Fit 3.0 connector, which provides 12 volts of power to a connected module. See Figure 11-5 for an illustration of the power connector.

Before Installing

Read this section and the Installation Safety and Site Preparation chapter before following any installation procedures in this chapter.

Prepare the Installation Site

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.

Read the Safety Information

Before performing any of the tasks in this chapter, you must read the safety warnings in this section and in the Installation Safety and Site Preparation chapter.

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, 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.

Cabling Guidelines

Follow these guidelines for using cables with the router:

- 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.

Install a Non-Cisco Module

This section provides the information you need to connect a non-Cisco module to the router. Some steps might require that you refer to the documentation that supports the module. This section includes these installation topics:

Tools and Materials You Supply

- **Wrench**—You must supply a 13-mm box-end wrench or socket set to remove liquid-tight seals from the cable ports and to install the cable glands on the cable ports.
- **Hardware**—You must provide any hardware required to Connect the Module to the Chassis, page 11-4.
- **Power Connector Adapter**—Depending on your module power cable, you might need to provide an adapter to connect the module to the router 4-pin Micro-Fit 3.0 power connector.

Open and Close the Router Door

You might be required to open the router door to install the module. For instructions on opening and closing the router door, see the chapter Opening the Router Chassis.

Connect the Module to the Chassis

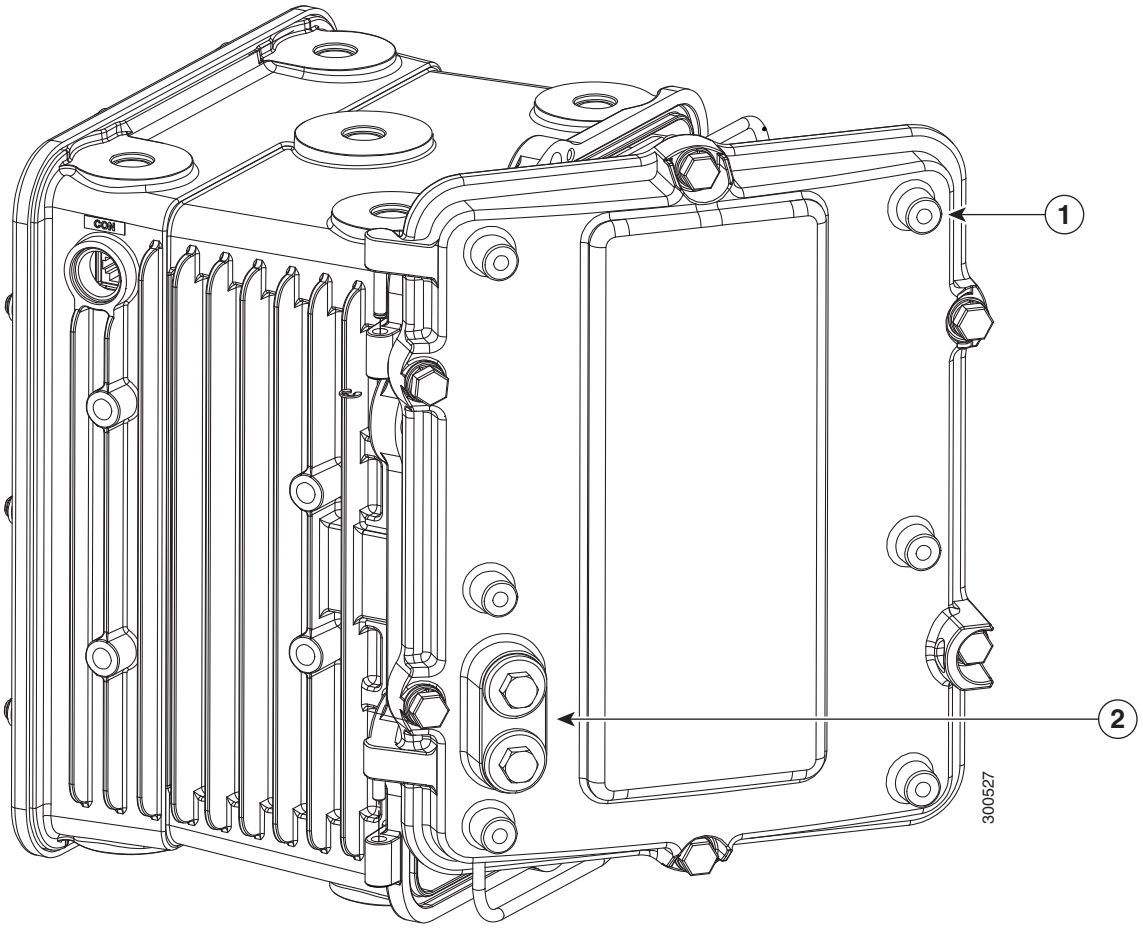
The router front door has these features for installing a module on the router exterior:

- Six mounting bosses for attaching a module to the router (see **1** in Figure 11-1)
- Two cable ports to thread power and Ethernet cables to the router interior (see **2** in Figure 11-1)

To attach the module to the mounting bosses, you must:

- Provide the hardware required to attach the module to the mounting bosses
- Follow the mounting instructions that support the module

Figure 11-1 Mounting Bosses and Cable Ports



Installation Options

The layout of the mounting bosses on the router front door supports two typical installation options, described in this section:

- External Cabling Installation Configuration, page 11-5
- Internal Cabling Installation Configuration, page 11-6

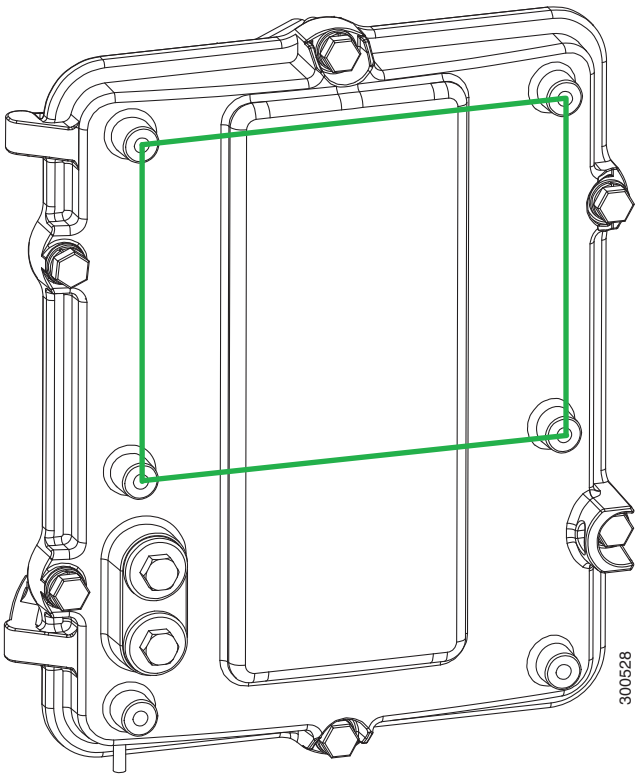
External Cabling Installation Configuration

In the configuration shown in Figure 11-2, install the module above the cable ports, and connect the cables from the module through the cable ports on the router door.

With this configuration:

- Use the four mounting bosses indicated in Figure 11-2.
- Supported dimensions: (**Need this information from hardware/mechanical engineering.**)
- Cables are exposed externally
- Use cable glands to thread cables through the cable ports
- Follow the cabling instructions in External Cabling, page 11-7

Figure 11-2 Non-Cisco Module Installation Configuration—External Cabling



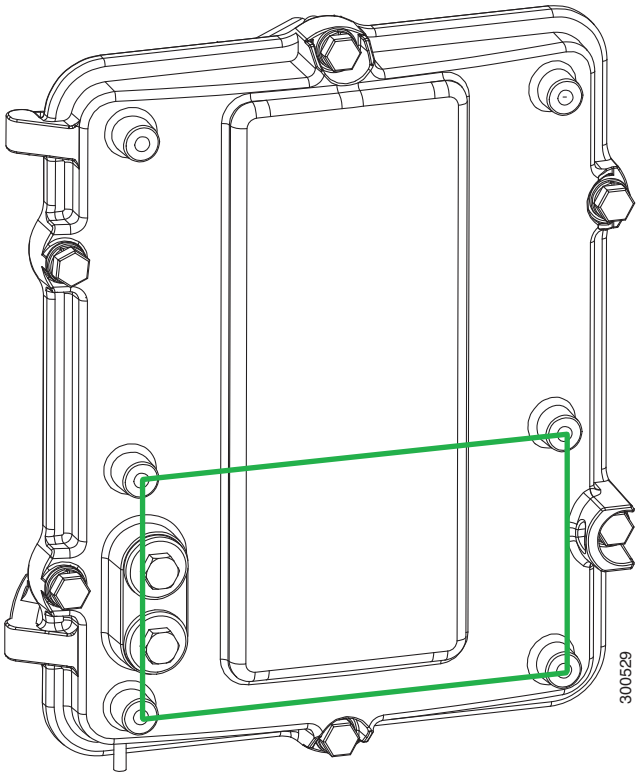
Internal Cabling Installation Configuration

In the configuration shown in Figure 11-3, install the module directly over the cable ports, and thread the module cables through the cable ports.

With this configuration:

- Use the four mounting bosses indicated in Figure 11-3
- Supported dimensions: 7 x 4 inches (17.78 x 10.16 cm)
- Cables are not exposed externally
- Install an O-ring in each cable port to create an environment-proof seal
- Follow the cabling instructions in Internal Cabling, page 11-7

Figure 11-3 Non-Cisco Module Installation Configuration—Internal Cabling



Cabling Instructions

This section describes the two cabling procedures. Use the procedure that applies to your installation configuration:

- External Cabling, page 11-7
- Internal Cabling, page 11-7

External Cabling

When you install the module in the configuration shown in Figure 11-2, the cables are external to the router, and then threaded through the cable ports on the router from the module.

Cisco Cable Glands

When you install the module in a configuration that uses external cabling from the module through the cable ports on the router door, you must provide cable glands for each cable port.

Cable glands:

- Create seal to protect the router interior from environmental elements
- Can be ordered from Cisco: CGR-IP67GLAND (one cable gland per kit)
- Are described in detail in Cable Glands Description, page 6-12 in the Installing the Router chapter

Caution The cable glands must be used for all cables that are threaded through the router chassis cable ports to prevent exposing the router interior to environmental elements.

Outdoor Cable Requirements

Verify that the cables you use to connect the module to the router meet the cable requirements described in Cable Requirements, page 6-13 of the Installing the Router chapter.

Connecting the Cable Glands

Step 1 Use the 13-mm wrench to remove the liquid-tight seals from the cable ports on the router door.

Step 2 Follow the steps in Cable Glands Installation Steps, page 6-13, in the Installing the Router chapter to:

- Thread the Ethernet and power cables through the cable glands
- Connect the cable glands to the cable ports on the router door

Internal Cabling

When you install the module in the configuration shown in Figure 11-3, the cables are threaded directly through the cable ports on the router from the module, and are not exposed externally.

Cisco O-Ring

When you install the module in a configuration that uses internal cabling from the module, through the cable ports on the router door, insert a rubber O-ring into each port to create an environmental-proof seal.

You can order an O-ring kit from Cisco using the model number xx-xxxxx. Each kit contains one O-ring.

Reviewers: Confirm that this is an orderable part from Cisco.

Caution The O-ring must be used to prevent exposing the router interior to environmental elements.

Connect to the Network

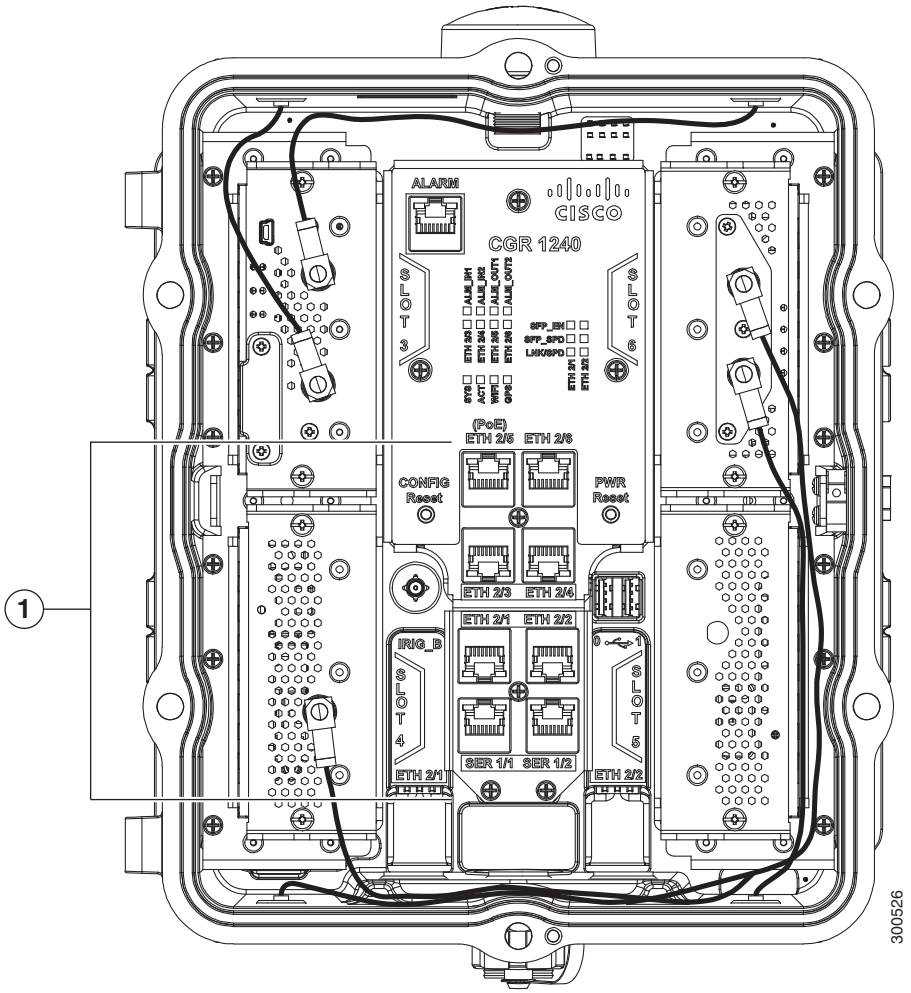
Step 1 Verify that the module Ethernet cable is threaded through the router cable port, and that the cable port has cable glands or an O-ring installed.

Step 2 Connect the module Ethernet cable to any of the Ethernet ports on the router interior. See in **1** in Figure 11-4 for router Ethernet port locations.

For detailed information about making router Ethernet connections, see Connect to the Ethernet Backhaul Network, page 6-3, in the Installing the Router.

Step 3 After connecting the module network cable to the Ethernet port, use the wire ties on the router door (see in **1** in Figure 11-5) to fix the cable to the door.

Figure 11-4 Router Ethernet Ports (1)



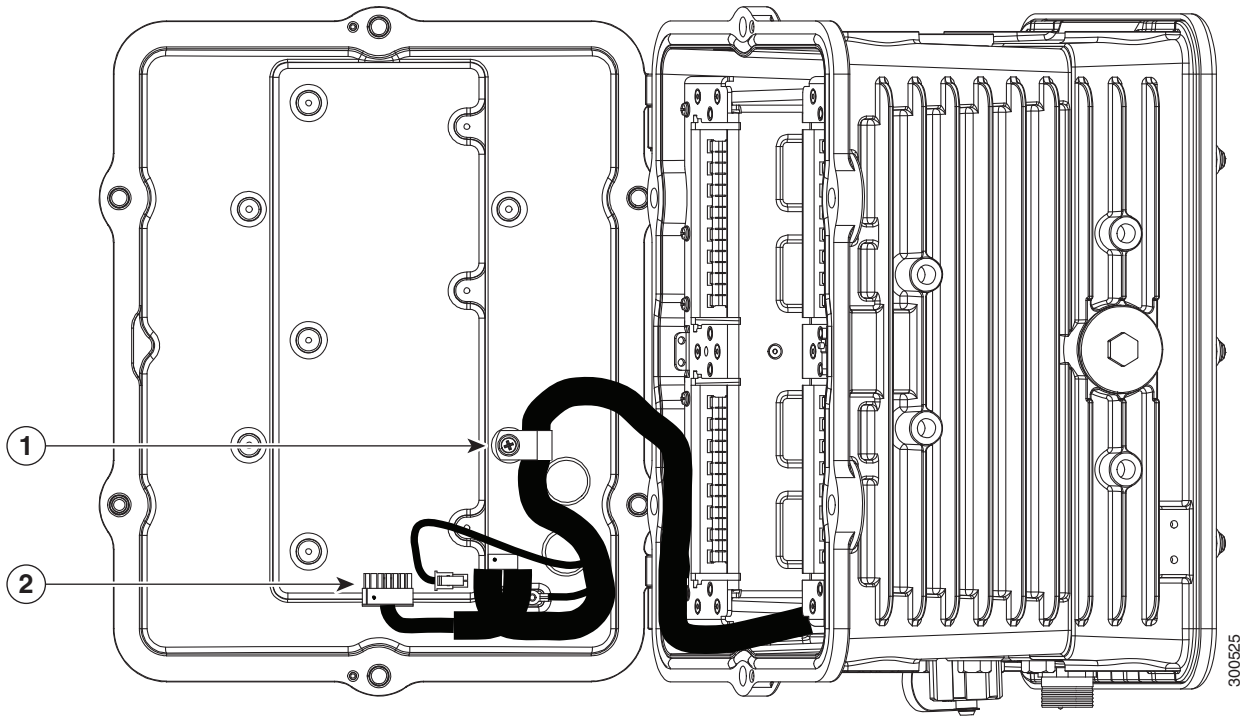
Connect to Power

Depending on your module power cable, you might need to provide an adapter to connect the module to a 4-pin Micro-Fit 3.0 power connector.

Step 1 Verify that the module power cable is threaded through the router cable port, and that the cable port has cable glands or an O-ring installed.

Step 2 Connect the power cable to the Micro-Fit 3.0 power connector. See in **2** in Figure 11-5 for connector location.

Figure 11-5 Cable Harness (1) and Power Connector (2)



Related Information

This chapter describes installation procedures. For detailed, technical information about the router hardware, including connector and cable descriptions, specifications, and pinouts, see the following chapters:

- The Router Hardware Description chapter describes all features of the router hardware, including the ports and cable glands described in this chapter.
- The Connector and Cable Specifications appendix includes the pinouts for the 12V power connector used to provide power to non-Cisco modules.

CHAPTER 12

Router LED Locations and States

View the Cisco 1240 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 12-8 to check the system status LED state from remote locations.

This chapter includes the sections:

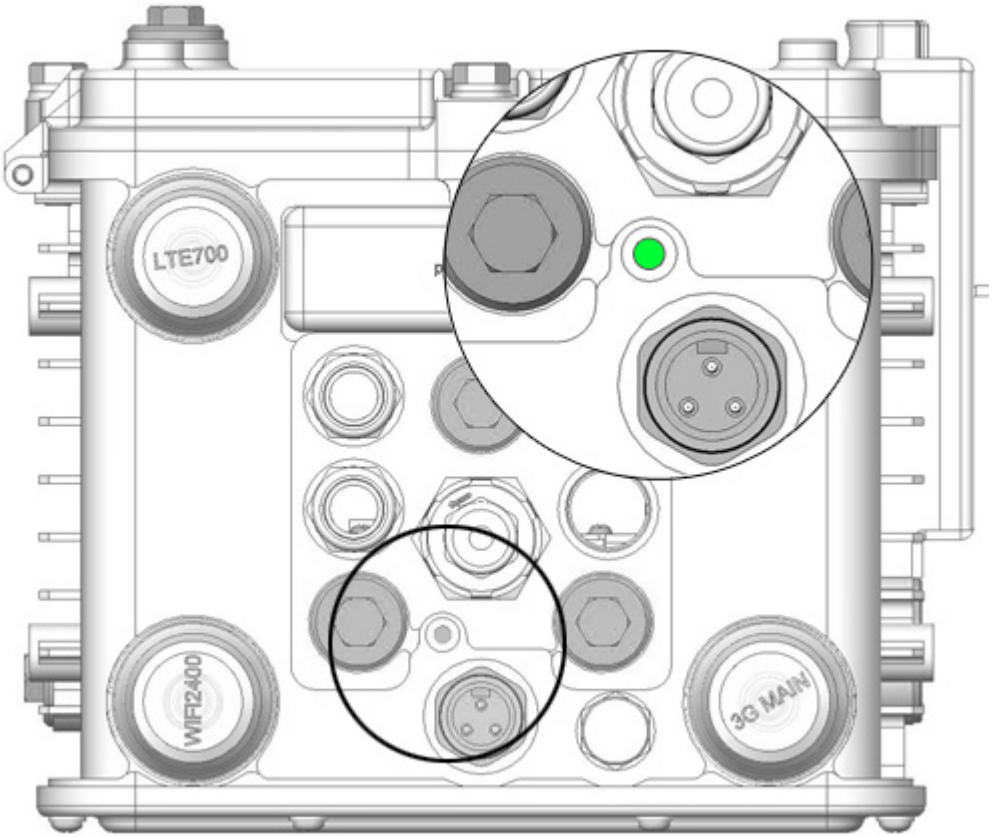
LED Locations and State Descriptions

System Status (SYS) LED

View the system status LED to determine the overall operating and power status of the router.

A second, identical system status LED is located inside the router. See the section Alarm and Network Connection LEDs, page 12-3 for the location of the interior SYS LED.

Figure 12-1 System Status LED (SYS) — Router Bottom Exterior

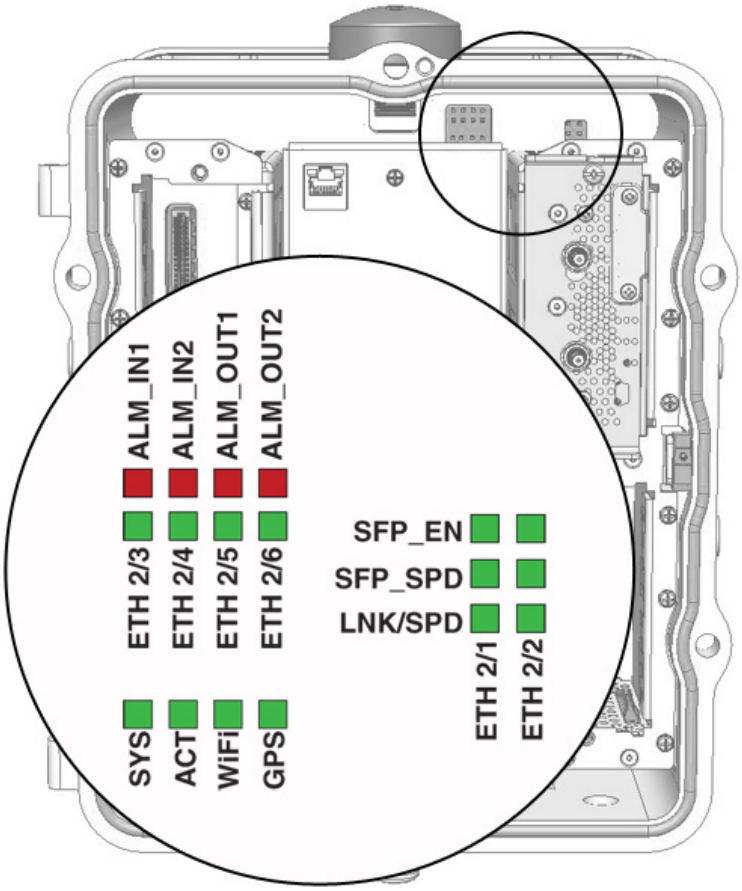


Label Description	Color and State	Description
SYS System status	Green	Normal system operating status
	Green blinking	The system is starting up or power cycling, and loading system software, including BIOS and operating system
	Amber	System receiving power but there is an error condition
	Off	System not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

Alarm and Network Connection LEDs

The router LEDs that indicate network activity and connection status, and the LEDs that indicate alarm states, are located inside the router. To see these LEDs, you must open the router chassis according to the instructions in the Opening the Router Chassis chapter.

Figure 12-2 Network and Alarm LEDs — Router Front Interior



ALARM LEDs

Alarm LEDs		
LED Label	**Color and State**	**Meaning**
ALM_IN1 **ALM_IN2** **ALM_OUT1** **ALM_OUT2**	Off	No alarm condition is present on the port
	Red solid	Alarm condition present on the port

Fast Ethernet LEDs

Fast Ethernet LEDs		
LED Label	**Color and State**	**Description**
ETH 2/3	Off	No link established
ETH 2/4	Green, 2 blinks/pause	10 MB/s link speed
ETH 2/5	Green, 1 blink/pause	100 MB/s link speed
ETH 2/6		

Combo Port LEDs

The ETH 2/1 and ETH 2/2 interfaces are shared. Each interface (ETH 2/1 and ETH 2/2) supports either a fiber optic GE connection (using an SFP module) or a copper GE connection, but not both. For more information, see Combo Ports, page 2-26 in the chapter Router Hardware Description.

Combo Port LEDs–SFP Module and Gigabit Ethernet Ports			
LED Label	**LED Label**	**Color and State**	**Description**
ETH 2/1 **ETH 2/2**	**SFP_EN–**This LED is active only for fiber optic (SFP module) connections on the ETH 2/1 and ETH 2/2 ports.		
		Off	No SFP installed in the port
		Green solid	Supported SFP installed in the SFP port
		Green blinking	SFP module can be removed or replaced
		Amber solid	Unsupported SFP installed in the SFP port
	SFP_SPD–This LED is active only for fiber optic (SFP module) connections on the ETH 2/1 and ETH 2/2 ports.		
		Green, 3 blink/pause	100 MB/s link speed
		Green, 2 blinks/pause	1000 MB/s link speed
		Off	No SFP link established on the optical GE port
	LNK/SPD–This LED is active only for copper GE connections on the ETH 2/1 and ETH 2/2 ports.		
		Amber, 3 blinks/pause	100 MB/s link speed
		Amber, 2 blinks/pause	1000 MB/s link speed
		Green solid	Ethernet cable connected and link established
		Off	No link established

System LEDs

System LEDs		
LED Label	**Color and State**	**Description**
SYS	**Note** This LED has the same functionality as the SYS LED on the router exterior, described in the section System Status (SYS) LED, page 12-2.	
	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	Off	No system data packet activity
	Green	System data packet activity between the system and any data port
	Green blinking	System data packet activity between the system and any data port

WiFi and GPS LEDs

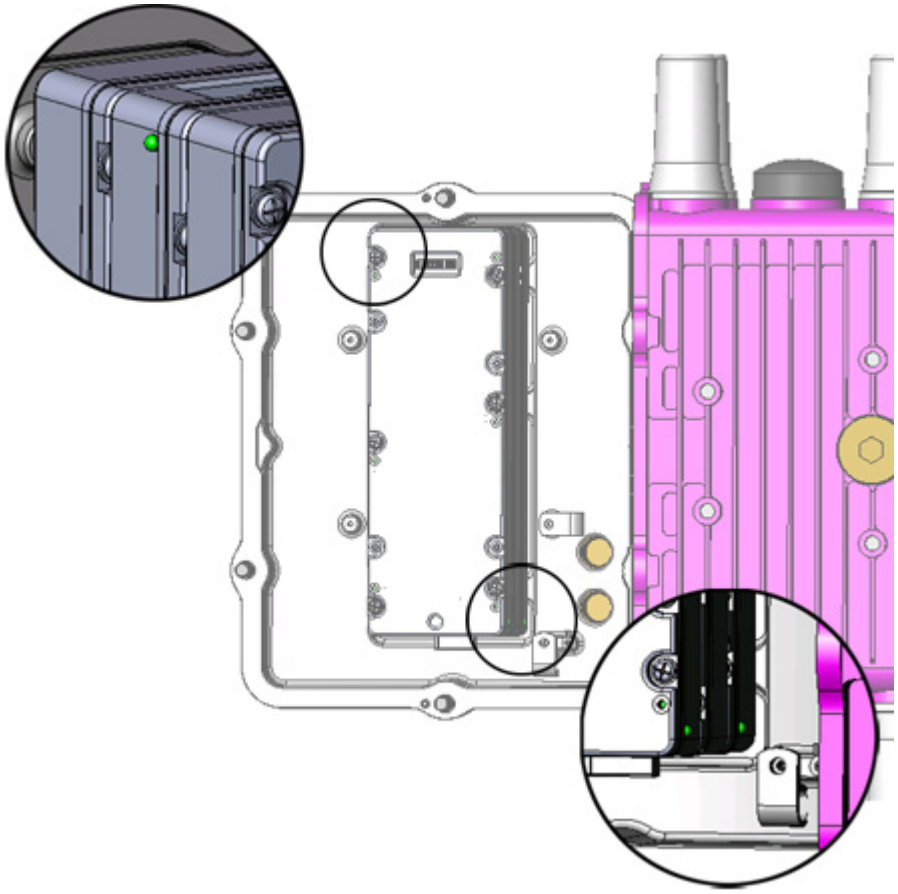
WiFi and GPS LEDs		
LED Label	**Color and State**	**Description**
WIFI	Green	WiFi link established
	Green blinking	WiFi link established and data transfer in progress
	Yellow	No WiFi link
GPS	Green	GPS link established
	Yellow blinking	Establishing link with GPS (in progress)
	Yellow solid	No GPS link

Battery Backup Unit LED

The router supports up to three battery backup units (BBUs). When two or more BBUs are installed, they are connected to each other in a head-to-tail configuration in the router and the the BBU LED are in the lcoations shown in Figure 12-3.

To see the LED for each BBU, open the router chassis according to the Opening the Router Chassis chapter.

Figure 12-3 Battery Backup (BAT) LED Location

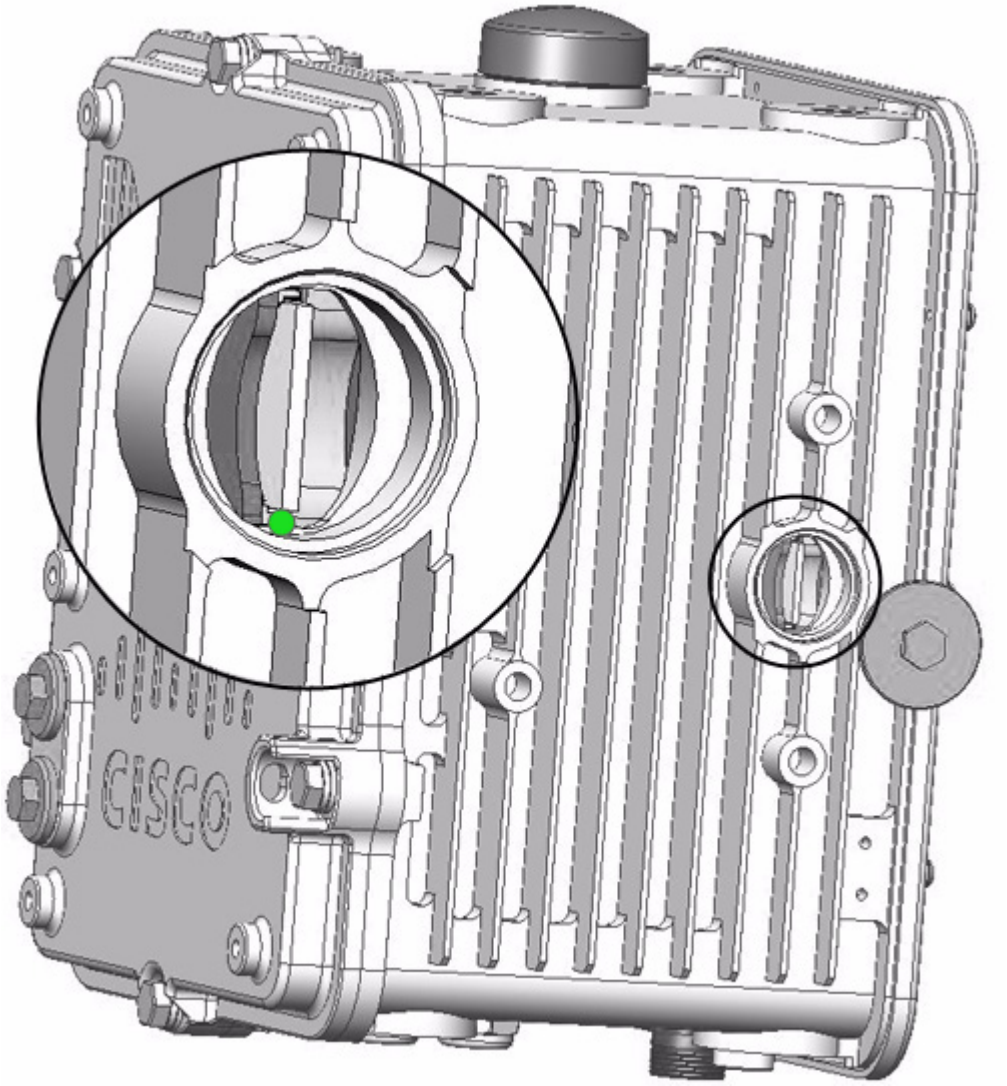


LED	Color and State	Description
BBU (no label)	Green solid	Idle state
	Green blinking	Charging
	Amber blinking	Discharging (providing power to the system)
	Amber slow blinking	Disabled with the system software
	Red/green blinking	Initializing
	Red blinking	Bootloader mode
	Red slow blinking	Test mode
	Red solid	BBU failure
	Off	Disconnected from router or completely discharged

SD Card (SD0) LED

To see the SD card and the SD LED, you must remove the exterior plug that covers the router SD card port, as shown here.

Figure 12-4 SD Card (SD0)— Router Right Side Exterior



Label	Color and State	Description
SD0	Green	SD flash card installed and operating normally
	Green blinking	SD flash card data transfer in process
	Amber	• Error when system accesses the SD flash card • Router cannot locate a system software image
	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 System Status (SYS) LED, page 12-2. During normal operation, the router can be installed at the top of an outdoor pole or other inaccessible location, and you might not be able to view SYS LED on the router hardware. In this case, you can view the status of the LED from a remote location using the router CLI.

This section includes these commands:

- show led, page 12-8
- show interface, page 12-8

show led

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

One SYS LED is located on the router exterior, as shown in Figure 12-1 and the other is located inside the router chassis, as shown in Figure 12-2.

The values displayed in the **System LED** field are described in the section System Status (SYS) LED, page 12-2.

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

```
CGR-1040> show led
System LED: green, solid

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

--- end of list ---
CGR-1040>
```

show interface

To display the status of and information about the router interfaces, use the **show interface** command in any command mode.

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

```
CGR1240> show interface
Ethernet0 is up, line protocol is up
  Hardware is Lance, address is 0019.076c.1a78 (bia 0019.076c.1a78)
  Internet address is 172.28.231.193/23
  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
```

APPENDIX A

Connector and Cable Specifications

This appendix includes specifications for the Cisco 1240 Connected Grid Router connectors, adapters, and compatible cables, and is organized into the following sections:

Connector Specifications

GPS Serial Port

For detailed information about the integrated GPS, see the chapter Router Hardware Description.

Table A-1 GPS Serial Port Specification

Port	Direction	Pin	Protocol	Baud rate	Data bits	Parity	Stop bits	Flow control
A	TXD-A	23	TSIP-Out	38.4 Kobe	8	None	1	No
	RXD-A	21	TSIP-In	38.4 Kb	8	None	1	No
B	TXD-B	24	NMEA-Out	4800	8	None	1	No
	RXD-B	20	NMEA-In	4800	8	None	1	No

Alarm Ports

For detailed information about the alarm ports, see the chapter Router Hardware Description.

Table A-2 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 A-3 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

Copper Interface—Combination Port (SFP and GE Ethernet)

For detailed information about the combination ports, see the chapter Router Hardware Description.

Table A-4 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

Table A-4 Combination Port Specification —Copper Interface (continued)

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

SFP Interface—Combination Port (SFP and GE Ethernet)

For detailed information about the combination ports, see the chapter Router Hardware Description.

Table A-5 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[1]	–	–
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 A-6 Serial Port Specification

RS-232[1]				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.

AC Power Supply Connector

For detailed information about the hardware described in this section, the chapter Router Hardware Description.

Table A-7 AC Power Supply Connector Specification

Pin	Signal Name	Signal Description
1	L	AC line
2	N	AC neutral
3	Chassis	Chassis ground
4	NC	–
5	NC	–
6	NC	–

AC Power Supply Output Connector

For detailed information about the hardware described in this section, the chapter Router Hardware Description.

Table A-8 AC Power Supply Output Connector Specification

Pin	Signal Name	Signal Description
1	12V	12V source
2	12V	12V source
3	3.3V_STBY	3.3V source
4	OUT_EN_L	12V output enable
5	PS_PRESENT_L	Power supply presence
6	I2C_SDA	I2C data
7	12C_CLK	12C clock
8	GND	12V return
9	GND	12V return
10	GND	3.3V standby return
11	L2_OK	AC Phase 1 input good
12	NC	–
13	DC_OUT_OK	12V output good
14	ALRT	Power supply fault

Battery Backup Unit Cable Connector

For detailed information about the hardware described in this section, see the chapter Installing Battery Backup Units.

Figure A-1 Battery Backup Unit Cable Connector Pinouts

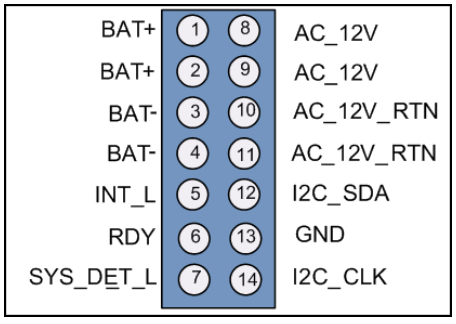


Table A-9 Battery Backup Unit Cable Connector Specification

Pin	Signal Name	Signal Description
1	BAT_12V	+12V output
2	BAT_12V	+12V output
3	BAT_12VRTN	Ground
4	BAT_12VRTN	Ground
5	INT_L	BBU interrupt
6	RDY	MCU indicates good status and 12C communication ready
7	SYS_DET_L	Loop back for cable interlock
8	AC_12V	+12V input
9	AC_12V	+12V input
10	AC_12VRTN	Ground
11	AC_12VRTN	Ground
12	12C Data	+3.3V +/- 2%
13	Gnd	Ground
14	12C Clock	+3.3V +/- 2%

Non-Cisco Module Power Connector

For more information about non-Cisco modules, see the chapter Installing Non-Cisco Modules.

Table A-10 Micro-Fit 3.0 Power Connector Specification

Pin	Signal Name	Signal Description
1	12V	12V from system
2	GND	System GND
3	CBL_PRESENT:L	Cable presence detect
4	GND	System GND

Connected Grid Module Slots

For detailed information about the hardware described in this section, see the the Connected Grid modules documentation on Cisco.com.

Table A-11 Connected Grid Module Slots Specification

Side A Signal			Side B Signal	
Name	Description	Pin	Name	Description
BRD_PRSNT_A	BRD_PRSNT_A	1	GND	GND
GND	GND	2	GPIO signals	MIM_GPIO_0
3.3V Standby	3.3V Rail	3	GND	GND

Table A-11 Connected Grid Module Slots Specification (continued)

Side A Signal			Side B Signal	
Name	**Description**	**Pin**	**Name**	**Description**
GND	GND	4	GPIO signals	MIM_GPIO_1
12V DC Input	12V	5	GND	GND
12V DC Input	12V	6	GPIO signals	MIM_GPIO_2
GND	GND	7	GPIO signals	MIM_GPIO_3
MIM_GPIO_4	GPIO signals	8	GND	GND
GND	GND	9	GPIO signals	MIM_GPIO_5
Reset_L	Reset/Watchdog Reset	10	GPIO signals	MIM_GPIO_6
PWR_OK	Power OK	11	GPIO signals	MIM_GPIO_7
Connector Notch				
GND	GND	12	GND	GND
GND	GND	13	Power enable	PWR_EN_L
USB_HOST_DN	USB host diff bus	14	AC power ok indicator from MB	AC pwr ok (1)
USB_HOST_DP	USB host diff bus	15	DC-DC regulator input power ok	12v pwr ok (1)
GND	GND	16	GND	GND
GND	GND	17	SPI data dut (18.75M)	SPI_MOSI (RXD)
SPI_SCK (TXD)	SPI clock (RTS)	18	SPI_CS	SPI_SSN (CTS)
GND	GND	19	SPI Data in (18.75M)	SPI_MISO (TXD)
GND	GND	20	GND	GND
GE_TX_N	GE transmit signal	21	I2C clock (400kHz)	SCLK
GE_TX_P	GE transmit signal	22	GND	GND
GND	GND	23	I2C Data in/out	SDA
GND	GND	24	Reset	QUACK_RST_L
GE_RX_N	GE receive signal	25	GND	GND
GE_RX_P	GE receive signal	26	GPIO serial clock	GPIO_SCK
GND	GND	27	GND	GND
GND	GND	28	GPIO Serial data in	GPIO_MISO
PCIe_PET_N	PCIe transmit diff pair	29	GPIO Serial data out	GPIO_MOSI
PCIe_PEN_P	PCIe transmit diff pair	30	GPIO Serial enable	GPIO_SEN
GND	GND	31	GND	GND
GND	GND	32	Board ready	BRD_RDY
PCIe_PER_N	PCIe receive diff pair	33	3.3V from PS	3.3V/RESERVED
PCIe_PER_P	PCIe receive diff pair	34	GND	GND
GND	GND	35	RESERVED	RESERVED
GND	GND	36	RESERVED	RESERVED

Table A-11 Connected Grid Module Slots Specification (continued)

Side A Signal			Side B Signal	
Name	**Description**	**Pin**	**Name**	**Description**
PCIe_CLKIN_N	PCIe clock diff pair	37	RESERVED	RESERVED
PCIe_CLKIN_P	PCIe clock diff pair	38	RESERVED	RESERVED
GND	GND	39	RESERVED	RESERVED
GND	GND	40	RESERVED	RESERVED
RESERVED	RESERVED	41	GND	GND
RESERVED	RESERVED	42	JTAG Clock	TCK
GND	GND	43	JTAG Data Out	TDO
GND	GND	44	JTAG Mode Select	TMS
RESERVED	RESERVED	45	GND	GND
RESERVED	RESERVED	46	JTAG Data In	TDI
GND	GND	47	JTAG Reset	TRSTN
GND	GND	48	GND	GND
RESERVED	RESERVED	49	BRD_PRSNT_B	BRD PRSNT B

Cable and Adapter Specifications

SFP Cable

For detailed information about the SPF ports, see the chapter Router Hardware Description.

Table A-12 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)
1000BASE-LX/LH	1310	MMF[1]	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[2]	—	43.4 to 62 miles (70 to 100 km)[2]

Table A-12 SFP Port Cabling Specification (continued)

SFP Module	Wavelength (nm)	Cable Type	Core size/ Cladding Size (micron)	Modal Bandwidth (MHz/km)	Cable Distance
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.

APPENDIX B

Starting a Router Terminal Session

This appendix describes how to start a terminal session with the Cisco 1240 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 6-15 in the chapter Installing the Router.

About the Console Port

Caution The console port does not support cable glands. When a cable is connected to this port, the router interior is exposed to environmental elements, which can damage the port and the router interior. This port should be exposed only during terminal sessions, when a cable is connected to the port. This port should never be left unattended when in use.

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.

Parameter	Console Port Setting	Description
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 and is accessible by removing the seal over the console port. (For details, see Console Port, page 2-15 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.

To prevent unauthorized access to the router configurations and passwords, the Ctrl-C command is disabled on the Cisco CGR 1240 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.

Step 2 Configure the terminal emulation software with the parameters described in About the Console Port, page B-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**.

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