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## **Cisco 1240 Connected Grid Router Hardware Installation Guide**

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# CHAPTER 1

## Unpacking the Router

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This chapter includes instructions about how to unpack the Cisco 1240 Connected Grid Router and describes the items that ship with the router. This chapter includes the following sections:

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

## Unpacking the Router



**Tip**

---

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

---

Follow these steps to unpack the router:

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

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# Router Package Contents

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

**Table 1-1 Router Package Contents**

Qty.	Item	Description
1	Cisco Connected Grid 1240 Router	Router chassis
1	SD Flash memory module	1GB, 2GB, or 3GB
1	AC Power Kit	Each kit includes: <ul style="list-style-type: none"> <li>• AC power supply (integrated in router)</li> <li>• AC power cord, 15 ft.</li> </ul>
1	Console cable	RJ-45-to-DB-9
1	Mounting kit	<ul style="list-style-type: none"> <li>• Pole mount bracket</li> <li>• Pole mount clamps (2)</li> <li>• Stainless steel bands (2)</li> <li>• Electrical join compound</li> <li>• All required hardware</li> </ul> For details, see the chapter <a href="#">Mounting the Router</a> .
1	Grounding kit	Grounding lug, screw, 6-gauge wire
1-4	Connected Grid Modules	<i>Depends on configuration ordered</i>
1-7	Connected Grid Antennas	<i>Depends on configuration ordered</i>
2	Battery backup units (BBU)	Up to 12 hours, based on configuration order. For details, see the chapter <a href="#">Installing Battery Backup Units</a> .



## CHAPTER 2

# Router Hardware Description

---

This chapter describes the major hardware features of the Cisco 1240 Connected Grid Router, including the chassis and the internal and external connectors and ports. This chapter contains the following sections:

- [Router Overview, page 2-1](#)
  - [Exterior Hardware Features, page 2-4](#)
  - [Interior Hardware Features, page 2-11](#)
- [Hardware Features Detailed Description, page 2-12](#)

**Note**

---

This chapter is intended to provide information about the router connector and ports. For instruction on installing the router, including connecting all network and other ports, see the chapter [Installing the Router](#).

---

## Router Overview

### Router Applications Overview

The Cisco 1240 Connected Grid Router is designed for use in Field Area Networks (FANs) in North American power distribution grids, and in regions with similar distribution grid architectures. A FAN can also be referred to as a Neighborhood Area Network (NAN). The Smart Grid FAN is a distribution system in which power generation and transmission are linked to the power consumers.

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

- Advanced Metering Infrastructure (AMI)
- Demand Response (DR)
- Distribution Automation (DA)
- Integration of Distributed Energy Resources (DER), also known as Renewable Energy Sources (RES) and Distributed Generation (DG)
- Power asset management
- Workforce automation

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The router provides reliable and secure real-time communication between the FAN network systems and the millions of devices that exist on the FAN, including as meters, sensors, protection relays, Intelligent Electronic Devices (IEDs), plug-in electric vehicle (PEV) charging stations, and distributed solar farms. Network data is forwarded and processed over secure communication links between devices within the distribution grid for local decision processing. Additionally, this data is sent to Supervisory Control and Data Acquisition (SCADA) and other management systems.

## Hardware Compliance

For a complete list of regulatory and compliance standards supported by the Cisco CGR 1240 Router, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Routers* document on Cisco.com.

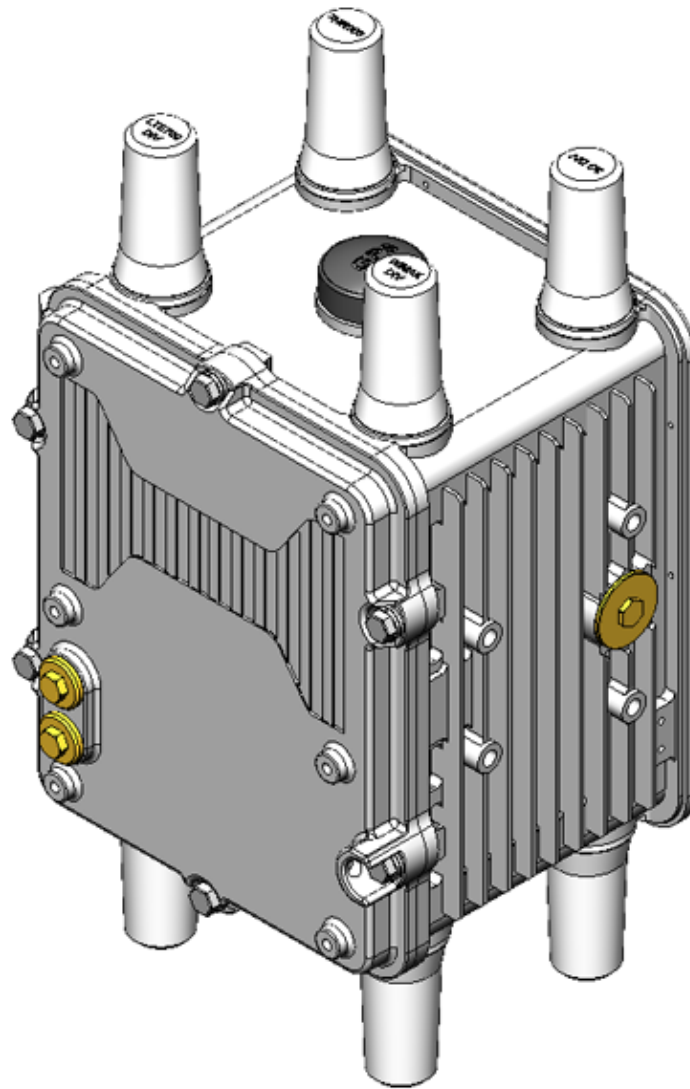
## Router Hardware Overview

The Cisco 1240 Connected Grid Router is a modular, ruggedized router that features:

- Four module slots that support ruggedized Connected Grid wireless modules
- Support for fiber Gigabit Ethernet and copper Fast Ethernet connections
- Integrated serial ports
- Automated battery backup power

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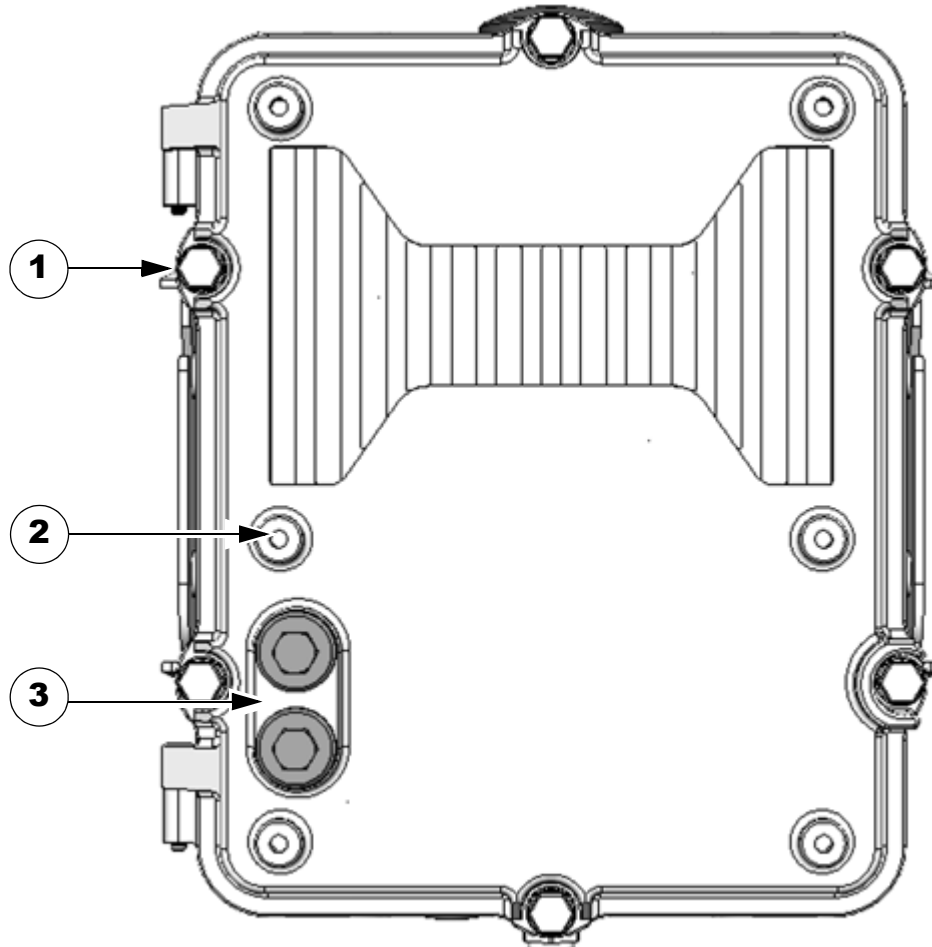
**Figure 2-1 Cisco 1240 Connected Grid Router with Integrated Antennas Installed**



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Exterior Hardware Features**

This section illustrates the router exterior hardware features and includes a brief description of each feature. Detailed descriptions of each feature are in the [Hardware Features Detailed Description](#), page 2-12 section later in this chapter, or in other chapters in this document.

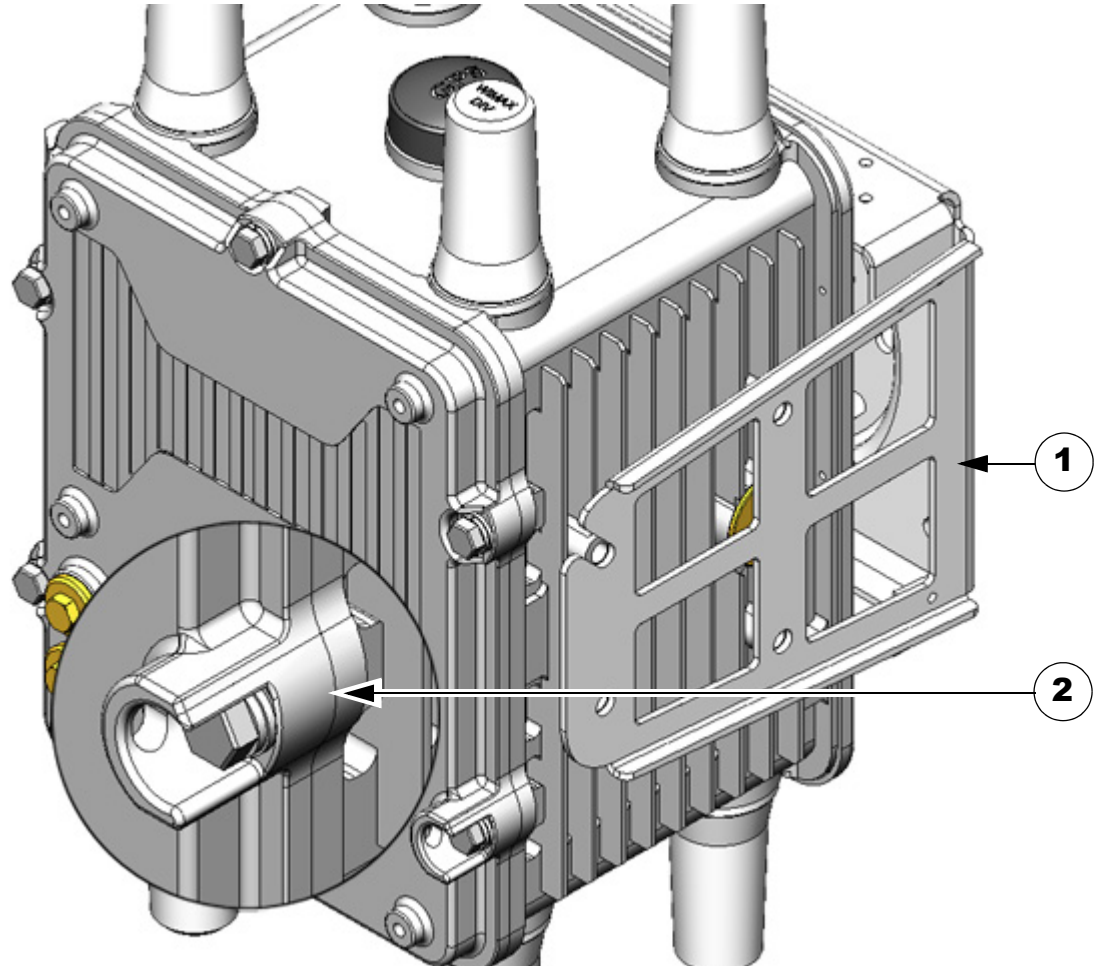
**Figure 2-2 Router Front Exterior**



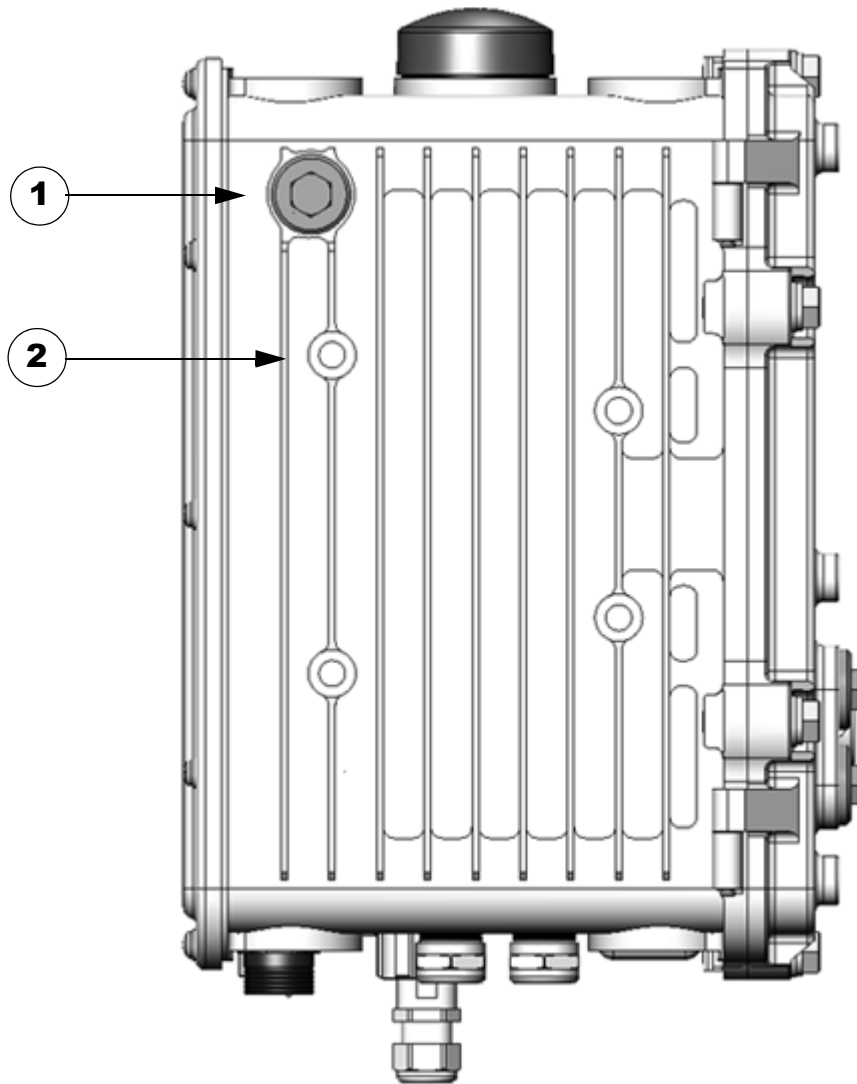
**Table 2-1 Router Front Exterior Features**

	Description	Detailed Information
1	M8 captive screws (8)	Loosen these screws to access the router interior. For information about opening the chassis, see the chapter <a href="#">Opening the Router Chassis</a> .
2	Module mounting bosses (6)	Mount a supported non-Cisco module (optional) to the front exterior of the router using these mounting bosses. For more information on connecting a module to the router exterior, see the chapter <a href="#">Installing Non-Cisco Modules</a> .
3	Module cable ports (2)	Thread cables through these ports, to ports and connectors inside the router, when installing a module on the router exterior. For more information on connecting a module to the router exterior, see the chapter <a href="#">Installing Non-Cisco Modules</a> .

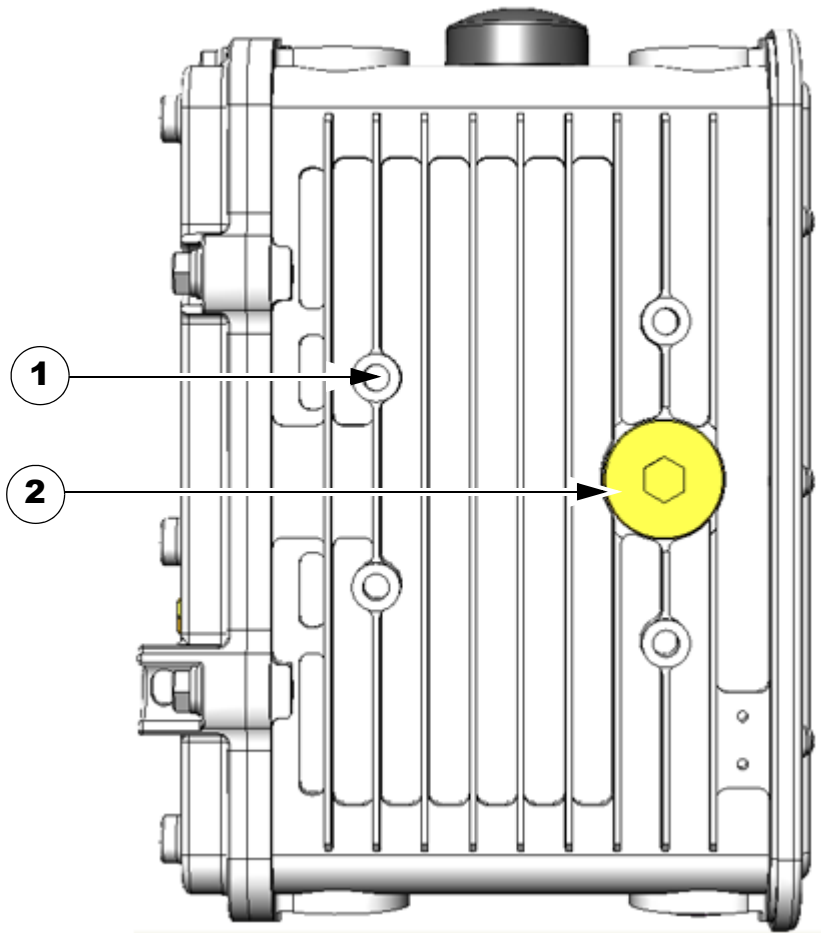



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-3 Router Front with Mounting Bracket and Lock****Table 2-2 Router Bracket and Lock Features**

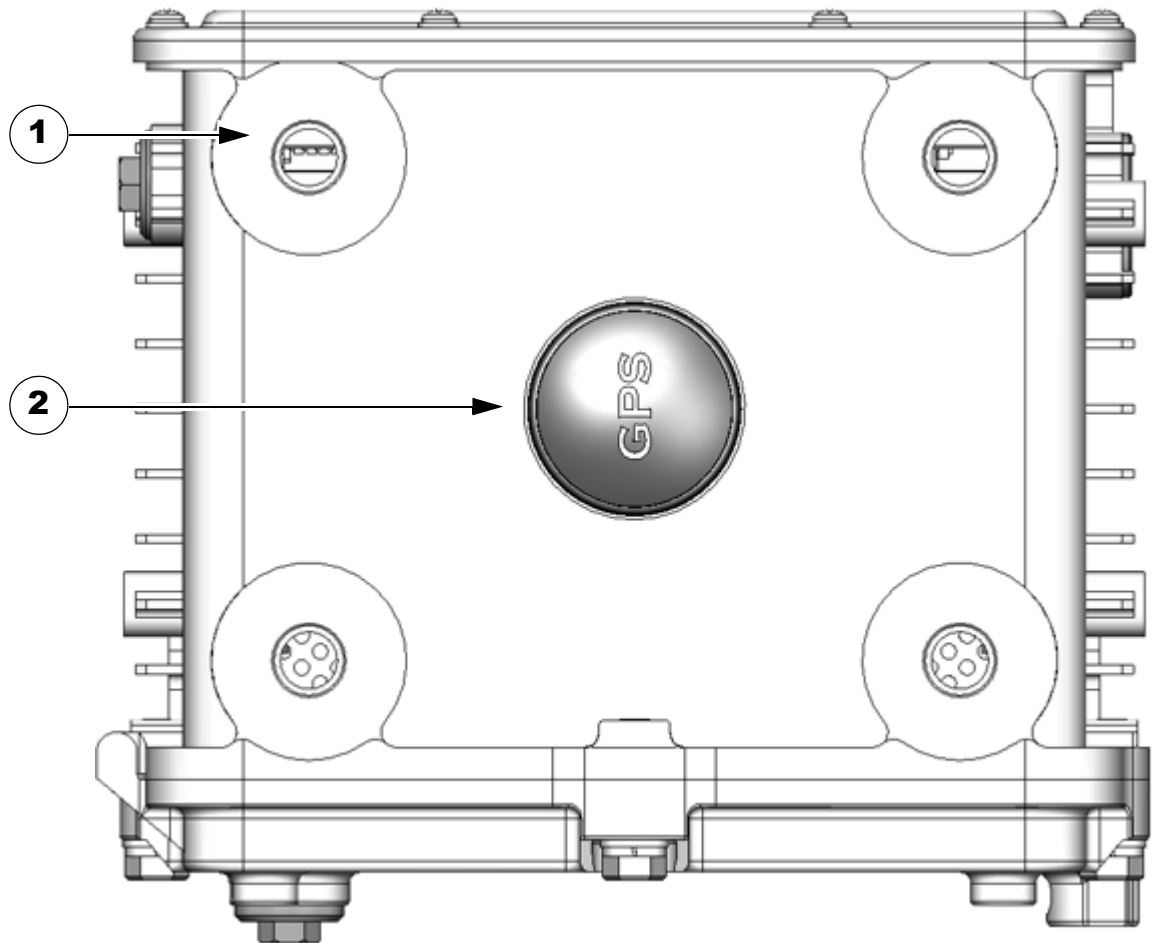
	Description	Detailed Information
1	Mounting bracket	Use the mounting bracket with the Cisco pole mount kit to install the router on a pole. For information about router mounting options and procedures, see the chapter <a href="#">Mounting the Router</a> .
2	Door lock block	Use the lock block to install a lock that you supply on the router door, preventing unauthorized physical access to the router interior. For information about physical security features for the router chassis, see the chapter <a href="#">Opening the Router Chassis</a> .

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-4 Router Right Side Exterior****Table 2-3 Router Right Side Exterior Features**

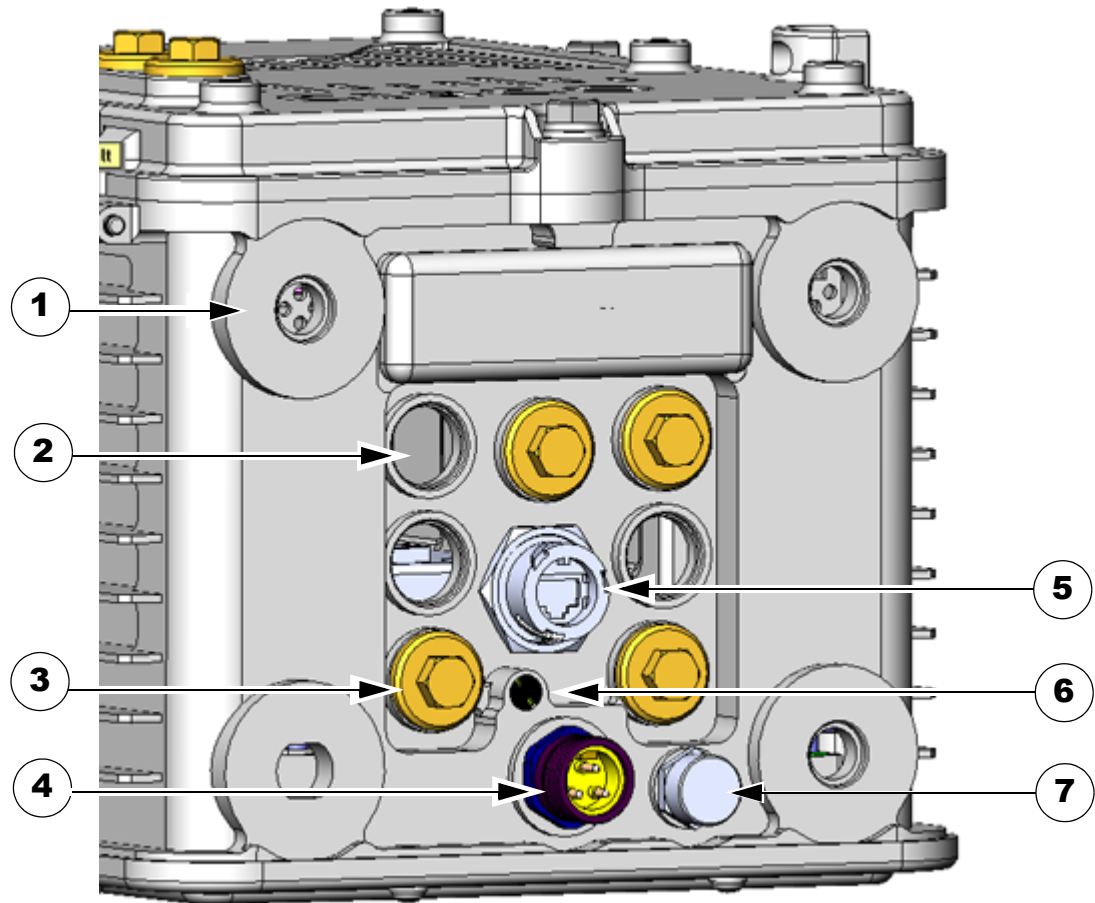
	Description	Detailed Information
1	Console port access	Remove the plug shown here to access the console port. This port is described in the section <a href="#">Console Port, page 2-15</a> , later in this chapter. For detailed information about connecting to this port, see the chapter <a href="#">Installing the Router</a> .
2	Mounting bracket connectors (4)	Mount supported brackets to the router using these connectors. For information about router mounting options and procedures, see the chapter <a href="#">Mounting the Router</a> .

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-5 Router Left Side Exterior****Table 2-4 Router Left Side Exterior Features**

	<b>Description</b>	<b>Detailed Information</b>
1	Mounting bracket connectors (4)	Mount supported brackets to the router using these connectors. For information about router mounting options and procedures, see the chapter <a href="#">Mounting the Router</a> .
2	SD flash memory module port	<p>Remove the plug shown here for access to the router SD module, which is described in the <a href="#">SD Flash Memory Module</a>, page 2-16, later in this chapter. For detailed information about using an SD flash memory module with the router, see the chapter <a href="#">Using the SD Flash Memory Module</a>.</p> <p> <b>Note</b> When a mounting bracket is installed on the router, the bracket blocks access to the SD card port. In order to access the port after the bracket is installed, you must remove the router from the pole, and rotate the bracket away from the port. For detailed instructions,</p>

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-6 Router Top Exterior****Table 2-5 Router Top Exterior Features**

	Description	Detailed Information
1	Antenna connectors (4)	Install supported integrated or external antennas in these ports. For detailed information about the router antennas, including how to find installation instructions, see the chapter <a href="#">About Router Antennas</a> .
2	GPS antenna	The GPS antenna connects the router GPS, which is described in <a href="#">GPS Module, page 2-29</a> , to the GPS source. For more information about GPS antenna, including specifications and frequencies supported, see the chapter <a href="#">About Router Antennas</a> .

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-7 Router Base Exterior****Table 2-6 Router Base Exterior Features**

	Description	Detailed Information
1	Antenna connectors (4)	Install supported integrated or external antennas in these ports. For detailed information about the router antennas and information about installation instructions, see the chapter <a href="#">About Router Antennas</a> .
2	Cable ports (7)	Use a cable glands to thread network cables through these ports when installing the router. Unused ports are sealed with standard, environmental-proof plugs. For detailed descriptions of supported cable glands and plugs, see <a href="#">Chassis Cable Ports, page 2-13</a> .
3	Port plugs (up to 7)	Use port plugs to seal unused cable ports and protect the router interior from environmental elements. For a detailed description of supported plugs, see <a href="#">Chassis Cable Ports, page 2-13</a> .
4	AC power connector	Connect the router AC power connector to a power source to power on the router. For detailed information about the connecting the router to the AC power supply, see <a href="#">AC Power Supply, page 2-17</a> .
5	100BASE-T Fast Ethernet (FE) port	Use this connector to connect the router to a 100BASE-T Ethernet network without requiring access to the router interior. This port is connected to one of the router internal FE ports. For detailed information on connecting the router to an Ethernet network, see to <a href="#">Installing the Router</a> .

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Table 2-6 Router Base Exterior Features**

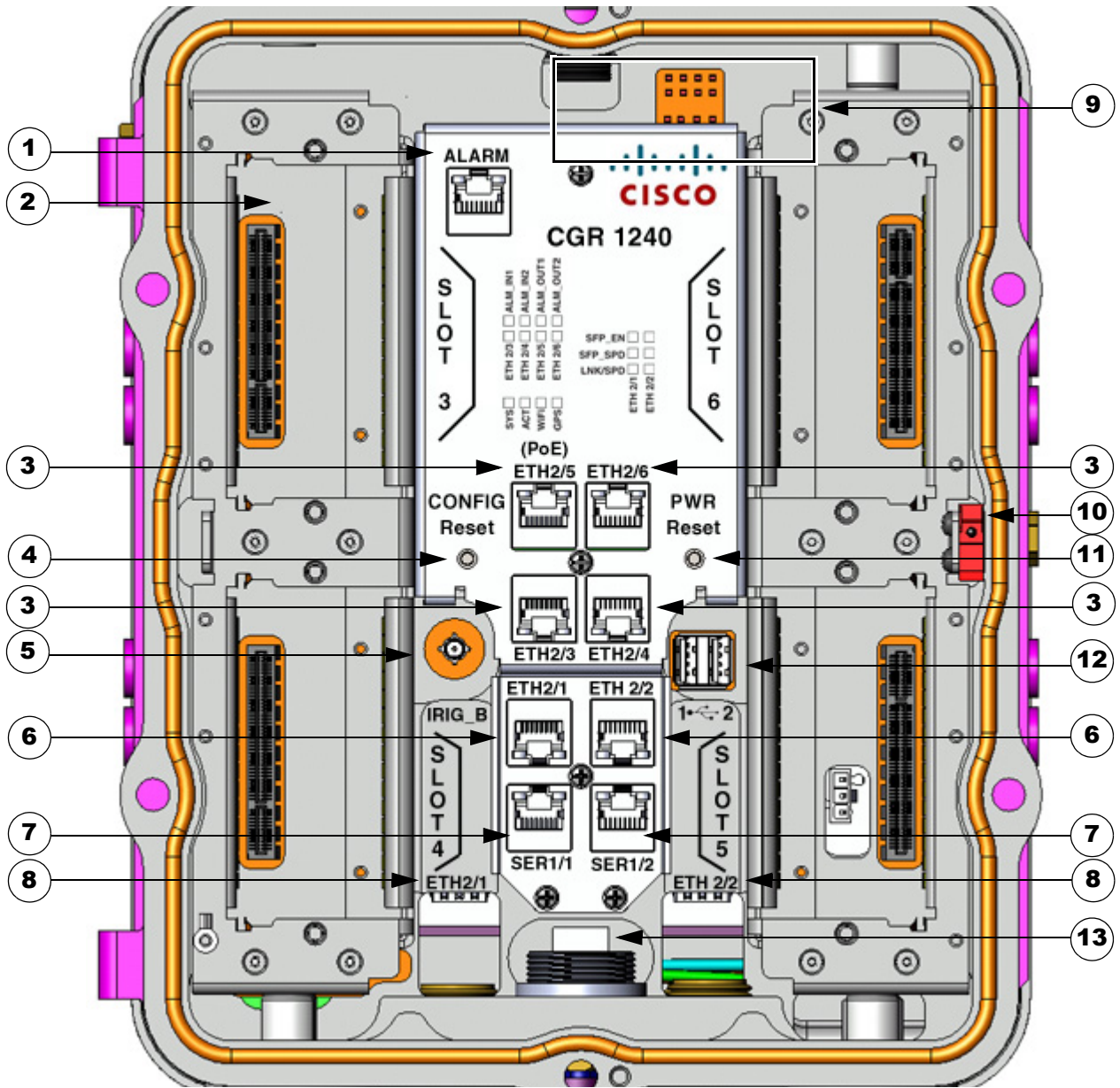
<b>6</b>	System (SYS) LED	View the System LED to determine the overall operating and power status of the router. For detailed information about all the route LEDs, see the chapter <a href="#">Router LED Locations and States</a> .
<b>7</b>	Protective vent	The chassis vent relieves pressure buildup inside the router chassis. For a description of the vent, see <a href="#">Protective Vent, page 2-17</a> .

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**Interior Hardware Features**

This section illustrates the router front panel hardware features and includes a brief description of each feature. Detailed descriptions of each feature are in [Hardware Features Detailed Description, page 2-12](#), later in this chapter, or in other chapters in this document.

**Figure 2-8 Interior Front Panel Hardware Features**




**Note**

In [Table 2-7](#), items indicated with a footnote 1 are currently not supported, and will be supported in a future software release.



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Table 2-7 Interior (Front Panel) Features**

	Label	Description
1	ALARM <sup>1</sup>	Connect this alarm port to an alarm system to monitor system errors and events. For more information, see <a href="#">Alarm Port, page 2-18</a> .
2	SLOT 3, SLOT4, SLOT 5, SLOT 6	Install Cisco Connected Grid modules in these four Connected Grid module slots. For more information, see <a href="#">Connected Grid Module Slots, page 2-19</a> .
3	ETH 2/3, ETH 2/4, ETH 2/5, ETH 2/6	Make 10/100 Mbps Ethernet network connections using these four Fast Ethernet ports. For more information, see <a href="#">Fast Ethernet Ports, page 2-22</a> .
4	CONFIG Reset	Press the CONFIG reset button to reset the router to the default software configuration. For more information, see <a href="#">Reset Buttons, page 2-21</a> .
5	IRIG_B <sup>1</sup>	Connect the IRIG-B timing port (time source: router <a href="#">GPS Module</a> ) to any device that requires precise time. For more information, see <a href="#">IRIG-B Timing Port, page 2-26</a> .
6	ETH 2/1, ETH 2/2	Make 100/1000 Mbps Ethernet network connections using these two Gigabit Ethernet ports. For more information, see <a href="#">Gigabit Ethernet Ports, page 2-22</a> .
7	SER 1/1, SER 1/2 <sup>1</sup>	Connect the router to DTE or DCE devices using these two serial ports. For more information on these ports and supported devices, see <a href="#">Serial Ports, page 2-23</a> .
8	ETH 2/1, ETH 2/2	Install supported small-form-factor pluggable (SFP) modules in these two SFP ports. For more information and supported SFPs, see <a href="#">Small Form-Factor Pluggable (SFP) Ports, page 2-24</a> .
9	–	The LEDs indicate alarm port status and connection status for Ethernet, WiFi, and GPS connections. The LED label is located in the center of the chassis (see <a href="#">Figure 2-8</a> ). For more information, see the chapter <a href="#">Router LED Locations and States</a> .
10	–	The door alarm switch triggers the router to generate a syslog event and send an SNMP alarm when the door is opened. For more information on physical security features of the router chassis, see the chapter <a href="#">Opening the Router Chassis</a> .
11	PWR Reset	Press the PWR Rest button to cycle the router power without powering off the router. The router cannot be powered off with this button. For more information, see <a href="#">Reset Buttons, page 2-21</a> .
12	1  2	Connect these USB ports to supported, external USB devices. For more information, see <a href="#">USB Ports, page 2-27</a> .
13	–	Use the external Fast Ethernet connector to connect the router to an Ethernet network without requiring access to the router interior. This port is connected to one of the router internal FE ports. For more information, see the chapter <a href="#">Installing the Router</a> .

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

## Hardware Features Detailed Description

This section provides detailed information about all of the router hardware features, including descriptions, illustrations, specifications, and links to related information. This section is divided into two topics:

- [Router Exterior Hardware Features, page 2-13](#)
- [Router Hardware Interior Features, page 2-18](#)



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## Router Exterior Hardware Features

This section includes detailed information about the exterior hardware features illustrated in the [Exterior Hardware Features](#) section, and contains the following topics:

- [Chassis Enclosure](#), page 2-13
- [Chassis Cable Ports](#), page 2-13
- [Console Port](#), page 2-15
- [SD Flash Memory Module](#), page 2-16
- [100BASE-T Fast Ethernet Connector](#), page 2-17
- [Protective Vent](#), page 2-17
- [AC Power Supply](#), page 2-17

### Chassis Enclosure

The Cisco CGR 1240 Router industrial enclosure (see [Figure 2-1](#)) meets Type 4X and IP67 standards and is designed for deployment in extreme weather. The enclosure can be painted to comply with aesthetic requirements.

#### Specifications

Specification	Description
Dimensions	12 x 8 x 7.5 inches (30.5 x 20.3 x 19 cm)
Environmental	Type 4x compliant IP67 compliant

#### Additional Information

For router regulatory compliance information, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Routers* on Cisco.com, at: [URL-TBD](#)

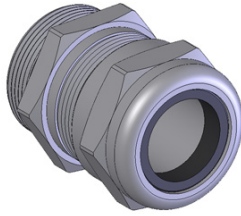
### Chassis Cable Ports

The router chassis has the following cable ports for router network and power cables:

- **Door**—Two cable ports on the front door, shown in [Figure 2-2](#), provide support for third party radio cabling. The router supports installation of a compatible radio, as described in [Installing Non-Cisco Modules](#).
- **Base**—Seven cable ports on the router base, shown in [Figure 2-7](#), provide support for router network cabling, as described in [Installing the Router](#).

#### Cable Glands

A cable gland (also known as a cable connector) is required to install cables in the chassis cable ports. Use a compatible cable gland to attach and secure the end of a cable to the router. The cable gland provides cable strain relief and seals the cable entry into the router chassis to prevent damage to the router interior.

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-9 Cable Gland****Table 2-8 Supported Cisco Cable Glands**

Cisco Product ID	Description
CGR-IP67GLAND	Contains 1 gland

**Specifications**

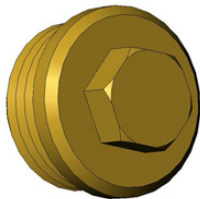
Specification	Description
Size	PG 13 Cable diameters: 0.20-0.35 inches (5.08-8.89 mm)
Environmental	Liquid Tight Type 4x & IP67 Seal guaranteed up to 150 psig (10 bar) Flame protected

**Cable Port Seals**

Unused router ports are sealed with a liquid-tight cover (PG13) to protect the router interior from environmental elements.

**Caution**

The router should not be installed unless all unused chassis cable ports are sealed. Leaving chassis ports unsealed can damage the router.

**Figure 2-10 Cable Port Seal**

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Console Port**

The router features a single, asynchronous console port (see [Figure 2-4](#) and [Figure 2-11](#)) for connecting a console or PC directly to the router. To configure the router locally, using the command-line interface (CLI), you must establish a connection to the router with a terminal session.

**Caution**

This port does not support cable glands and therefore the router interior is exposed to environmental elements while the port is in use. This port should be exposed only during active terminal sessions with the router and should never be left unattended when exposed.

**Note**

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

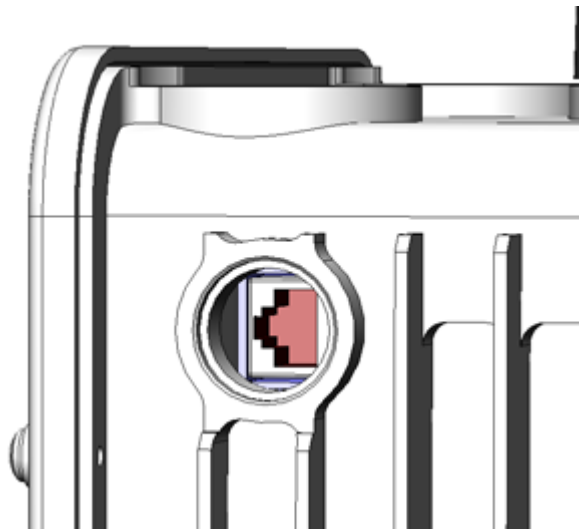
**Console Port Default Settings**

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

**Connecting to the Console Port**

Detailed information about connecting and using the console port is in the chapter [Installing the Router](#).

**Figure 2-11 Console Port Detail**

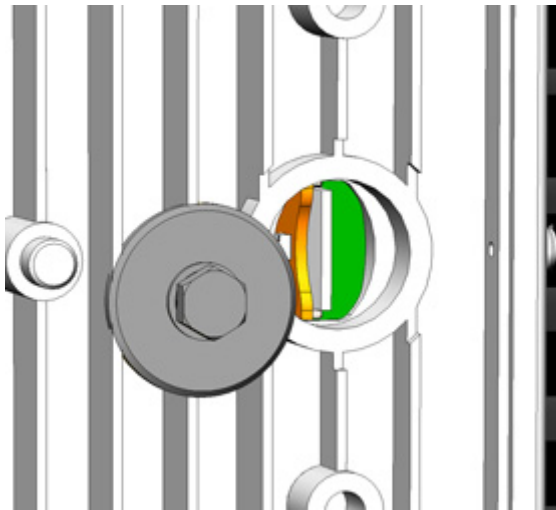
**Specifications**

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

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****SD Flash Memory Module**

The router supports one Cisco Secure Digital (SD) flash memory module (see [Figure 2-5](#) and [Figure 2-12](#)), which stores router software, configurations, and network data. For detailed information on using the SD flash memory module with the router, see the chapter [Using the SD Flash Memory Module](#).

**Figure 2-12 SD Flash Memory Slot Detail**



[Table 2-9](#) lists the supported Cisco SD modules; you must use a supported module with the router.

**Table 2-9 Supported SD Flash Modules**

Cisco Part Number <sup>1</sup>	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.)

**Specifications**

Specification	Description
Installation	Supports online insertion and removal (OIR)
Socket type	14-pin
Power (from router)	+3.3 V_STBY
Voltage ramp rate range	1 mS – 100 mS

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****100BASE-T Fast Ethernet Connector**

The router feature an external Fast Ethernet (FE) connector (see [Figure 2-7](#)) that enables you to connect the router to an Ethernet hub or switch without opening the chassis. The connector is connected to one of the four [Fast Ethernet Ports](#) inside the router chassis.

**Specifications**

Specification	Description
Connector type	RJ-45, ODVA-compliant Copper Ethernet
Cable type for connection to internal FE port	Category 5 RJ-45 to RJ-45
Cable type for connection to Ethernet	Category 5 or higher Ethernet

**Protective Vent**

The protective vent on the router base (see [Figure 2-7](#)) relieves pressure buildup inside the router chassis that can be caused by changing temperatures in the router installation environment. This prevents pressure from building up and damaging enclosure seals, exposing sensitive components to water. The vent also protects the router interior from dust, dirt, water, and other environmental elements.

**AC Power Supply**

The router has two power sources, the AC power supply and the battery backup units.

The AC power supply connector on the router base (see [Figure 2-7](#)) is the connection from the to AC power. If AC power is longer being supplied to the router, the battery backup units will continue to supply power to the router until power is restored. For details about how the battery backup units operate, see the chapter [Installing Battery Backup Units](#).

**Specifications**

Specification	Description
Input voltage	1-phase, two wire (line and neutral) 100-240 Vrms AC +/-10
Output	40W
DC output voltage	12V/3.5A, 3.3V/0.68A
Efficiency	20% load: 81% 50% load: 85% 100% load: 82%
Cooling	Convection, conduction
Operating temperature range	-40C to 85C

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Router Hardware Interior Features**

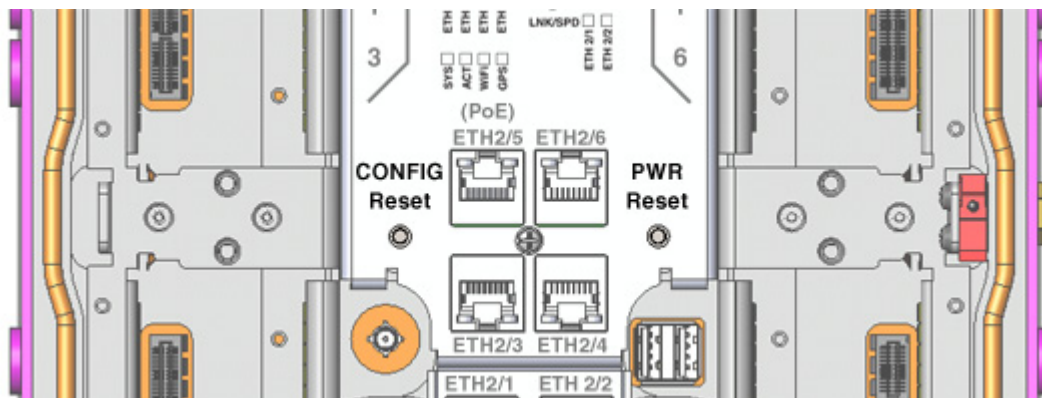
This section includes detailed information about the interior hardware features illustrated in [Router Hardware Overview, page 2-2](#), and contains the following topics:

- [Alarm Port, page 2-18](#)
- [Connected Grid Module Slots, page 2-19](#)
- [Reset Buttons, page 2-21](#)
- [Fast Ethernet Ports, page 2-22](#)
- [Gigabit Ethernet Ports, page 2-22](#)
- [Serial Ports, page 2-23](#)
- [Small Form-Factor Pluggable \(SFP\) Ports, page 2-24](#)
- [IRIG-B Timing Port, page 2-26](#)
- [USB Ports, page 2-27](#)
- [Memory, page 2-29](#)
- [GPS Module, page 2-29](#)
- [Short-Range Access Point, page 2-32](#)

**Alarm Port****Note**

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

**Figure 2-13 Router Alarm Port**



Attach the alarm port (see [Figure 2-13](#)) to an alarm system to monitor software events and errors, and supports two alarm inputs and two alarm outputs.

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

**Input Alarm Trigger Settings**

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

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

**Output Alarm Trigger Settings**

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

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

**Note**


---

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

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**Specifications**

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

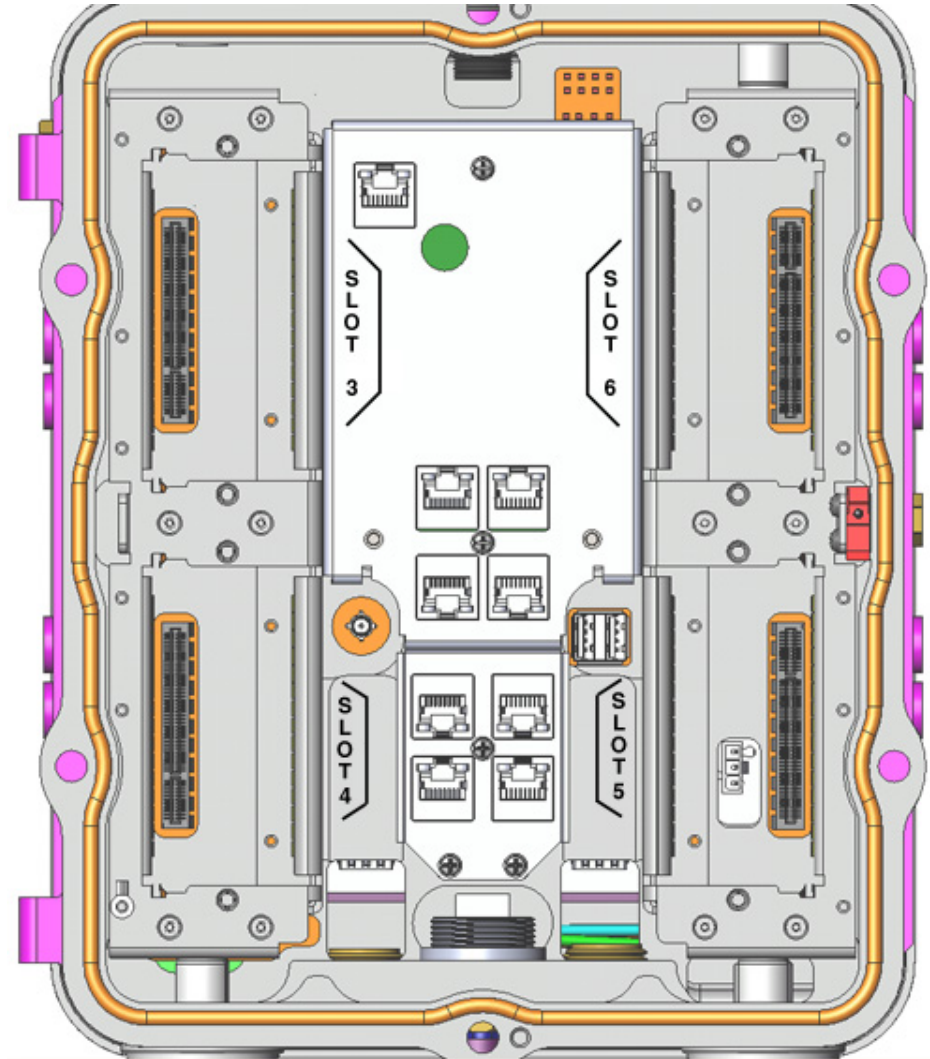
**Connected Grid Module Slots**

The router has four module slots to support installation of up to four compatible Cisco Connected Grid modules, for additional router WAN and LAN interfaces. Modules should be installed in the slots according to the module slot numbers shown [Figure 2-14](#). For more information about installing Cisco Connected Grid modules, see the corresponding installation and configuration guide for each module.

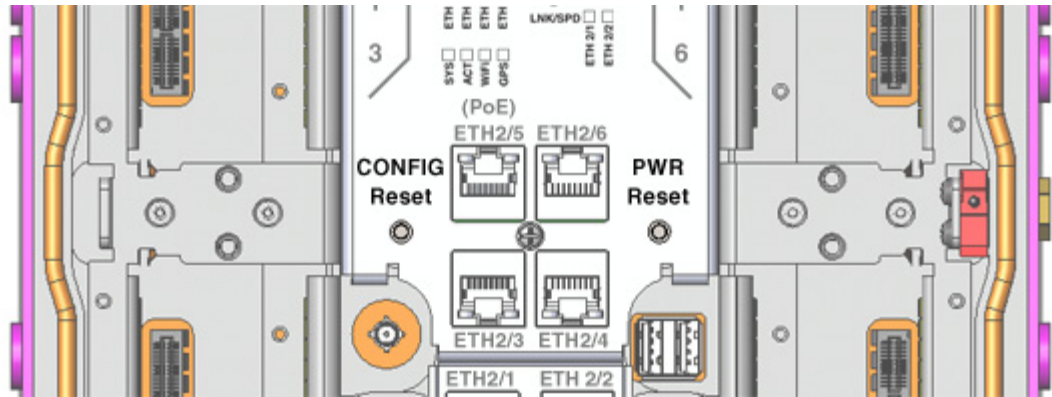
**Module Numbering**

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

- Module 1 is the router supervisor engine (located on the CPU motherboard)
- Module 2 is the router's integrated Ethernet switch module, which has four Fast Ethernet ports and two Gigabit Ethernet ports.
- Modules 3-6 are Connected Grid modules installed in the router module slots with the corresponding number (see [Figure 2-14](#)).

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-14 Router Module Slot Numbering**

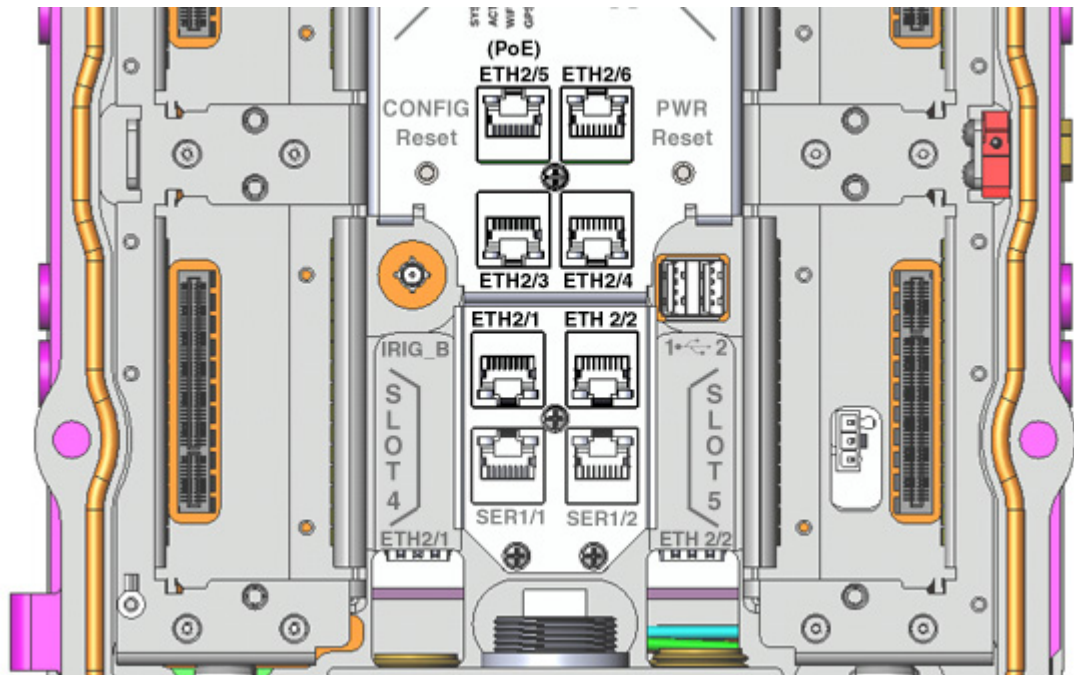


**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Reset Buttons****Figure 2-15 Router Reset Buttons**

Use power and reset buttons as follows:

- The **CONFIG Reset** button resets the router to a the system default factory configuration and reloads the router.
- The **PWR Reset** button cycles the system but does not power off the router.

For detailed instructions on using these buttons, see the chapter [Installing the Router](#).

**Ethernet Ports****Figure 2-16 Router Ethernet Ports**

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Ethernet Connections**

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

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

**Fast Ethernet Ports**

The router features four Fast Ethernet (FE) ports that can be connected to an Ethernet hub or switch. The ports are labeled as follows (see [Figure 2-16](#)):

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

**Note**

Although port ETH 2/5 is labeled PoE, this port does not currently support Power over Ethernet (PoE).

**Specifications**

Specification	Description
Connector type	RJ-45
Cables	Category 5 or higher
Interface speed	10BASE-T and 100BASE-TX
Time stamp	IEEE 1588
Pinouts	See <a href="#">Connector and Cable Specifications</a>

**Gigabit Ethernet Ports**

The router features two Gigabit Ethernet (GE) ports that can be connected to an Ethernet hub or switch. The ports are labeled as follows (see [Figure 2-16](#)):

- ETH 2/1
- ETH 2/2

**Note**

Interfaces ETH 2/1 and ETH 2/2 are also used by the [Small Form-Factor Pluggable \(SFP\) Ports](#). For more information about how these ports are used together, see [Combo Ports, page 2-26](#).

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

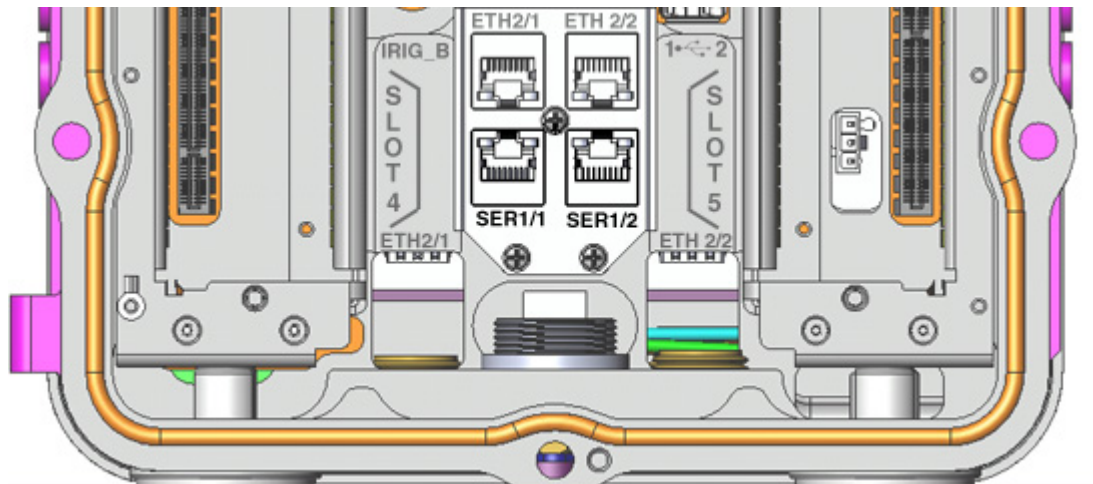
**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Specifications**

Specification	Description
Connector type	RJ-45 (Copper mode)
Cables	Optical fiber Category 5, 5e, 6 UTP
Interface speed	100BASE-TX and 1000BASE-T
Time stamp	IEEE 1588
Pinouts	See <a href="#">Connector and Cable Specifications</a>

**Serial Ports****Note**

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

**Figure 2-17 Router Serial Ports**



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

- RS232
- RS422
- RS485

The ports are labeled as follows (see [Figure 2-17](#)):

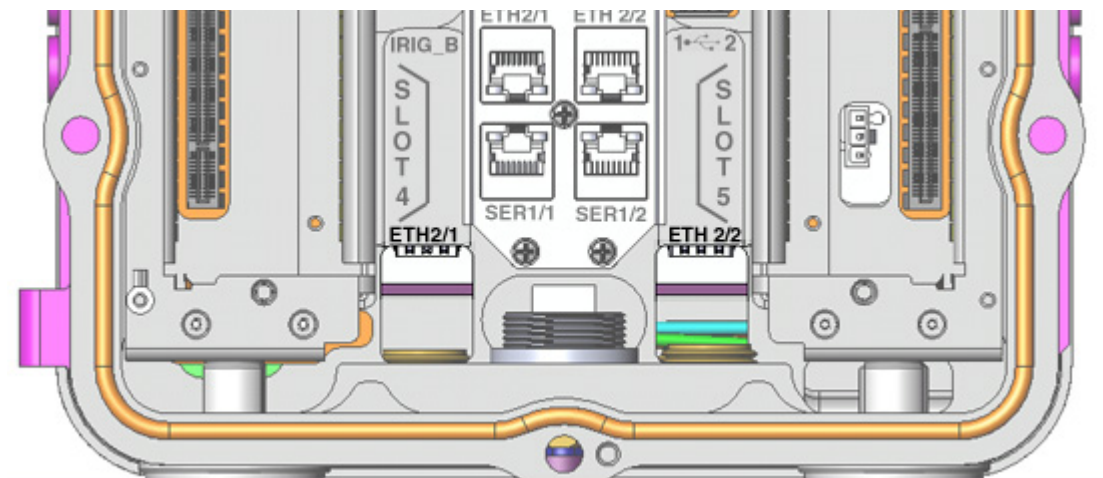
- SER 1/1
- SER 1/2

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Specifications**

Specification	RS232	RS422	RS485
Connector type	RJ-45		
Cable	Cisco serial transition cable that matches the signaling protocol		
Pinouts	See <a href="#">Connector and Cable Specifications</a>		
Signaling	Single-ended	Differential	Differential
Max. drivers	1	1	32
Max. receivers	1	10	32
Operating mode	Full duplex	Half duplex Full duplex	Half duplex Full duplex
Network topology	Point-to-point	Multidrop	Multipoint
Max. distance (standard)	15 m	1200 m	1200 m
Max speed (at 12 m/1200 m)	20 Kbps/1 Kbps	10 Mbps/100 Kbps	35 Mbms/100 Kbps
Max. slew rate	30 V/îs	NA	NA
Receiver input resistance	3..7 kÛ	4 kΩ	12 kΩ
Driver load impedance	3..7 kÛ	100 Û	54 Û
Receiver input sensitivity	±3 V	±200 mV	±200 mV
Receiver input range	±15 V	±10 V	-7..12 V
Max. driver output voltage	±25 V	±6 V	-7..12 V
Min. driver output voltage (load)	±5 V	±2.0 V	±1.5 V
Pinouts	See <a href="#">Connector and Cable Specifications</a>		

**Small Form-Factor Pluggable (SFP) Ports**

Figure 2-18 Router SFP Ports



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The router features two fiber optical SFP ports that support optional Cisco rugged SFP modules for Gigabit Ethernet connections. The ports are labeled as follows (see [Figure 2-18](#)):

- ETH 2/1
- ETH 2/2

**Note**

Interfaces ETH 2/1 and ETH 2/2 are also used by the [Gigabit Ethernet Ports](#). For more information about how these ports are used together, see [Combo Ports, page 2-26](#).

**Hot Swapping SFP Modules**

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

**Supported SFPs**

[Table 2-10](#) lists the supported SFP modules.

**Note**

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

**Table 2-10 Supported SFP Modules**

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

**Specifications**

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

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Combo Ports**

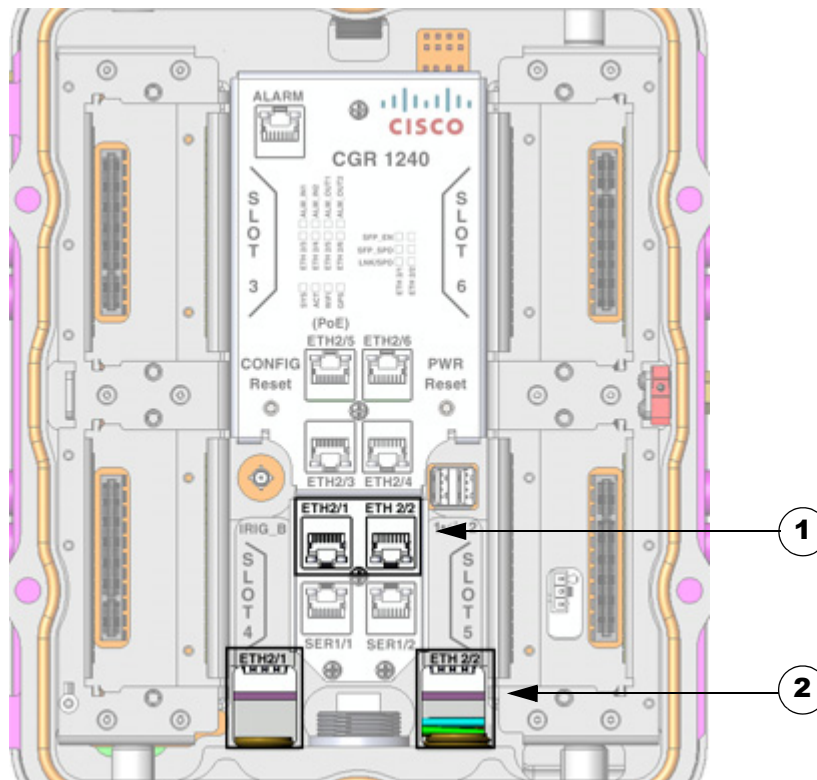
The two **Gigabit Ethernet Ports** and the two **Small Form-Factor Pluggable (SFP) Ports** ports are labeled identically (ETH 2/1 and ETH 2/2) because the SFP and GE interfaces share physical ports on the router. The Gigabit Ethernet ports support copper GE connections and the SFP modules support fiber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

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

**Note**

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

**Figure 2-19 GE Ports and SFP Ports Share Interfaces ETH 2/1 and ETH 2/2**

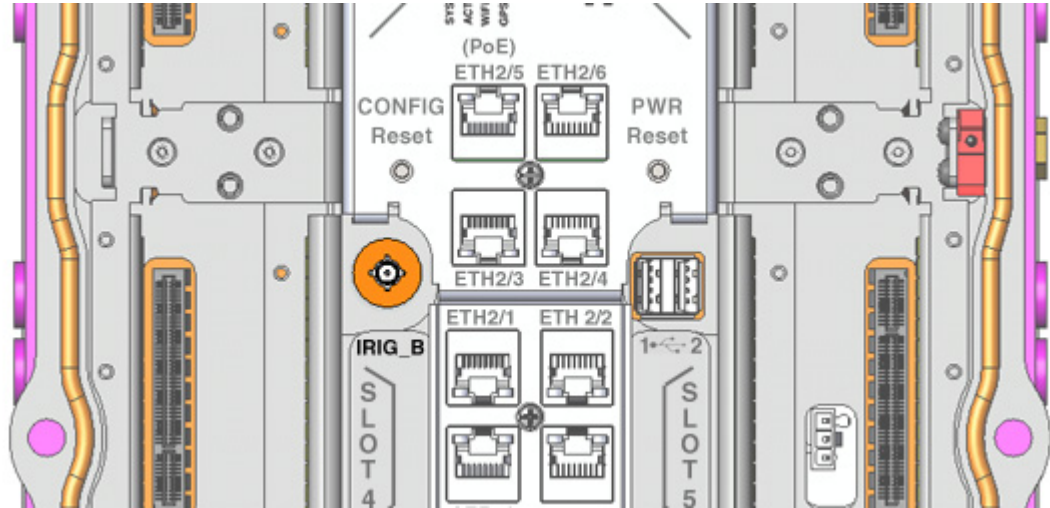


Items	Description	Gigabit Ethernet Connection Type
1	Gigabit Ethernet ports	Copper
2	SFP module ports	Fiber optic

**IRIG-B Timing Port****Note**

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



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-20 Router IRIG-B Timing Port**

The router features a single IRIG-B timing port (see Figure 2-20), which provides serial formatted time codes to an optional connected device. IRIG-B output provides standard time codes so timing devices can correlate time information with network devices. The router integrated GPS provides the time information that is provided by this interface.

**Note**

The IRIG-B timing port supports timing output only.

**Table 2-11 Supported IRIG Serial Time Code Formats**

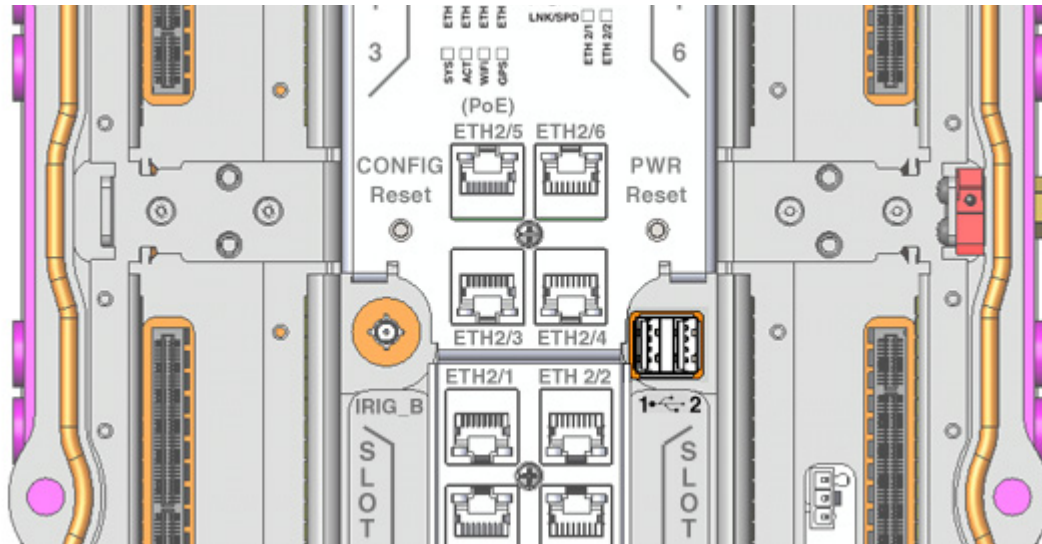
Format	Modulations	Carrier Frequency	Code Expression	Interface
B000	DC Level Shift (DCLS) pulse-width coded	None	BCD time of year, CF and SBS	RS232/RS485
B120	Amplitude Modulation (AM)	1kHz sine wave	BCD time of year, CF and SBS	50 ohms BNC

**Specifications**

Specification	Description
Connector type	SMB coaxial RF
Supported Code Formats	IRIG-B000 and B123

**USB Ports****Note**

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

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 2-21 Router USB Ports**

The router features two standard USB 2.0 ports for connecting and powering optional USB peripheral devices. These ports also support USB devices that are powered by an external source, such as an AC adapter or batteries, when the connected device consumes 2.5 or less power per port.

These ports are labeled as follows (see [Figure 2-21](#))

- 1  2

The USB ports operate at the following speeds:

- 1 Mbps
- 12 Mbps
- 480 Mbps

### Connection Considerations

- Depending on the USB devices you connect to these ports, you might require a USB extension cable to connected devices to these ports.
- To prevent connected USB devices from being stolen or accidentally removed, secure any connected USB device with a locking mechanism designed for this purpose

### Specifications

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



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Memory****SD Flash Memory**

See [SD Flash Memory Module](#), page 2-16.

**SDRAM**

The router features 1 Gb of double data rate (DDR) SDRAM.

**Boot Flash**

The router features 16 Mb of boot flash memory, consisting of two 8 Mb Serial Peripheral Interface (SPI) flash devices. The boot flash supports the Common Flash Interface (CFI) standard and CFI Descriptions should be taken into account when configuring router timeout values for router access operations, such as erase or program operations.

**DC Power for External Devices**

The router provides features a 4-pin Micro-Fit 3.0 power connector to support a compatible external device, such as an optional non-Cisco wireless module installed on the router exterior.

**More Information**

- For detailed instructions on how to install a non-Cisco module and connect to this DC power connector, see the chapter [Installing Non-Cisco Modules](#).
- Pinouts for the Molex Micro-Fit 3.0 connector are in the appendix [Connector and Cable Specifications](#).

**Specifications**

Specification	Description
Voltage	12 VDC +/-5%
Maximum Power	12 W (continuous)
DC Power Connector	Molex Micro-Fit 3.0

**GPS Module**

The router has an internal Global Positioning System (GPS), which provides time synchronization throughout the field area network, providing precise to enable efficient power measurement and distribution. The GPS also provides the router location information to the network management system.

**GPS Operating Modes**

The router GPS operates in the following modes, based on the router operating status:

- **Run mode**—Run mode is the normal GPS operating mode, during which the GPS continually provides location and time information to the router.

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- **Monitor mode**—The GPS operates in monitor mode when you upgrade the firmware that is stored in the [SD Flash Memory Module](#).
- **Standby mode**—When the router AC power supply fails or is not present, and the battery backup unit is providing power to the router, the GPS operates in standby mode. The GPS receiver is disabled but the GPS RAM and the real-time clock remain active. In this mode, the GPS RAM stores the GPS almanac, ephemeris, and last position.
  - When the GPS is in standby mode for less than two hours, it performs a hot start when normal router power is restored.
  - When the GPS is in standby mode for more than two hours, it performs a warm start when normal router power is restored.

**GPS LED**

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

**GPS Timing Messages**

GPS positioning messages contain a timestamp which can be up to two seconds in the past, so the router uses data contained in timing messages described [Table 2-12](#) as the source of time for the GPS.

**Note**

The GPS time must calculate in the Universal Coordinated Time (UTC) offset, which is used to set the local time.

**Table 2-12**      *GPS Timing Protocols and Messages*

Protocol Name	Message Type Containing Time Information
TSIP (Trimble Standard Interface Protocol)	Packets 41 and 8F-21.
TAIP (Trimble ASCII Interface Protocol)	TM messages
NMEA (National Marine Electronics Association)	ZDA message.

**Acquiring the Correct Time**

Take the following steps to ensure the GPS acquires an accurate time:

- Step 1** To eliminate UTC offset, confirm that the almanac is complete and the receiver is generating 3D fixes.
- Step 2** Confirm that the GPS receiver is configured for the late PPS (Pulse-Per-Second) option (the receiver outputs one PPS for a 3D fix).
- Step 3** Capture the time from TSIP packet 0x41 or TSIP packet 0x8F-20.
- Step 4** On the next PPS, add 1 to the whole second captured in [Step 3](#) to adjust to the correct time.

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Specifications**

Specification	Description
Channels	12
Tracking sensitivity	-160 dBm
Acquisition sensitivity	-148 dBm
Fast TTFF (Cold start)	38 seconds
Error correction	Space Based Augmentation Systems (SBAS)
Timing protocols	NMEA (0183 v3.0 Messages), TSIP, TAIP
Serial ports	2 For pinouts, see the appendix <a href="#">Connector and Cable Specifications</a>
<b>Pulse Per Second (PPS) Specifications</b>	
PPS CMOS output	1
PPS Output Mode	Always on (Early PPS)
PPS pulse width (configurable)	4.2 microseconds (default)
PPS polarity (configurable)	-1 positive (default)

**Related Commands**

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

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

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

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

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

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Short-Range Access Point**

The router features an integrated, short-range WiFi access point to support a wireless console connection to the router. Generally, the router is installed on a pole above the ground, which makes a wired console connection impractical during router operation.

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

**Related Commands**

Use the **show hardware internal wifi** command to display details about the state of the integrated WiFi access point.

**show hardware internal wifi**

<b>show hardware internal wifi</b> { <b>event-history</b>   <b>logging-levels</b>   <b>port</b>   <b>registers</b>   <b>sw-state</b> }	Enter the keyword for the information you want to see. <ul style="list-style-type: none"> <li>• <b>event-history</b>—Displays a list of events for the integrated access point.</li> <li>• <b>logging-levels</b>—Displays the current logging levels for the integrated access point.</li> <li>• <b>port</b>—Displays port information (per port) for the integrated access point.</li> <li>• <b>registers</b>—Displays the register values for the integrated access point.</li> <li>• <b>sw-state</b></li> </ul>
--	--

**Real-Time Clock (RTC)**

The router features an integrated real-time clock (RTC) with battery backup that supplies the system software with accurate date and time information. The integrated router GPS compares the current RTC time with the time at which it last received a valid signal to ensure accurate timekeeping on the router. The RTC value can be synchronized with other time counters in the network, for example the system time maintained by Precision Time Protocol (PTP).

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

**RTC Battery**

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

**Specifications**

Specification	Description
<b>Battery type</b>	High-capacity lithium (550 mAh)
<b>Battery life span</b>	10 years
<b>Supported interrupts</b>	Time-of-day alarms (Range: 1/second – 1/month)

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Specification	Description
	Periodic rates (Range: 122 us – 500 ms)
	End-of-update-cycle notifications

## Temperature Sensor

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

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

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## CHAPTER 3

# Installation Safety and Site Preparation

---

This chapter contains safety and site preparation information that you must read before installing the router, and includes these sections:

- [Safety Recommendations, page 3-1](#)
- [Safety with Electricity, page 3-1](#)
- [Preventing Electrostatic Discharge Damage, page 3-2](#)
- [Safety Warnings, page 3-2](#)
- [Site Requirements, page 3-3](#)
- [Power Guidelines and Requirements, page 3-4](#)
- [Preparing for Network Connections, page 3-5](#)
- [Required Tools and Equipment for Installation and Maintenance, page 3-7](#)

## Safety Recommendations

Follow these guidelines to ensure general safety:

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

## Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Read all warnings in the section [Safety Warnings, page 3-2](#).
- Locate the emergency power-off switch for your installation location. If an electrical accident occurs, you can quickly turn off the power.
- Disconnect all power before doing the following:
  - Installing or removing a chassis

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

## Preventing Electrostatic Discharge Damage

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

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

**Caution**

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

## Safety Warnings

This section contains important safety warnings for the installation and use of the router.

Translated versions of all safety warnings are available in the safety warnings document that shipped with your router, and which is available on Cisco.com.

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

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

Statement 1071



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Warning**

**In order to comply with FCC radio frequency (RF) exposure limits, antennas for this product should be located a minimum of 7.9 in. (20 cm) or more from the body of all persons.** Statement 332

**Warning**

**Do not operate the unit near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use.** Statement 364

**Warning**

**This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 366

**Warning**

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

**Warning**

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

**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 20 A.** Statement 1005

**Warning**

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

**Warning**

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

**Warning**

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

**Warning**

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

## Site Requirements

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

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## Poletop Installation Requirements

The installation steps in this manual ([Installing the Router](#)) require that the router mounting and installation locations, usually at the top of a power or other utility pole, have the following connections available for basic router installation:

- AC power connection
- Fast Ethernet connection, as described in the section [Ethernet Connections, page 3-5](#)

## Environmental Requirements

The location of your router is an important consideration for proper operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can make maintenance difficult. Plan for access to both power supply side and cable side panels of the router.

If you are currently experiencing shutdowns or an unusually high number of errors with your existing equipment, these precautions and recommendations may help you isolate the cause of failure and prevent future problems.

- Always follow ESD-prevention procedures described in the [Preventing Electrostatic Discharge Damage, page 3-2](#) to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the chassis door closes securely and that all empty module slots and have filler panels installed.
- When other equipment is installed on or connected to the router, try operating the router by itself, if possible. Power off other equipment (such as USB devices and installed third-party modules) to allow the router under test a maximum of cooling air and clean power.

## FCC Safety Compliance Statement

The FCC, with its action in ET Docket 9608, has adopted a safety standard for human exposure to RF electromagnetic energy emitted by FCC-certified equipment. When used with approved Cisco antennas, Cisco products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio device according to the instructions in this publication results in user exposure substantially below the FCC recommended limits.

## Power Guidelines and Requirements

- Check the power at your site to ensure that you are receiving power that is free of spikes and noise.
- Install a power conditioner if necessary.
- Verify the AC power supply includes an autorange feature to autoselect 100 V to 240 V operation.

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# Preparing for Network Connections

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

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

- [Ethernet Connections, page 3-5](#)
- [Serial Connections, page 3-5](#)



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

---

## Ethernet Connections

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

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

For more information about Ethernet connections and cables, see the following chapters:

- For cable and connector pinouts, see the appendix [Connector and Cable Specifications](#).
- For cabling instructions, see the chapter [Installing the Router](#).

## Serial Connections

Serial connections are provided by router serial ports, described in detail in the [Router Hardware Description](#) chapter.

Before you connect a device to a serial port, you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface
- Signaling standard required by the device
- Serial ports can be configured as DTE or DCE, depending on the serial cable used.

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Serial DTE or DCE Devices**

A device that communicates over a synchronous serial interface is either a DCE or DTE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that accompanied the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either DTE or DCE mode.) [Table 3-1](#) lists typical DTE and DCE devices.

**Table 3-1 Typical DTE and DCE Devices**

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

1. If pins protrude from the base of the connector, the connector is male.

2. If the connector has holes to accept pins, the connector is female.

**Signaling Standards Supported**

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

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

All serial ports configured as DTE require external clocking from a Channel Service Unit/Data Service Unit (CSU/DSU) or other DCE device.

**Exterior 100BASE-T Fast Ethernet Port**

The router exterior Ethernet connector is compliant with Open DeviceNet Vendor Association (ODVA) standards. Cables used with this port must also be ODVA-compliant. ODVA compliant cables and connectors meet IP 67 ratings.

**Distance Limitations**

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

[Table 3-2](#) lists the recommended maximum speeds and distances for each serial interface type; however, you might get good results at speeds and distances greater than those listed, if you understand the electrical problems that might arise and can compensate for them. For instance, the recommended maximum rate for V.35 is 2 Mb/s, but 4 Mb/s is commonly used.

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Table 3-2 Serial Signal Transmission Speeds and Distances**

Rate (bps)	Distance for EIA/TIA-232		Distance for X.21 and V.35		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
2400	200	60	4100	1250	16.4	5
4800	100	30	2050	625	16.4	5
9600	50	15	1025	312	16.4	5
19200	25	7.6	513	156	16.4	5
38400	12	3.7	256	78	16.4	5
56000	8.6	2.6	102	31	16.4	5
1544000 (T1)	—	—	50	15	16.4	5

**Asynchronous/Synchronous Serial Module Baud Rates**

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

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

**Required Tools and Equipment for Installation and Maintenance**

The tools and equipment you need for each hardware procedure are described as part of the procedure. See the following chapters for detailed information on the tools and equipment you must supply for the procedures described in the following chapters:

- [Mounting the Router](#)
- [Opening the Router Chassis](#)
- [Installing Battery Backup Units](#)
- [About Router Antennas](#)
- [Installing Non-Cisco Modules](#)
- [Installing the Router](#)

See the Cisco Connected Grid modules installation and configuration guides for instructions on how to install or replace router modules, include the tools and equipment you must supply.

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## CHAPTER 4

# Opening the Router Chassis

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This chapter describes how to open the Cisco CGR 1240 Router door so that you can access the interior of the chassis, and contains these sections:

- [Opening the Router Door, page 4-1](#)
- [Door Features, page 4-5](#)

## Opening the Router Door

To access the router interior, you must open the router front door. Many of the router hardware installation tasks require you to open the router door and access the router interior. These tasks include:

- Installing Cisco Connected Grid modules
- Installing some module antenna models
- Connecting and cabling the router ports
- Installing battery backup units
- Installing a non-Cisco module on the router
- Using the power and reset buttons
- Viewing the LEDs on the router interior

## Preparing to Open the Door

The router door can be opened while the router is powered on and connected to the network. Take any safety precautions described in [Safety Information, page 4-2](#).

## Tools You Supply

You must provide a 1/2-inch (13-mm) box-end wrench or socket set to open and close the router chassis door.

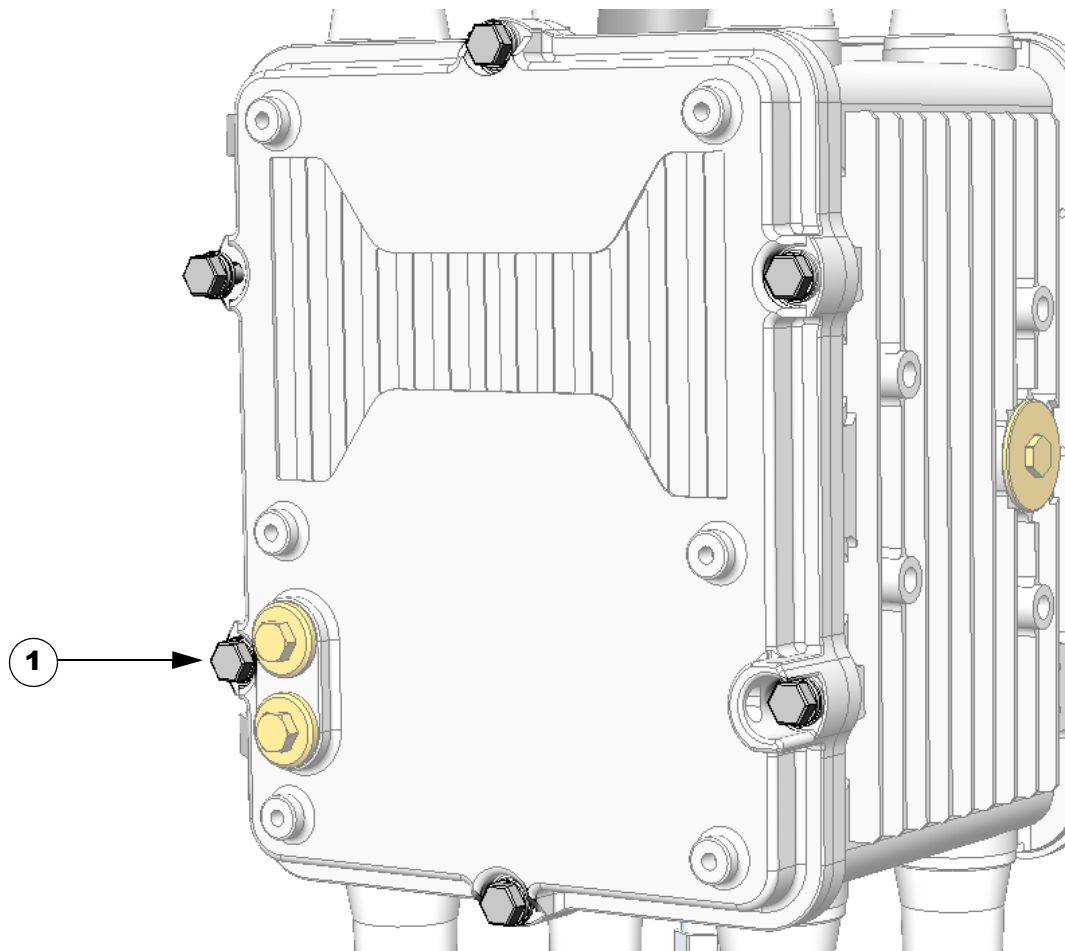
**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Safety Information**

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

**Captive Screws**

The router door features six captive screws, shown in [Figure 4-1 \(1\)](#).

**Figure 4-1 Router Door, Showing Captive Screws**

**Order of Loosening and Tightening Door Screws**

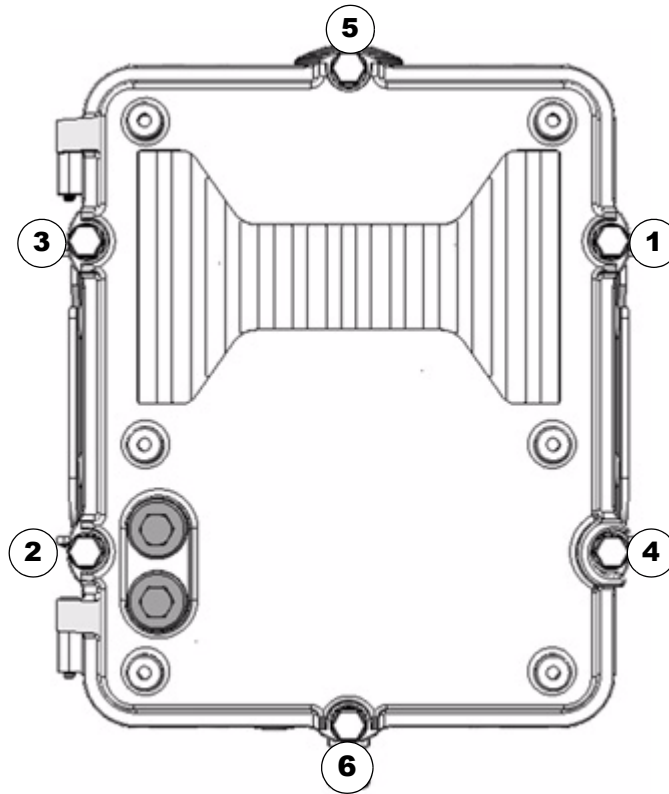
Cisco recommends that you loosen and tighten the door screws in the order shown in [Figure 4-1](#).

The chassis door features an environmental seal that protects the chassis against environmental elements when the door is closed. This seal creates pressure, which can cause the door to open suddenly when the last screw is loosened.



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- When opening the door, alternate loosening screws on each side of the chassis, in the order shown in [Figure 4-1](#), to evenly release the door pressure.
- When closing the door, do not tighten the screws on the hinge-side of the door first. Tightening the screws on the hinge-side first can place too much pressure on the door hinges.

**Figure 4-2 Recommended Order of Loosening and Tightening Screws**

## Opening the Door

**Step 1** To open the door, use a box-end or socket wrench to loosen all six captive screws in the order shown in [Figure 4-1](#).



**Note** The screws cannot be removed from the door. [Figure 4-3](#) is a detailed view of a captive screw.

**Step 2** After all six screws are loose, swing the door open on the left-side hinges, as shown in [Figure 4-4](#).



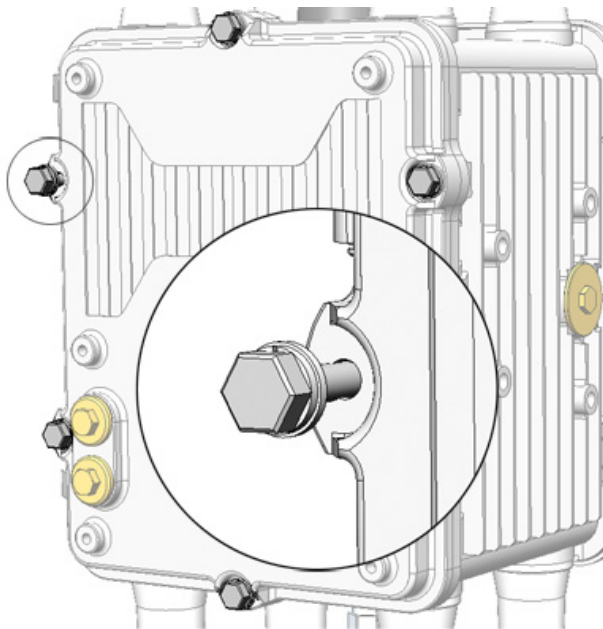
**Caution** The door gasket creates a seal when the door is closed, so the door might open suddenly when the last screw is loosened.

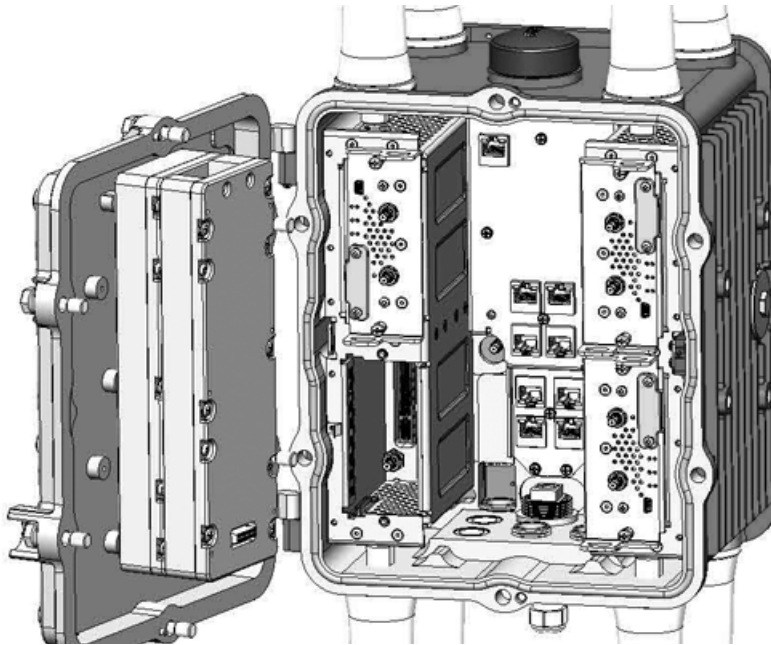
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## Closing the Door

- 
- Step 1** Verify that the door seal is clean and that all cables are tucked back into the chassis.
  - Step 2** To close the door, use the wrench to evenly tighten all six screws in the order shown in [Figure 4-1](#).
  - Step 3** Evenly tighten the screws again, in the order shown in [Figure 4-1](#), this time using 6 to 7 foot-pounds of torque.
  - Step 4** Replace any locking mechanism on the door.
- 

**Figure 4-3** *Captive Screw Detail*



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-4 Router Door Open**

## Door Features

This section describes these door features:

- [Door Sensor, page 4-5](#)
- [Support for Exterior Door Lock, page 4-6](#)

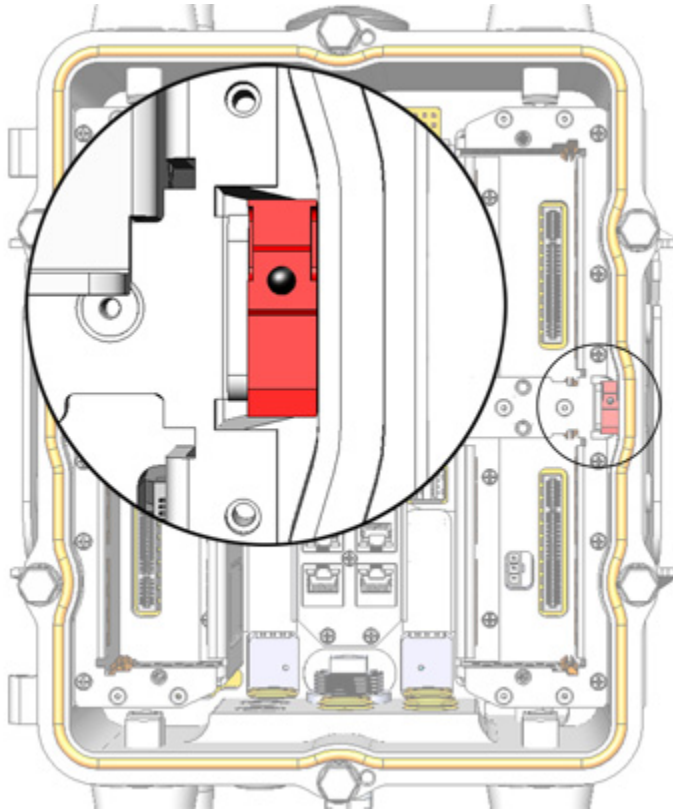
## Door Sensor

The chassis hardware features a pressure-sensitive alarm switch, shown in [Figure 4-5](#), which detects when the router door opens or closes and alerts the operator to a potential security breach.

When the switch detects that the door has been opened or closed, it sends an event message to the router. The event message is stored in the router log file.

These are examples of the door state event messages:

```
Sep 24 08:04 Router %% VDC-1 %% %FCPLMGR-2-FCPLMGR_DOOR_ALARM: door/lid has been closed
Sep 24 08:04 Router %% VDC-1 %% %FCPLMGR-2-FCPLMGR_DOOR_ALARM: door/lid has been open
```

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-5 Door Open Detection Switch Detail**

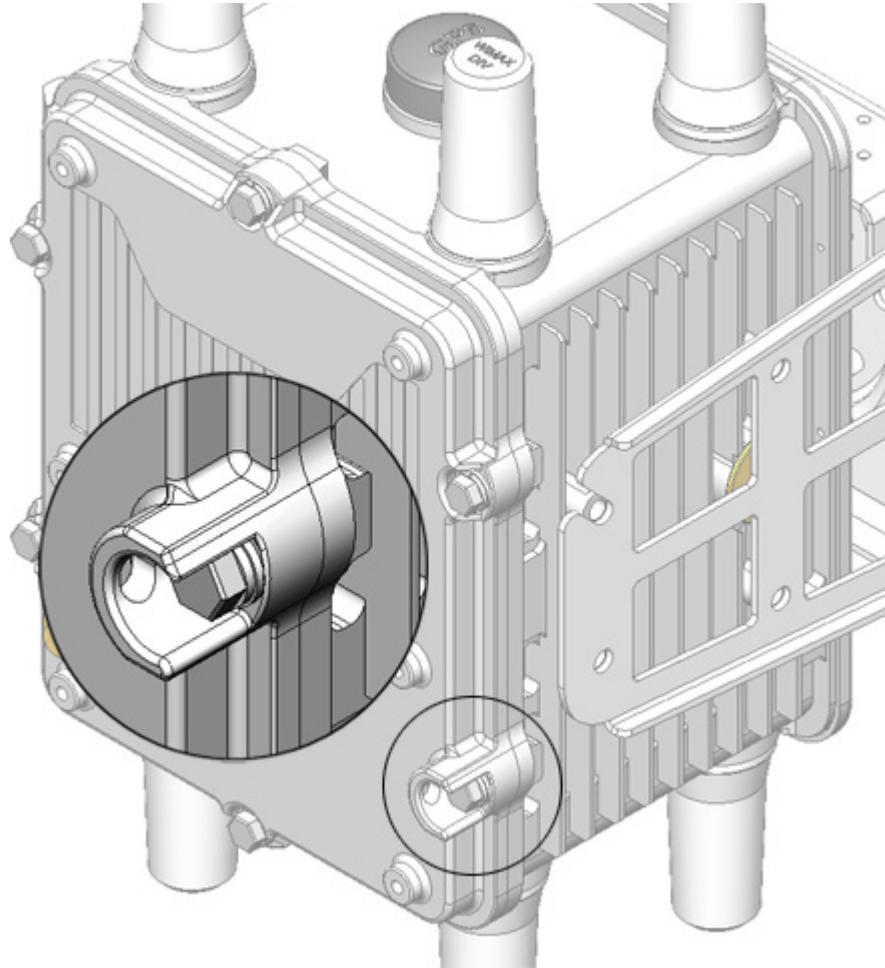
## Support for Exterior Door Lock

The router door has a single lock block, shown in [Figure 4-6](#), which supports an external lock to prevent unauthorized access to the router interior:

- You must provide the lock
- Lock size of up to 5/16 inches

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**Figure 4-6 Door Lock Block Detail**



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# CHAPTER 4

## Mounting the Router

This chapter describes the safety information, equipment, and procedures required to mount the Cisco 1240 Connected Grid Router on a vertical pole or streetlight. This chapter contains these sections

- [Overview of the Pole Mount Kits, page 4-1](#)
- [General Safety Information for Mounting, page 4-2](#)
- [Contents of the Mounting Kits, page 4-2](#)
- [Materials and Tools You Supply, page 4-6](#)
- [Mounting Instructions, page 4-6](#)
- [Grounding Instructions, page 4-18](#)

## Overview of the Pole Mount Kits

You will need some or all of the kits described in this section to install the router on a pole. Your installation environment and requirements determine the kits you need.

The [Contents of the Mounting Kits](#) section includes a detailed description of each kit.

Cisco Part Number	Name	Description
CGR-PMK1000	<a href="#">Pole Mount Kit</a>	This kit is required for all pole or streetlight installations and includes a mounting plate and the hardware required to attach the mounting plate to a pole.
CGR-PMK-BAND	<a href="#">Mounting Bracket Kit</a>	Use this kit if your installation requires a Cisco mounting bracket to mount the router. This kit is used with the pole kit and includes the hardware required to attach the mounting bracket to the mounting plate.
CGR-PMK-BAND	<a href="#">Band Strap Kit</a>	This kit includes two steel straps for mounting the router on poles larger than 5 inches (14 cm) in diameter. This kit is used together with the <a href="#">Pole Mount Kit</a> . A Band-It Tool is required to install the steel straps on a pole.
AIR-BAND-INST-TL=	<a href="#">Strap Tool Kit</a>	This kit includes a Band-It tool that is required when using steel straps to install the router on poles larger than

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# General Safety Information for Mounting

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

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

**Caution**

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

**Caution**

The mounting surface, attaching screws, and optional wall anchors must be able to support a 50 pound (22.7 kg) static weight.

**Caution**

Personnel mounting the router must understand grounding methods.

**Warning**

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

Statement 1052

## Contents of the Mounting Kits

This section describes the contents of the mounting kits available for the router and when you should use each kit.

### Pole Mount Kit

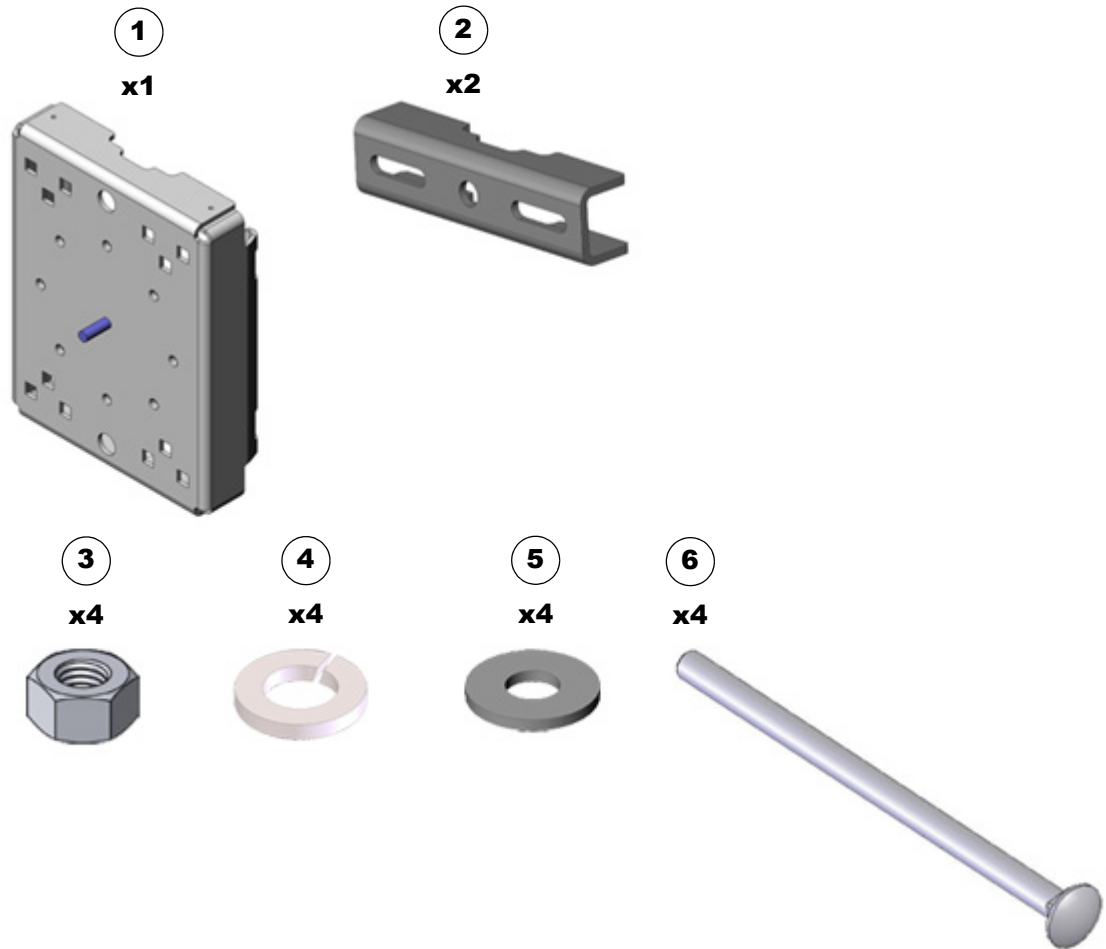
**When to Use**

Use the Cisco pole mount kit to install the mounting plate on any pole or streetlight. The kit supports poles that meet the following criteria:

- **Size**—2 to 16 inch diameter poles
- **Material**—Metal, wood, or fiberglass poles

Item	Description	Item	Description
1	Mounting plate (18.03 x 23.11 x 5.48 cm)	5	M8 x 4.25 washer
2	Clamp brackets (17.32 x 4.31 x 3.42 cm)	6	3/8-in. carriage bolt, 7 in. (10.2 cm) length
3	M8 x 4.25 hex nut		
4	M8 x 4.25 split lock washer		



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-1 Pole Mount Kit Contents**

## Mounting Bracket Kit

**When to Use**

Use the [Mounting Bracket Kit](#) if you require a Cisco mounting bracket. The mounting bracket attaches to the mounting plate, and then the router is installed on the mounting bracket.

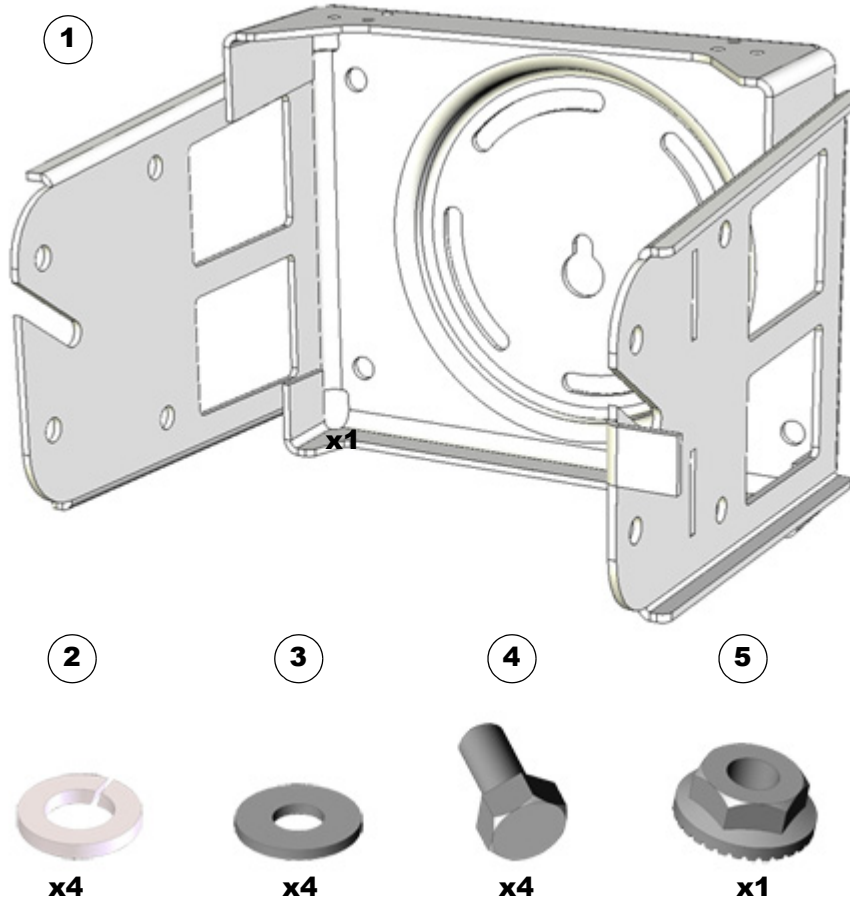
**Note**

You can optionally use any compatible mounting bracket with the Cisco [Pole Mount Kit](#). Check with your authorized Cisco reseller for compatible mounting brackets.

Item	Description	Item	Description
1	Mounting bracket (25.53 x 19.13 x 22.87 cm)	4	Bolt (M8 x 1.25)
2	Split lock washer (M8)	5	Serrated nut (M8 x 1.25)
3	Washer (M8)		

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**Figure 4-2 Mounting Bracket Kit Contents**



## Band Strap Kit

### When to Use

Use the straps in the Band Strap Kit when you mount the router on a pole larger than 5 inches (12.7 cm) in diameter. This installation also requires the [Pole Mount Kit](#) and the [Strap Tool Kit](#).

Item	Description
1	Steel straps (2)

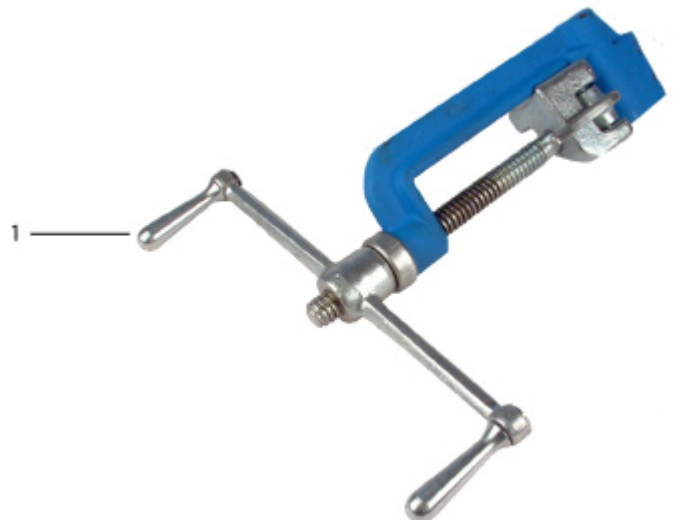
**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-3 Band Strap Kit Contents****Strap Tool Kit****When to Use**

Use the tool in the Strap Tool Kit to attach the steel straps included in the [Band Strap Kit](#). Steel straps are required to install the mounting plate on poles larger than 5 inches (12.7 cm) in diameter.

**Note**

The tool in the Strap Tool Kit is manufactured and supported by BAND-IT. For more information about the tool, see <http://www.band-it-idex.com>.

Item	Description
1	Strap tool
2	Strap tool documentation (not shown)

**Figure 4-4 Strap Tool Kit Contents**

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## Materials and Tools You Supply

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

Item	Required for These Procedures
13-mm box-end wrench or socket set	<ul style="list-style-type: none"> <li>Install the Mounting Plate—Poles Up to 5 Inches in Diameter</li> <li>Install the Mounting Plate—Through-Pole Mounting (Optional)</li> <li>Attach the Mounting Bracket to the mounting plate or extension bracket</li> </ul>
Bolt, standard washer, fender washer, and nut, 5/8 in. (2 sets)—Bolt length depends on the size of the pole used in the installation.	Install the Mounting Plate—Through-Pole Mounting (Optional)
Drill and drill bit	Install the Mounting Plate—Through-Pole Mounting (Optional)
Phillips screwdriver, or other screwdriver for cross-recessed screws	Ground the Router
Crimping tool or pliers	Ground the Router

## Mounting Instructions

This section includes all the procedures required to mount the router on any supported pole type.

### Router Orientation

When mounting the router on a pole, ensure that:

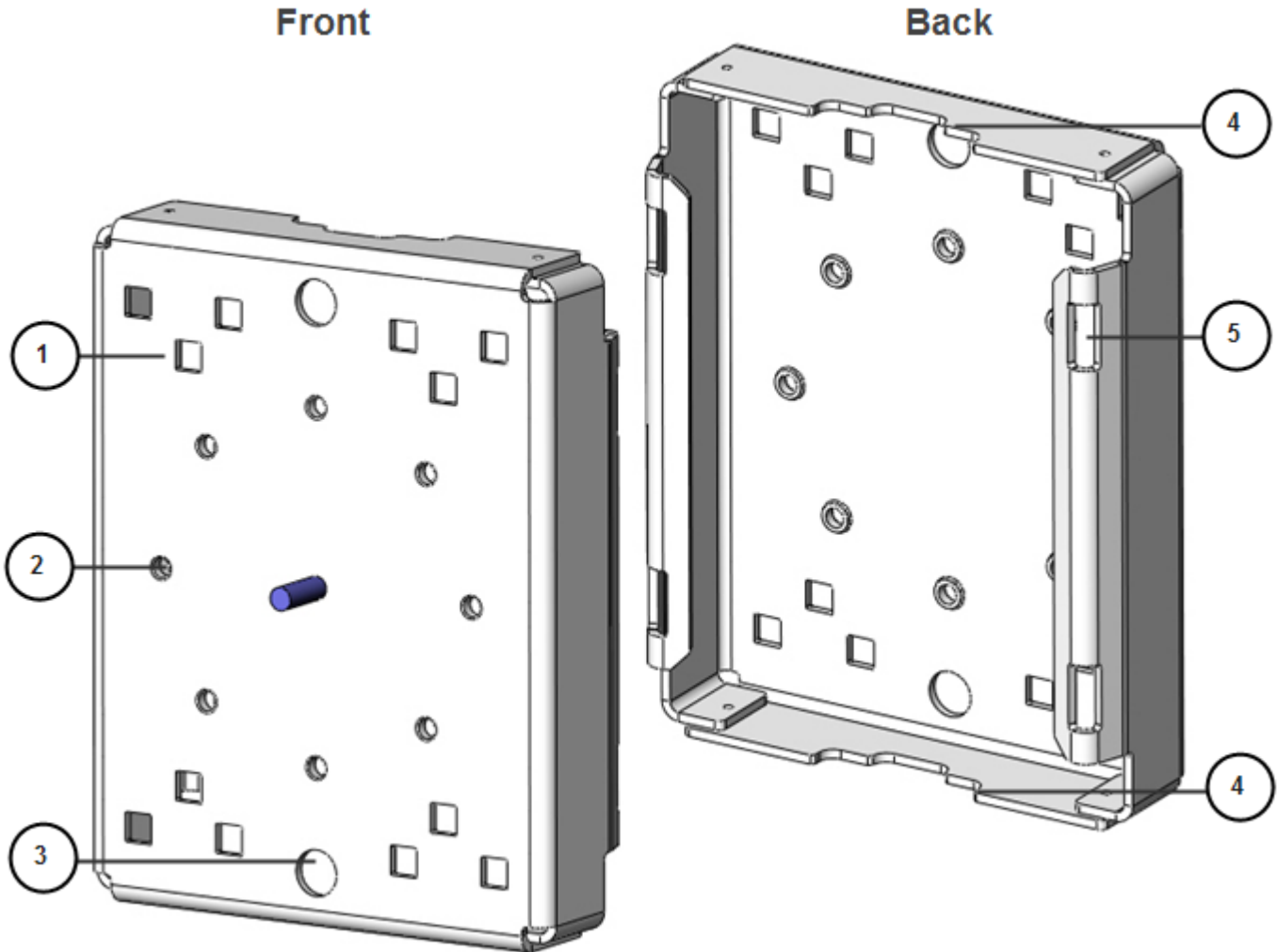
- The router is oriented with the chassis cabling openings pointing down so the router cables can be correctly connected through the openings and so the router door opens correctly, as shown in [Figure 4-13](#).
- The router is mounted with the hinged access cover facing out.

### Install the Mounting Plate on a Pole

This section describes three different procedures for installing the mounting plate on a pole. Follow the instructions for the pole type used in your installation.

The instructions in these section refer to the mounting plate features shown in [Figure 4-5](#).

- Install the Mounting Plate—Poles Up to 5 Inches in Diameter
- Install the Mounting Plate—Poles Larger than 5 Inches in Diameter
- Install the Mounting Plate—Through-Pole Mounting (Optional)

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-5 Mounting Plate Features – Front and Back View**

Item	Description
1	Carriage bolt holes (4)
2	Bracket mount holes (8)
3	Clearance holes, 3/4 in. (2)
4	Pole clamp notches (2)
5	Steel band strap slots (4)

**Install the Mounting Plate—Poles Up to 5 Inches in Diameter**

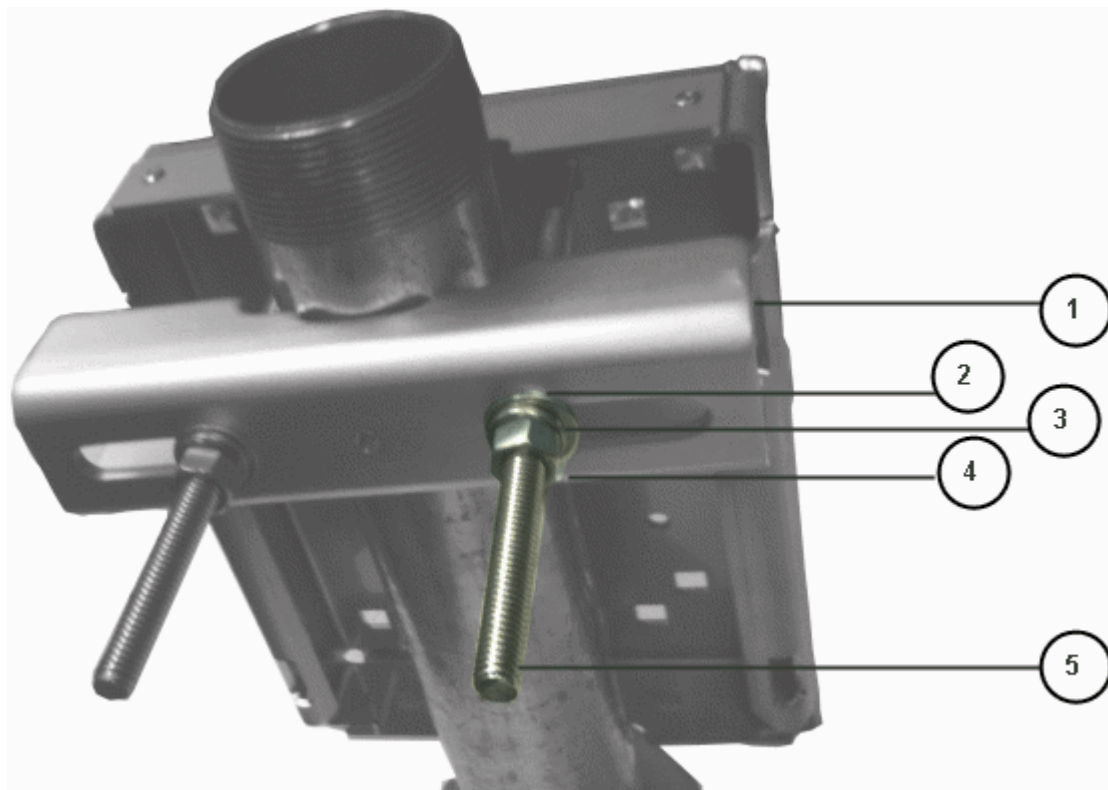
To install the mounting plate on a vertical pole up to 5 inches (12.7 cm) in diameter, follow these steps and refer to [Figure 4-6](#) and [Figure 4-7](#).

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- Mounting plate, carriage bolts, and clamp brackets included in the [Pole Mount Kit](#).
- Socket wrench that you provide.

- 
- Step 1** Select a mounting location on the pole and place the top and bottom pole clamp bracket (1) notches against the pole.
- Step 2** Place one of the clamp brackets (1) on the opposite side of the pole, aligning the clamp bracket holes with the top two carriage bolt holes on the mounting plate.
- Step 3** Insert a carriage bolt (5) through each of the top two carriage bolt holes on the mounting plate and through the holes in the clamp brackets.
- Step 4** Position the each bolt in the clamp so that the bolt is next to the pole, as shown in [Figure 4-6](#).
- Step 5** Follow these steps to place the bracket hardware on each carriage bolt, as shown in [Figure 4-6](#):
- a. Place the washer (2) and then the split lock washer (3) on the back of each carriage bolt (5).
  - b. Thread the hex nut (4) on each carriage bolt. The split lock washer should be between the washer and the nut.

**Figure 4-6 Carriage Bolt Hardware Detail**

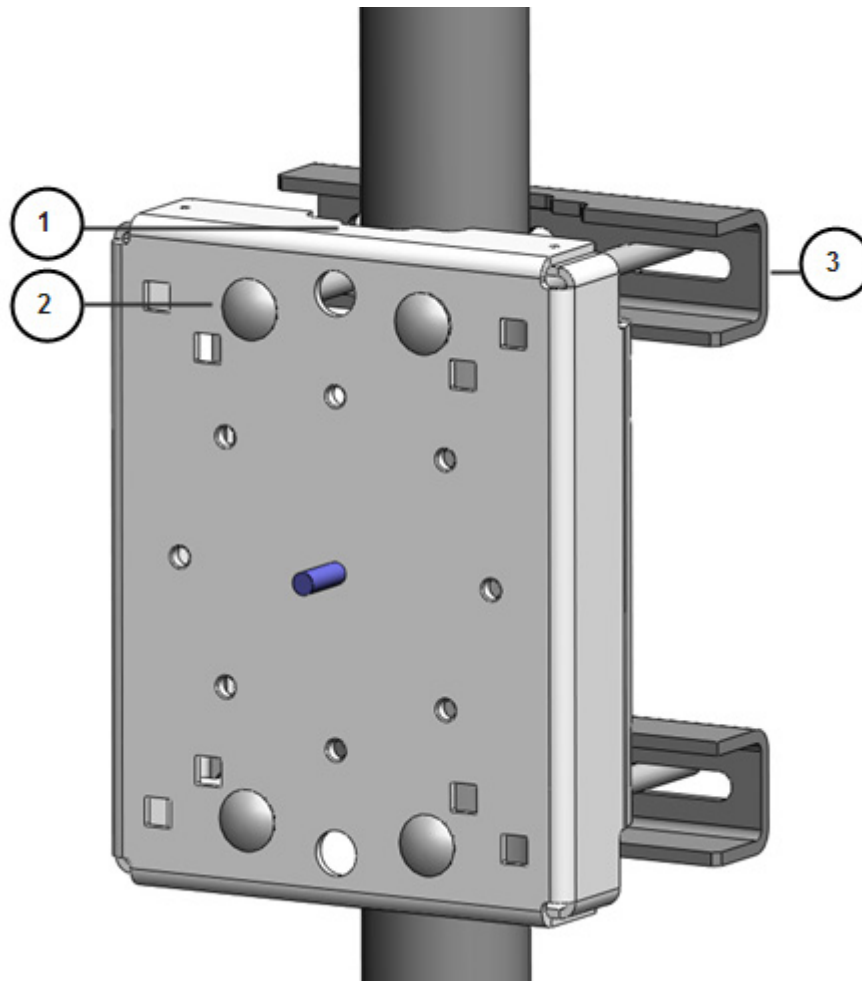


- Step 6** Hand tighten the hex nuts (do not overtighten).
- Step 7** Repeat [Step 3](#) through [Step 6](#), installing the two bottom carriage bolts and the second clamp bracket at the bottom of the mounting plate.
- Step 8** Position the mounting plate and clamp brackets on the pole as needed before further tightening the carriage bolts.

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- Step 9** Use a socket wrench to evenly tighten all four carriage bolts to finish installing the mounting plate on the pole.

**Figure 4-7** *Mounting Plate Installed on Pole with Clamp Brackets*



Item	Description
1	Pole clamp notch
2	Carriage bolts (4)
3	Pole clamps (2)

### Install the Mounting Plate—Poles Larger than 5 Inches in Diameter

To install the mounting plate on a vertical pole that is larger than 5 inches (12.7 cm) in diameter, follow these steps and refer to [Figure 4-8](#).

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****What you need**

- Mounting plate and steel straps included in the [Pole Mount Kit](#).
- Band-It tool included in the [Strap Tool Kit](#)

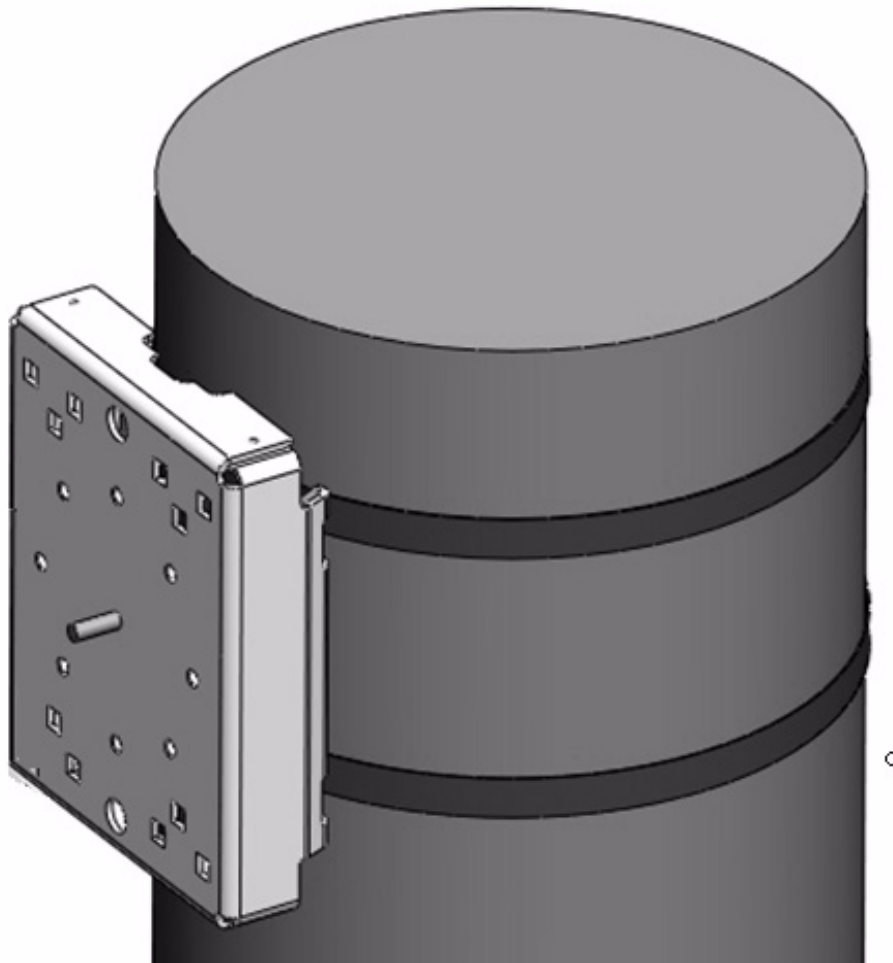
- 
- Step 1** Assemble the straps and the mounting plate by threading the two steel straps through the band strap slots on the mounting plate.
- Step 2** Select a mounting location on the pole.
- Step 3** Position the mounting plate on the pole as needed and tighten the straps around the pole.
- Step 4** Use the Band-It strap tool to tighten the metal bands around the pole, following the instructions in the box with the tool. Ensure the metal bands are as tight as possible.

**Note**

When the metal bands are tightened to the full tension, the mounting plate cannot be adjusted unless the metal bands are disassembled or cut.

---

**Figure 4-8** *Mounting Plate Installed on Pole with Steel Straps*





**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Install the Mounting Plate—Through-Pole Mounting (Optional)**

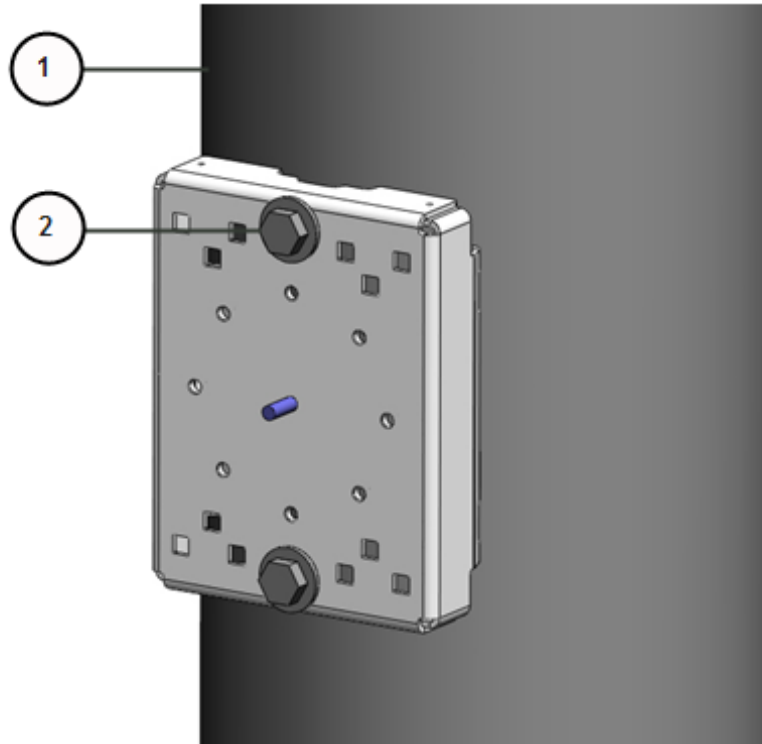
If the pole used in your installation is made of wood, you can optionally install the mounting plate using the procedure described in this section. This is an alternate mounting method to the following two mounting methods, which can also be used when mounting the router on a wood pole:

- [Install the Mounting Plate—Poles Up to 5 Inches in Diameter](#)
- [Install the Mounting Plate—Poles Larger than 5 Inches in Diameter](#)

**What You Need**

- Mounting plate included in the [Pole Mount Kit](#).
- Hardware that you supply: 5/8-in. through bolt (length depends on the pole size in your installation), standard washer, fender washer, nut (2 sets)
- Tools that you supply: Drill, drill bit (for 5/8-in. through bolts), and socket wrench.

- 
- Step 1** Place the mounting plate on the selected mounting location on the pole.
- Step 2** Mark the drilling locations on the pole through the clearance holes and remove the mounting plate.
- Step 3** Drill holes completely through the pole at the points you marked in [Step 2](#).
- Step 4** Position the mounting plate over the drilled holes. Align the clearance holes on the mounting plate with the drilled holes.
- Step 5** Place a standard washer against one of the clearance holes on the mounting plate, then feed the bolt through the washer, clearance hole, and drilled hole. Push the bolt all the way through the pole. See [Figure 4-9](#).
- Step 6** Follow these steps on the opposite side of the pole:
- a. Place a fender washer on the end of the bolt, and then a nut.
  - b. Hand tighten the nut.
- Step 7** Repeat [Step 5](#) and [Step 6](#) for the second bolt.
- Step 8** Use a socket wrench to evenly tighten both bolts to finish installing the mounting plate on the wooden pole.
-

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-9** Mounting Plate Installed on Wooden Pole with Through Bolts

Item	Description
1	Wood pole
2	5/8-in. through bolts (2)

## Attach the Mounting Bracket

This section describes how to attach the mounting bracket to the mounting plate.

### Assemble Bracket Hardware

Several of the procedures in this section require you to assemble the bracket hardware before installing the bracket. A bracket hardware set consists of one bolt, one washer, one split lock washer, and one nut. Take these steps to assemble the hardware:

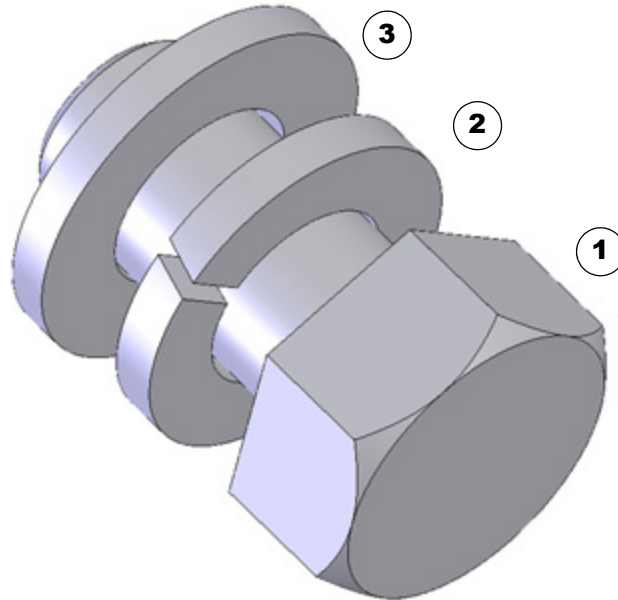
- 
- Step 1** Slide the split lock washer (2) on the bolt (1).
- Step 2** Slide the regular washer (3) on the bolt (1).

The split lock washer should be between the regular washer and the bolt as shown in [Figure 4-10](#).

---

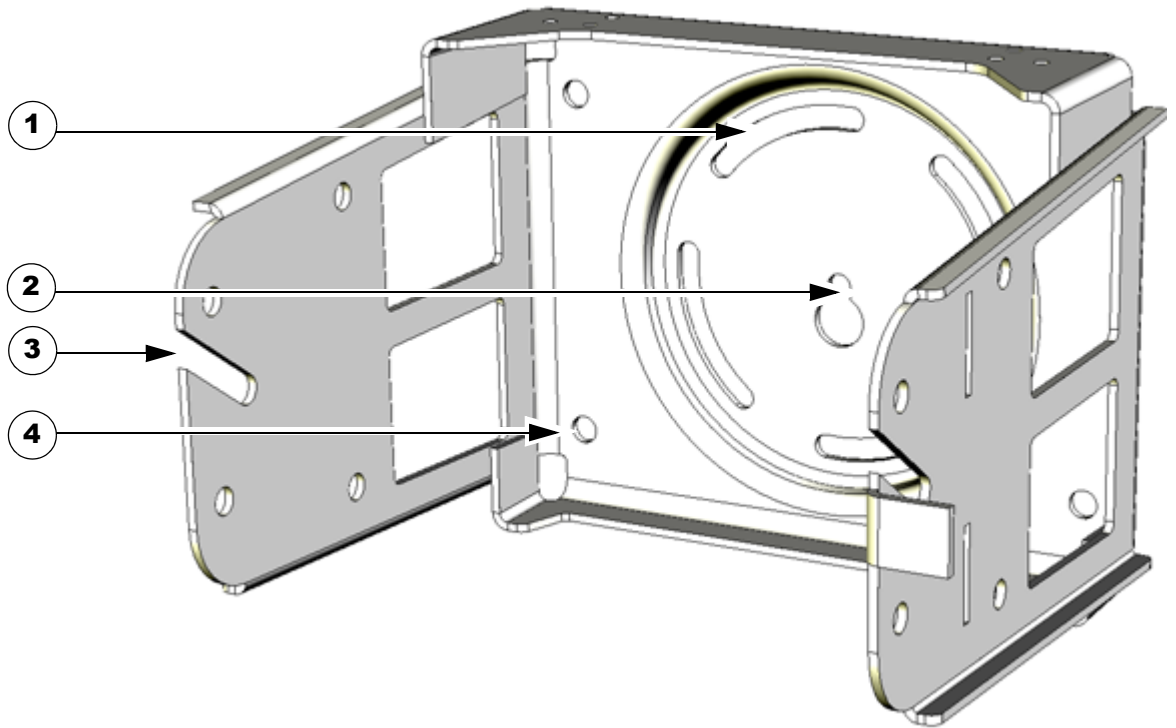
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**Figure 4-10 Assemble Bracket Hardware Sets**



The instructions for the procedures in this section refer to the mounting plate features shown in [Figure 4-11](#).

**Figure 4-11 Mounting Bracket Features**



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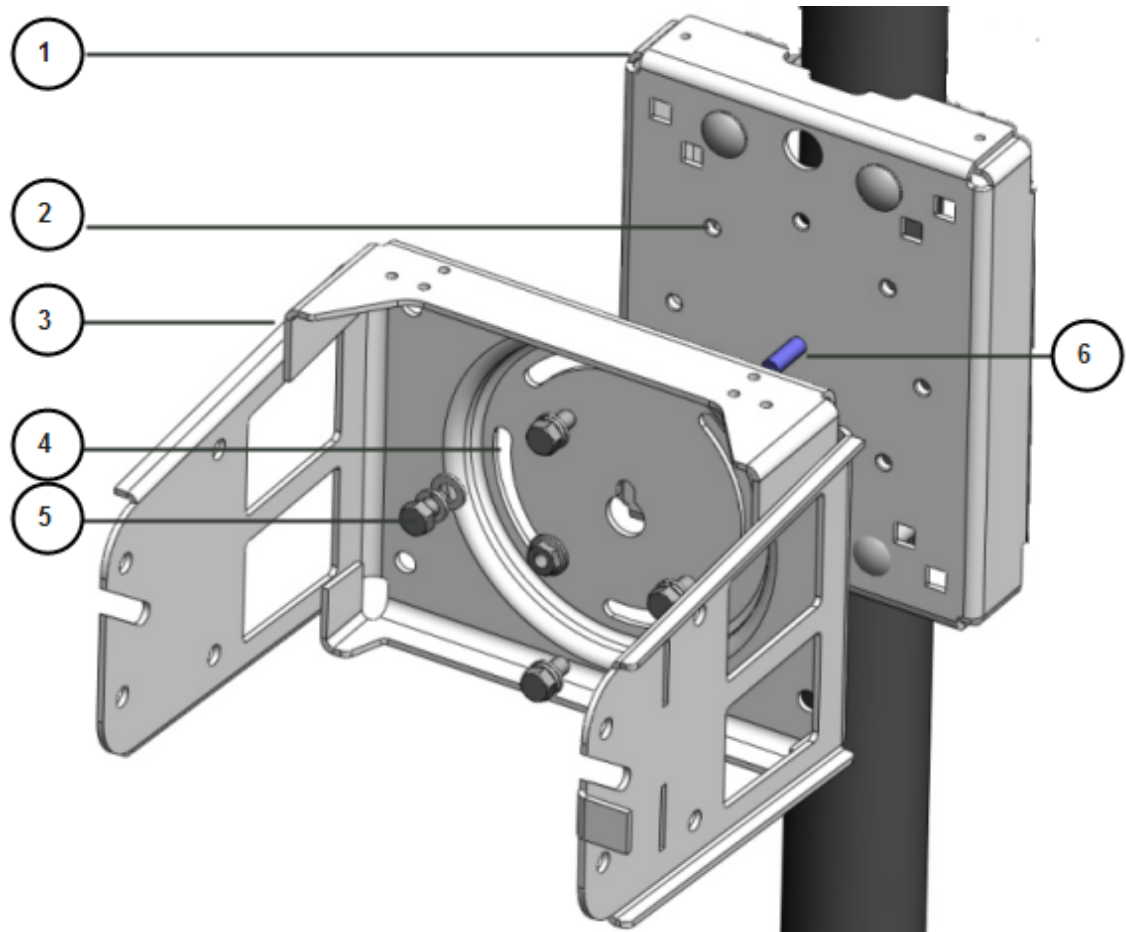
Item	Description
1	Pivot grooves (4)
2	Quick hang notch
3	Quick hang slots (2)
4	Wall mount holes (4)

To attach the mounting bracket to the mounting plate, follow these steps and refer to [Figure 4-12](#). The mounting plate must be installed according to the instructions in the [Install the Mounting Plate on a Pole](#) section.

**What You Need**

- Mounting bracket and hardware included in the [Mounting Bracket Kit](#).
- Socket wrench that you supply.

- 
- Step 1** Assemble four sets of bracket hardware (washer, split lock washer, and bolt) as shown in the section [Assemble Bracket Hardware, page 4-12](#).
- Step 2** Place the mounting bracket (3) against the mounting plate (1) by inserting the bracket quick hang notch over the mounting plate quick hang stud (6).
- Step 3** Align the pivot grooves (4) on the bracket with four of the bracket mount holes (2) on the mounting plate. Follow these guidelines:
- Each of the four pivot grooves on the bracket must be attached to at least one bracket mount hole on the mounting plate.
  - The final desired orientation of the mounting plate and router determine which bracket mount holes are used.
  - Mount the router according to the instructions in the [Router Orientation](#) section.
- Step 4** Thread the serrated nut onto the quick mount stud (6) and hand tighten (do not overtighten).
- Step 5** Insert one bolt assembly (5) through one of the pivot grooves (4) on the bracket and then through the corresponding bracket mount hole on the mounting plate.
- Step 6** Repeat [Step 5](#) for the remaining bolt assemblies.
- Step 7** Position the mounting bracket on the mounting plate as needed before further tightening the bolts.
- Step 8** Use a socket wrench to evenly tighten all four bolts and the serrated nut to finish installing the bracket on the plate.
-

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-12 Mounting Bracket Attached to Mounting Plate**

## Install the Router on the Mounting Bracket

This section describes how to attach the router to the mounting bracket. The instructions for the procedures in this section refer to the mounting bracket kit contents shown in [Figure 4-2](#) and the bracket features described in [Figure 4-11](#).

### What You Need

- Mounting bracket and hardware included in the [Mounting Bracket Kit](#).
- Socket wrench that you supply.

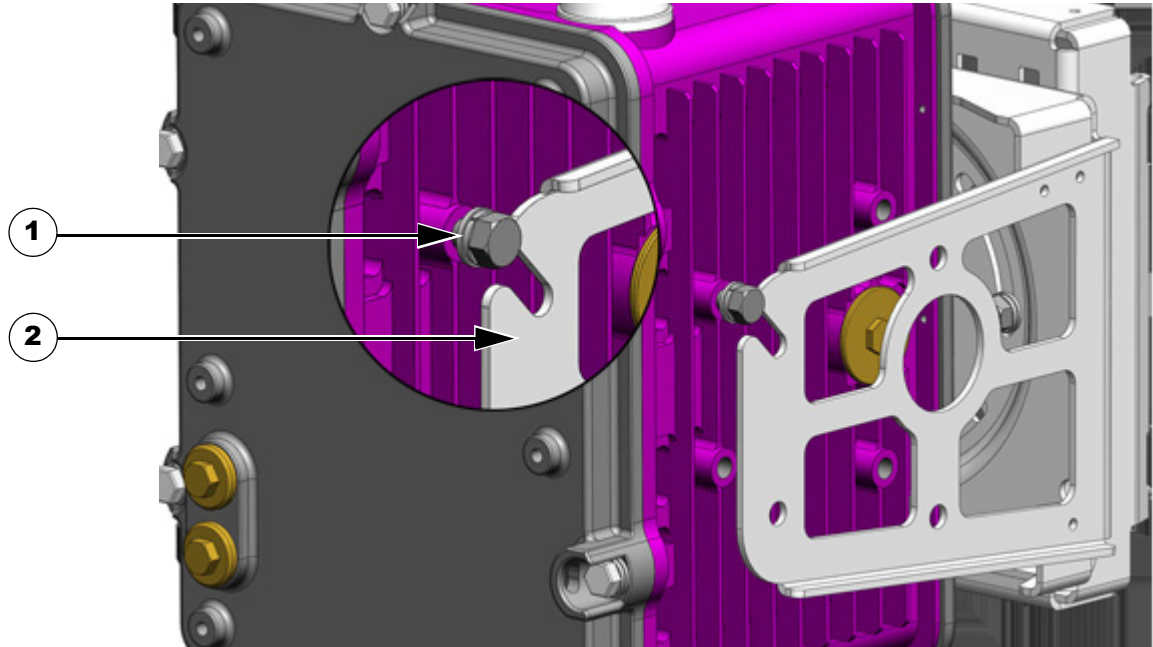
To mount the router on the bracket, take these steps and refer to [Figure 4-13](#) and [Figure 4-14](#):

- 
- Step 1** Assemble eight sets of bracket hardware (washer, split lock washer, and bolt) as shown in the section [Assemble Bracket Hardware](#), page 4-12.
- Step 2** One each side of the router, attach one set of hinge bolt hardware to the mounting bracket connector (1). Do not tighten the hardware until [Step 5](#). There must be enough space between the washer and the router to slide the router onto the bracket.

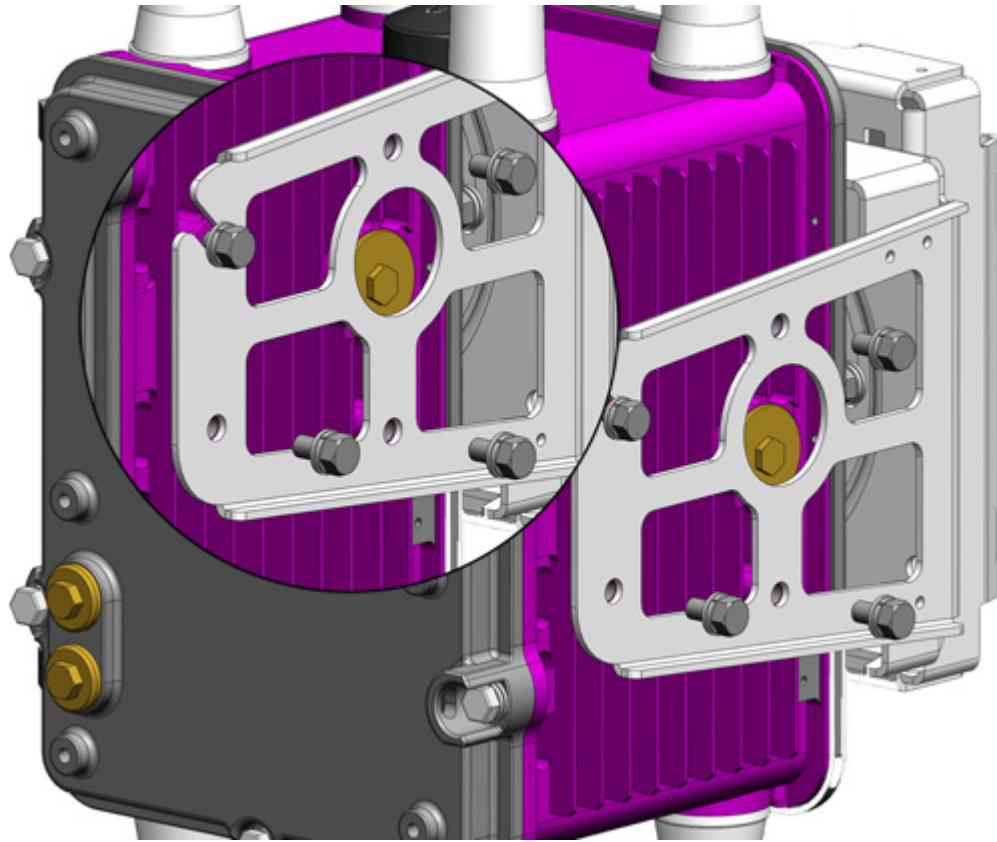
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- Step 3** Slide the router onto the bracket by inserting the hinge bolts you attached in [Step 2](#) into the bracket quick hang slots (2).

**Figure 4-13** Attach Hinge Bolt to Both Sides of Router



- Step 4** Attach the three remaining sets of hardware to each side of the bracket and router, as shown in [Figure 4-14](#).
- Step 5** Use a socket wrench to evenly tighten all four bolts.
-

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 4-14 Attach Remaining Bolts to Bracket and Router****SD Card Slot Access for Bracket-Mounted Routers**

When the Cisco mounting bracket is attached the router according to the instructions in this chapter, the bracket blocks access to the SD card port slot the router exterior.

To access the SD card slot (1) without removing the router from the bracket or any mounting installation that uses the bracket, take these steps and refer to [Figure 4-15](#):

- 
- Step 1** One one side of the router, remove the three bolts shown in [Figure 4-14](#).
  - Step 2** Loosen but do not remove the fourth bolt that is inserted in the quick hang slot.
  - Step 3** Repeat [Step 1](#) through [Step 2](#) on the other side of the router.
  - Step 4** Tilt the bracket on the quick mount slot, as shown in [Figure 4-15](#).

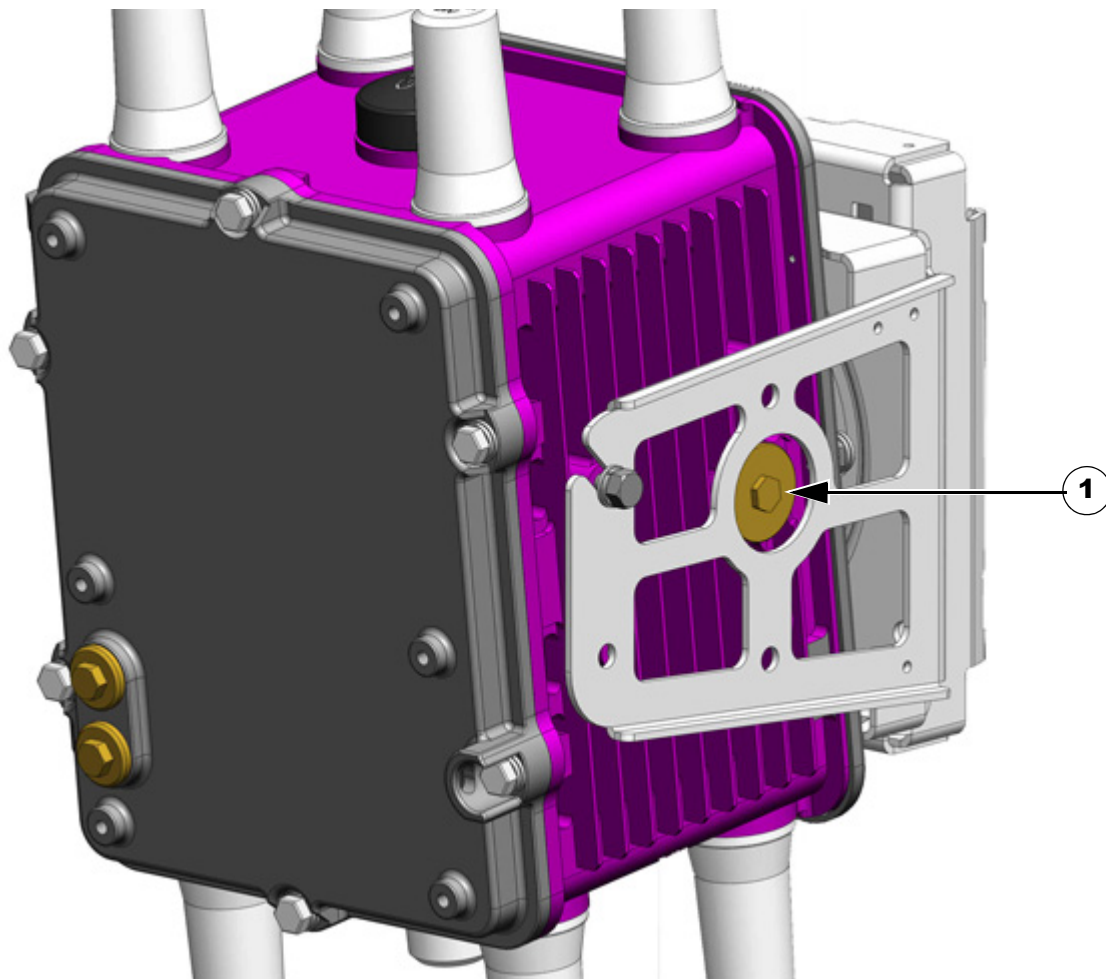
**Caution**

Be sure to reinstall and tighten all eight bolts when you finish using the SD card slot. The router must be securely attached to the mounting bracket with four bolts on each side.

---

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**Figure 4-15 Tilt Mounting Bracket for SD Card Slot Access**



## Grounding Instructions

In all installations, after the router is mounted, you must properly ground the unit according to the instructions in this section before connecting network and power cables as described in [Installing the Router](#), page 6-1.

  
Warning

**Warning This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 366

  
Warning

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



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## Grounding Hardware

The router is shipped with a grounding kit, shown in [Figure 4-16](#).

**Figure 4-16 Router Grounding Kit Contents**



Item	Description
1	Grounding lug
2	6-gauge ground wire
3	Screws (2)

## Materials You Supply

You must provide the tools listed in [Materials and Tools You Supply](#), page 4-6.

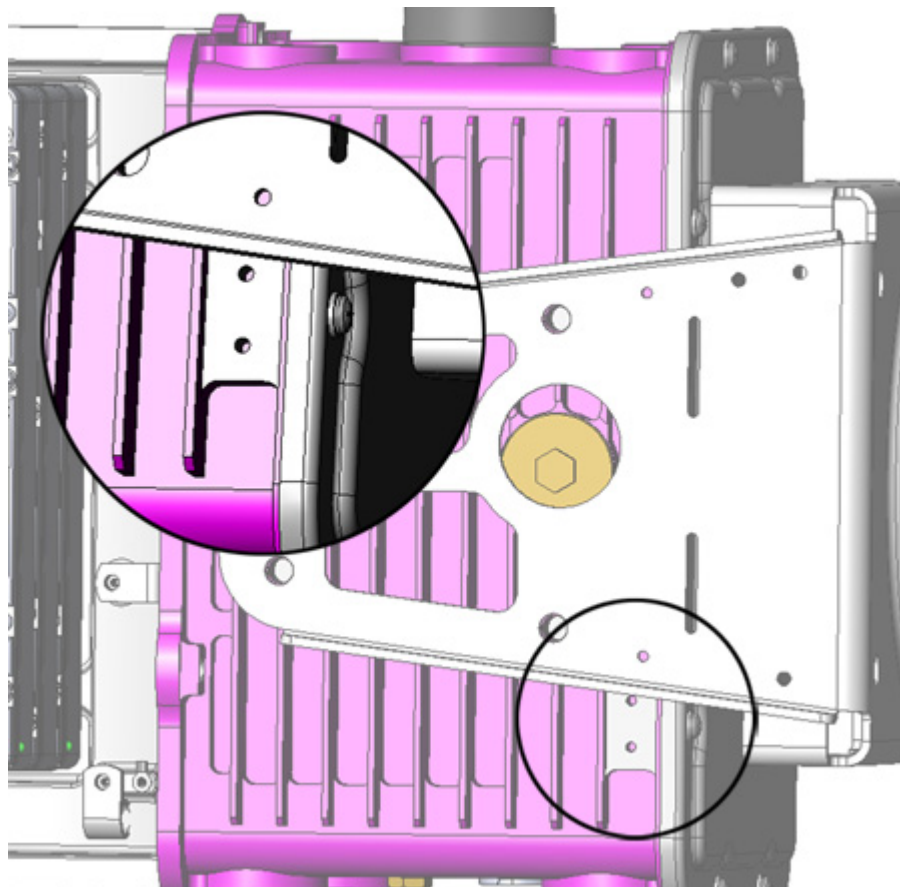
## Ground the Router

Take the following steps to ground the router:

- 
- Step 1** Use the appropriate crimping tool or pliers to crimp the 6-gauge ground wire (included in the grounding kit) to the grounding lug.
  - Step 2** Connect the grounding lug to the access point grounding connectors shown in [Figure 4-17](#) using the supplied grounding screws. Tighten the grounding screws to 7 to 8 15 lbf-in. Do not overtighten!
  - Step 3** If necessary, strip the other end of the ground wire and connect it to a reliable earth ground, such as a grounding rod or an appropriate grounding point on a pole that is grounded.
-

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**Figure 4-17**     **Grounding Lug Connectors**





## CHAPTER 6

# Installing the Router

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This chapter describes how to install the Cisco 1240 Connected Grid Router and includes the procedures for basic router installation and for optional installation steps. The procedures you follow depend on your network environment and requirements. This chapter contains the following sections:

- [Before Installing, page 6-1](#)
- [Related Information, page 6-2](#)
- [Basic Hardware Installation, page 6-2](#)
- [Additional Router Connections, page 6-10](#)
- [Installing Modules and Antennas, page 6-24](#)

## 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, 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.

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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.

## 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 aspects of the router hardware, including internal and external features and connectors.
- The [Connector and Cable Specifications](#) appendix lists pinouts for the router connectors and cables.

## Basic Hardware Installation

This section describes basis router installation steps. This is the minimum configuration required for the router to power up and begin operating on the backhaul network.

The steps in this section require that AC power and Ethernet network connections are available at the installation location, as described in the following [Installation Safety and Site Preparation](#) sections:

- [Power Guidelines and Requirements, page 3-4](#)
- [Preparing for Network Connections, page 3-5](#)

## Connect to the Ethernet Backhaul Network

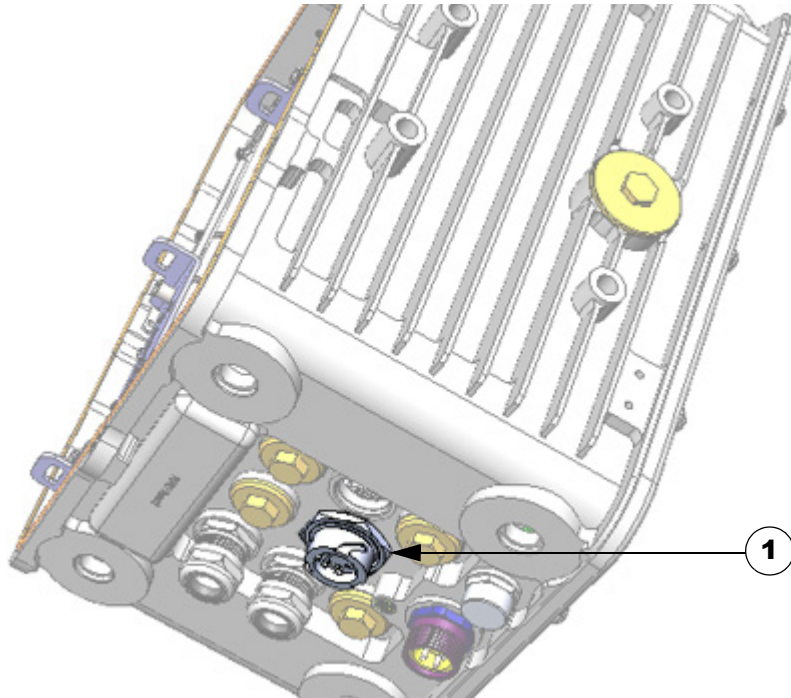
The available Ethernet connection must meet the requirements described in the [Installation Safety and Site Preparation](#) chapter.

- 
- Step 1** Remove the cover from the external Ethernet connector.

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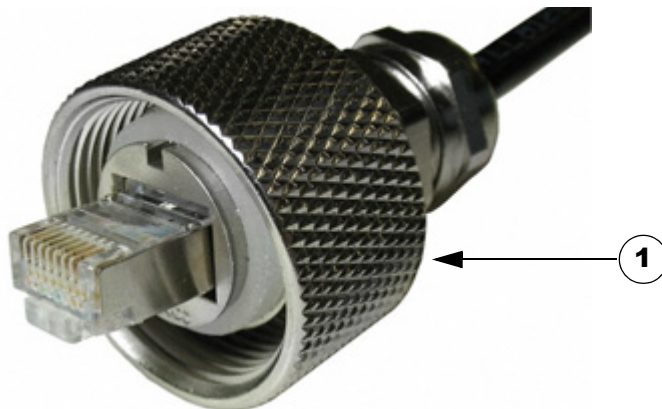
- Step 2** Connect local Ethernet cable to the router exterior Ethernet connector on the base of the router (Figure 6-1).
- Step 3** Tighten the cable coupling ring (Figure 6-2) over the exterior router Ethernet connector to ensure an adequate seal over the connector.

**Figure 6-1** External Ethernet Connector



Item	Description
1	External Ethernet connector

**Figure 6-2** Ethernet Cable with Coupling Ring



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Item	Description
1	Coupling ring

## Connecting to AC Power

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

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



### Warning

---

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

---



### Caution

---

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

---

- You must protect AC power plugs and AC receptacles from water and other outdoor elements. You can use a UL-listed waterproofing enclosure suitable for covering the AC receptacle and AC power plug that supplies power to the unit, as described in Article 406 of the National Electric Code (NEC).
- When you install the unit outdoors, or in a wet or damp location, the AC branch circuit that powers the unit should have ground fault protection (GFCI), as required by Article 210 of the NEC.
- If the power cord goes through a metal cover, a bushing should be installed to prevent fraying of the cord. When using a strain relief bushing, you should follow these recommendations:
  - Use properly sized parts
  - Use bushings that are safety certified
  - Use parts that are suitable for outdoor installation
- Ensure that the user-supplied AC power plug is certified for outdoor use and has a minimum IP67 rating, such as Interpower 84131251 or Hubbell HBL316P6W (IEC/EN60309 pin-and-sleeve type connectors).

## AC Power Cable

The router supports the Cisco AC power cable that is shipped with the unit. One end of the cable has the router AC power connector; the other end is unfinished and you must provide and attach an AC power plug. The AC power plug you use depends on the power source, such as a junction box, to which you will attach the cable.

You might have to cut the cable if a specific cable length is needed for your installation.



### Caution

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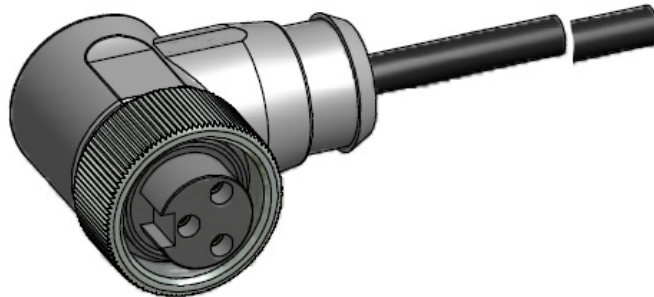
Ensure that the power source is OFF before connecting or disconnecting the power cord wires from the power source.

---

**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Caution**

To attach the appropriate connector the AC power cable, follow the manual or other instructions provided by the electrical equipment vendor, ensuring that you comply with the electrical codes for your installation location.

**Figure 6-3 Router AC Power Cable (Router Connector End)**

**Connect to AC Power**

Follow these steps to connect the router AC connector (Figure 6-4) to an AC power source.

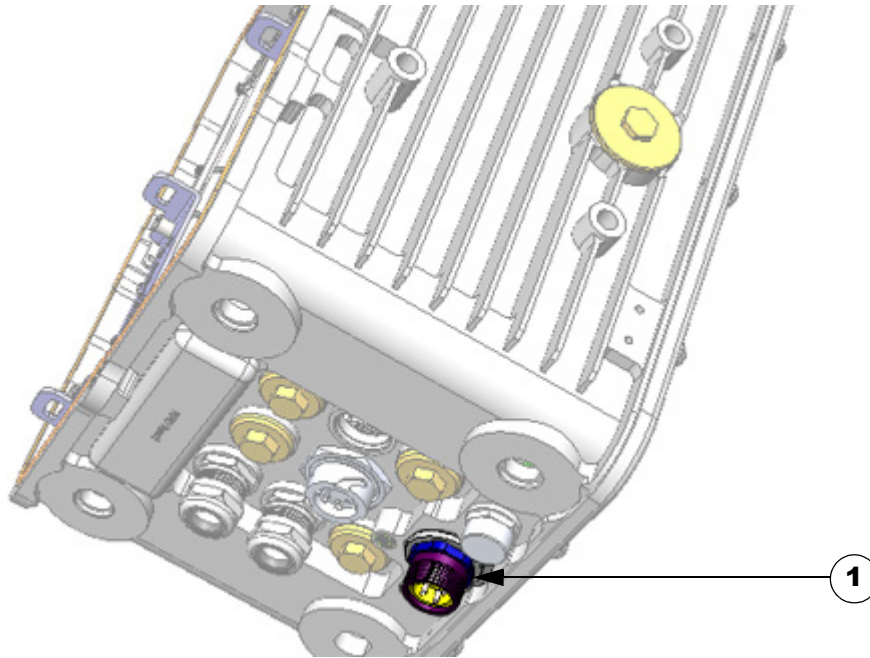
接続ケーブル、電源コード、ACアダプタ、バッテリーなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外の部品をご使用になると故障や動作不良、火災の原因となります。また、電気用品安全法により、当該法の認定（PSEとコードに表記）でなくUL認定（ULまたはCSAマークがコードに表記）の電源ケーブルは弊社が指定する製品以外の電気機器には使用できないためご注意ください。

**Caution**

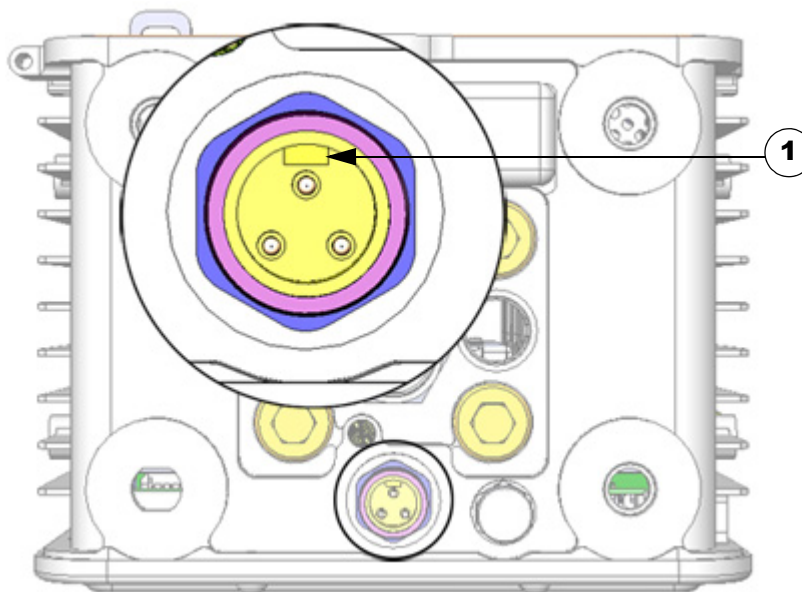
When connecting the router AC power connector, always connect the router end of the cable first. When removing the AC power connector, always disconnect the router end of the cable last.

- Step 1** Verify that the unit is grounded as described in the chapter [Mounting the Router](#).
- Step 2** Verify that the SD flash memory module is installed correctly as described in the chapter [Using the SD Flash Memory Module](#).
- Step 3** Turn off power to the AC power source at the designated circuits.
- Step 4** Align the notch in the AC power cable connector (Figure 6-5) with the key in the router AC power connector, then push the cable connector into the router connector. When the cable connector is fully seated, rotate the cable connector ring clockwise until hand-tight.
- Step 5** Confirm the router antennas are connected to the router before you apply power to the router.
- Step 6** Connect the other end of the AC power cable to the power source, using the instructions that came with the connecting device.
- Step 7** Turn on AC power at the designated circuits. The router will power on and boot the software image.



**DEC. 2011 – EFT REVIEW DRAFT – CISCO CONFIDENTIAL****Figure 6-4 Router AC Connector**

Item	Description
1	AC power connector

**Figure 6-5 AC Connector Notch**

Item	Description
1	AC connector notch



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## Power and Reset Buttons

There are two reset buttons inside the router chassis (Figure 6-6):

- **POWER Reset**—Pressing the Power button power cycles the router hardware without powering down the router. The router continues to operate during this process.
- **CONFIG Reset**—Pressing the Reset button restores the router software configuration the factory default and power cycles the router hardware.

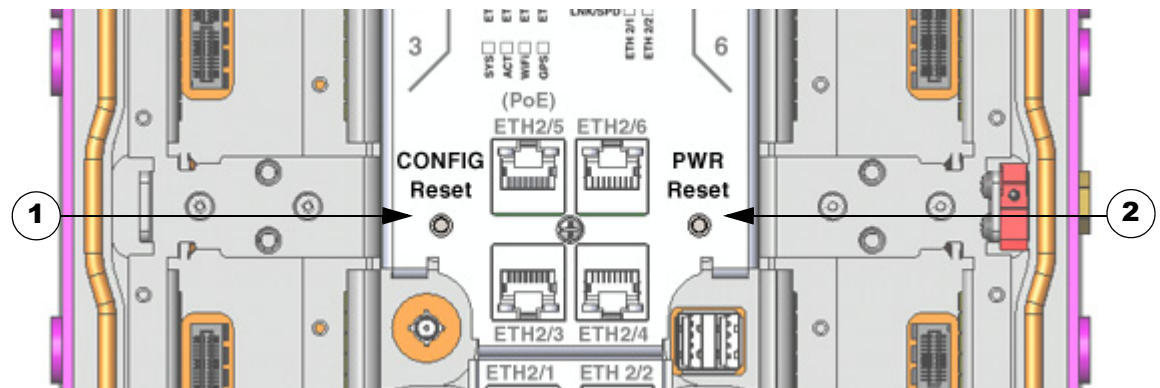
## Accessing the Buttons

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

## Related Information

For detailed instructions for opening chassis door, see the chapter [Opening the Router Chassis](#).

**Figure 6-6 Router Power and Reset Buttons**



Item	Description
1	CONFIG Reset button
2	PWR Reset button

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## Verify the Router Basic Installation

After you connect the router to the network and power on the router, verify that the installation was successful by performing the checks described in this section.

### Check the System (SYS) LED

To verify that the router has been successfully installed, check the System (SYS) LED on the router base (Figure 6-7). As the router starts up, the SYS LED will show these states:

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

**Figure 6-7** System (SYS) LED

