



Router Hardware Description

This section describes the major hardware features of the Cisco 1240 Connected Grid Router (CGR 1240 or router), including the chassis, internal and external connectors and ports, and hardware specifications.

These topics are discussed:

- [Router Overview, page 9](#)
- [Hardware Features Detailed Description, page 22](#)

Router Overview

- [Router Applications Overview, page 9](#)
- [Router Hardware Overview, page 10](#)
- [Hardware Compliance, page 21](#)

Router Applications Overview

The CGR 1240 is a ruggedized communication platform, designed for use in Field Area Network (FAN) power distribution grids that require outdoor, pole-mounted routers. The 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 can be leveraged across applications including:

- Advanced Metering Infrastructure (AMI)
- Distribution Automation (DA)
- Integration of Distributed Energy Resources (DER)
- Remote Workforce Automation
- Public Lighting

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

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

Router Hardware Overview

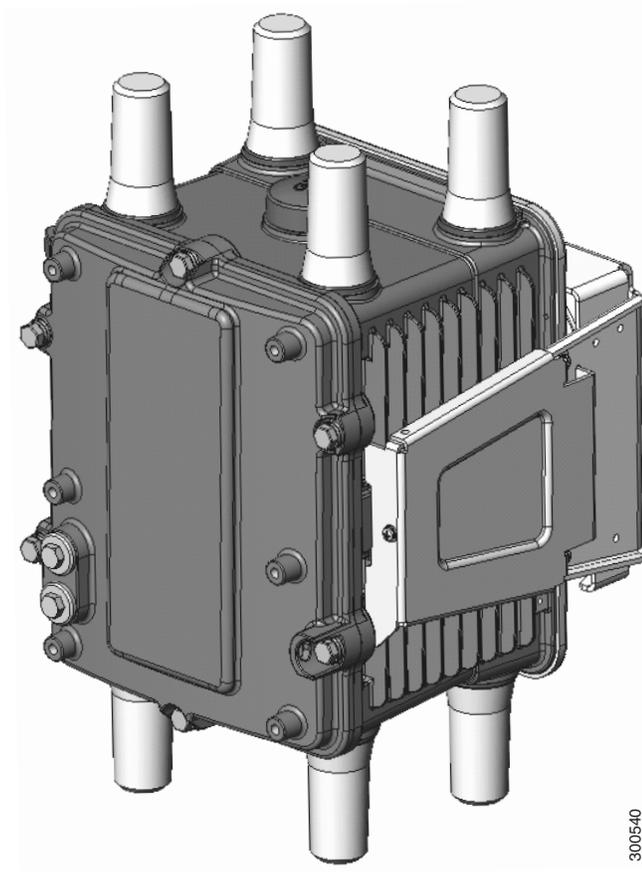
Table 2 on page 10 describes the hardware features of the router.

Table 2 CGR 1240 Hardware Features

Hardware Feature	Description
4 -Connected Grid Module Slots, page 29	The slots are for ruggedized Connected Grid modules that provide connectivity to the NAN endpoints and to the WAN, for connectivity to the utility control center.
4 x Fast Ethernet Ports, page 32 2 x Gigabit Ethernet Ports, page 32	Ethernet connections to the backhaul network and other IP network devices.
2 - Integrated Serial Ports, page 36	RS232/RS485 serial ports for optional connections to legacy devices, such as RTUs.
Chassis Enclosure, page 22	An RJ-45 console port provides local access to the router for management and administration tasks.
SD Flash Memory Module, page 25	An external, default 2-GB SD card stores the router system software and configurations.
Automatic Battery Backup	Up to 12 hours of battery backup power in the event of an AC power failure.
USB Ports, page 39	Two Type A USB ports for connecting to USB storage or other devices, and providing power to any connected device.
GPS Module, page 41	An integrated GPS provides accurate time and location information to the system.
WiFi Short-Range Access Point, page 43	An integrated wireless access point supports short range wireless access to the router, enabling local management over a WiFi connection to the router from outside the substation or utility box.
Mounting Features	Support for pole mounting on utility poles of varying diameter and materials.
4 x Connected Grid Module Slots, page 29	Ruggedized Connected Grid modules provide connectivity to the NAN endpoints and to the WAN, for connectivity to the utility control center.

The CGR 1240 hardware assembly is shown in [Figure 1 on page 11](#).

Figure 1 Cisco 1240 Connected Grid Router with Integrated Antennas Installed



This section contains:

- [Exterior Hardware Overview, page 11](#)
- [Interior Hardware Overview, page 17](#)
- [CGR1240 Filler Panels, page 20](#)

Exterior Hardware Overview

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 22](#).

Figure 2 Router Front Exterior

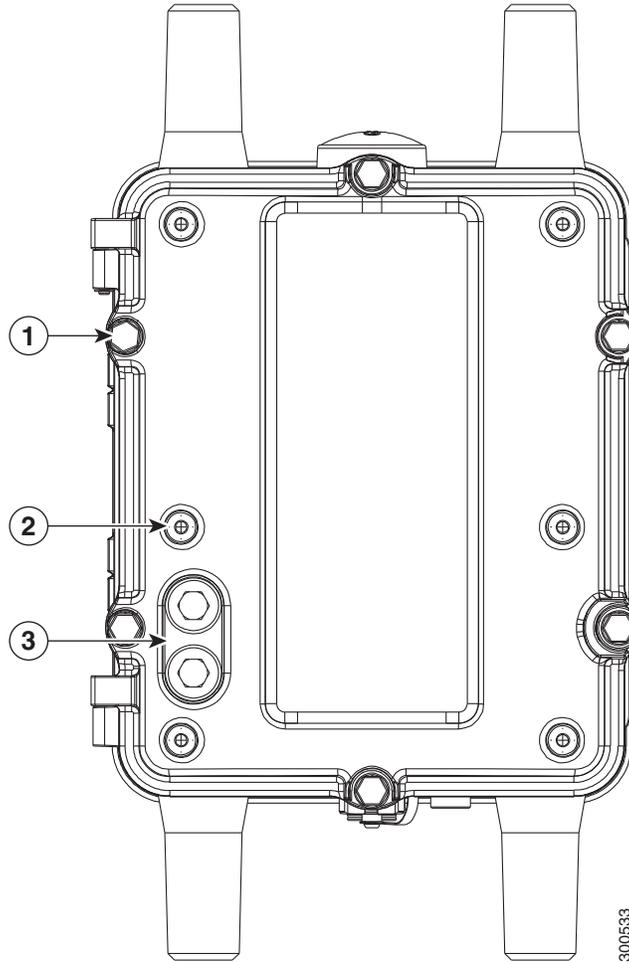


Table 3 Router Front Exterior Features

Item	Description	Detailed Information
1	M8 captive bolts (8)	Loosen these bolts to access the router interior. See Opening and Closing the Router Chassis, page 75 .
2	Module mounting bosses (6)	Mount a supported non-Cisco module (optional) to the front exterior of the router using these mounting bosses. See Installing External Non-Cisco Modules, page 173 .
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. See Installing External Non-Cisco Modules, page 173 .

Figure 3 Router Front with Mounting Bracket and Door Lock Post

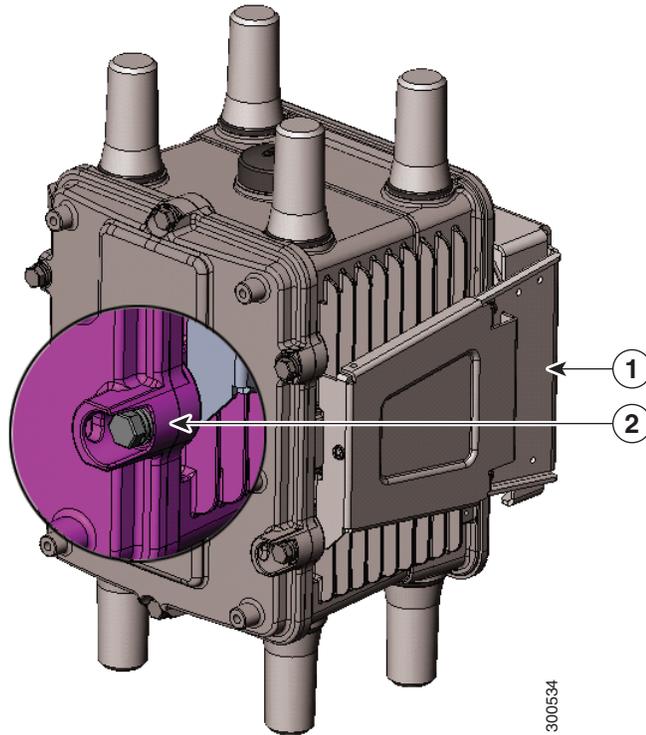


Table 4 Router Bracket and Lock Features

Item	Description	Detailed Information
1	Mounting bracket	Use the mounting bracket with the Cisco pole mount kit to install the router on a pole. For router mounting options and procedures, see Mounting the Router, page 45 .
2	Door lock post	Use the door lock post to install a lock on the router door to prevent unauthorized access to the router interior. See Opening and Closing the Router Chassis, page 75 .

Figure 4 Router Right Side Exterior

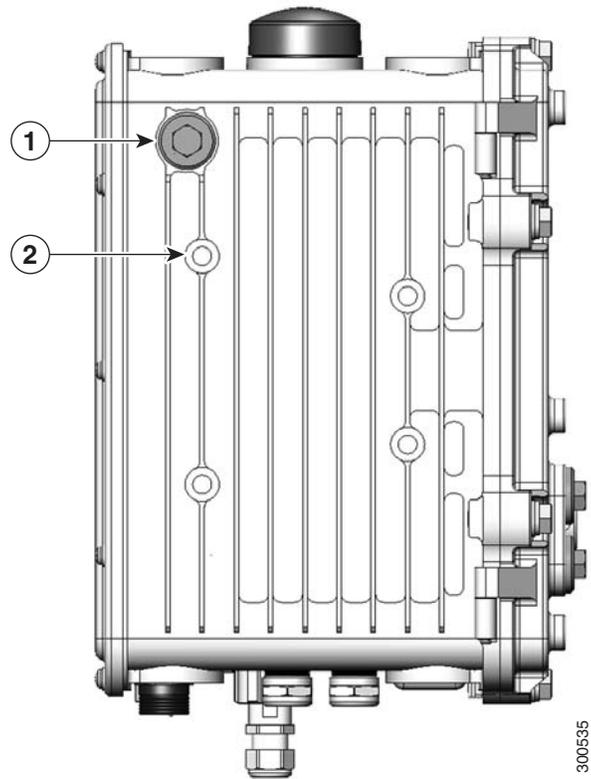


Table 5 Router Right Side Exterior Features

Item	Description	Detailed Information
1	Console port access	Remove the plug shown here to access the console port. This port is described in Console Port, page 24 . See Installing the Router, page 85 .
2	Mounting bracket posts (4)	Attach supported brackets to the router using these mounting posts. See Mounting the Router, page 45 .

Figure 5 Router Left Side Exterior

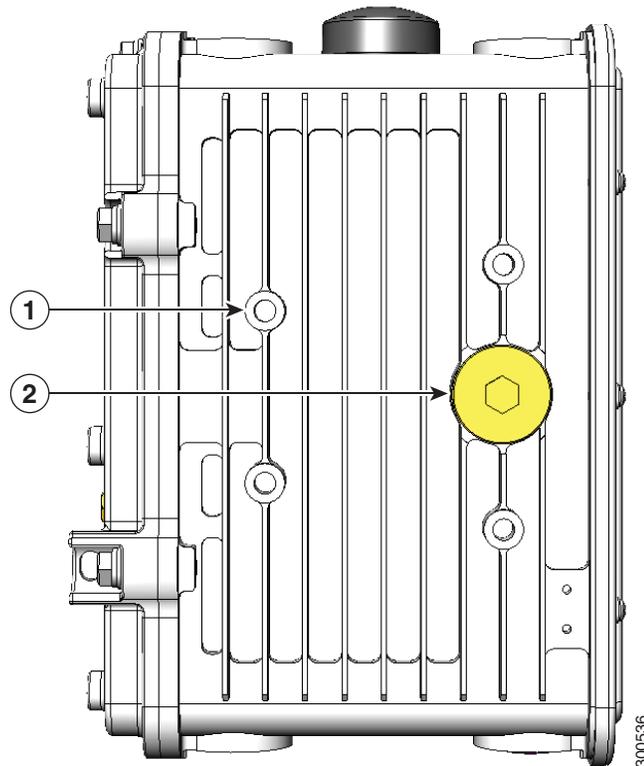


Table 6 Router Left Side Exterior Features

Item	Description	Detailed Information
1	Mounting bracket posts (4)	Attach supported brackets to the router using these mounting posts. See Mounting the Router, page 45 .
2	SD flash memory module port	Remove the plug shown here for access to the router SD module as described in SD Flash Memory Module, page 25 . For detailed information about using an SD flash memory module with the router, see Using the SD Flash Memory Module, page 133 . Note: When a mounting bracket is installed on the router, the bracket blocks access to the SD card port. To access the port after the bracket is installed, you must remove 3 of the bolts that attach the bracket to the router, and rotate the bracket away from the port. See Mounting the Router, page 45 .

Figure 6 Router Top Exterior

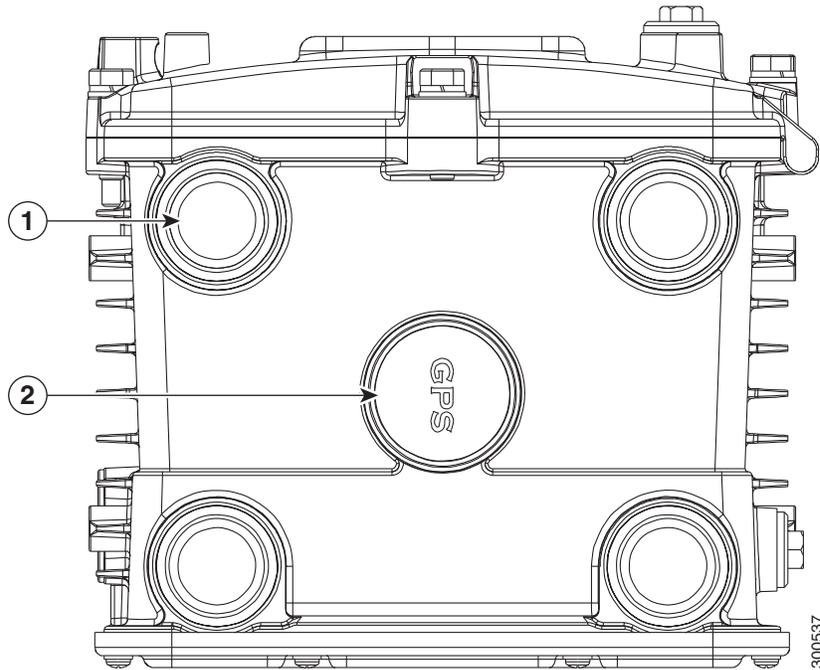


Table 7 Router Top Exterior Features

Item	Description	Detailed Information
1	Antenna connectors (4)	Install supported integrated or external antennas in these ports. For information on the router antennas, including how to find installation instructions, see Antennas, page 121 .
2	GPS antenna	The GPS antenna connects the router GPS (as described in GPS Module, page 41) to the GPS source. See GPS Antenna, page 123 for specifications and supported frequencies.

Figure 7 Router Base Exterior

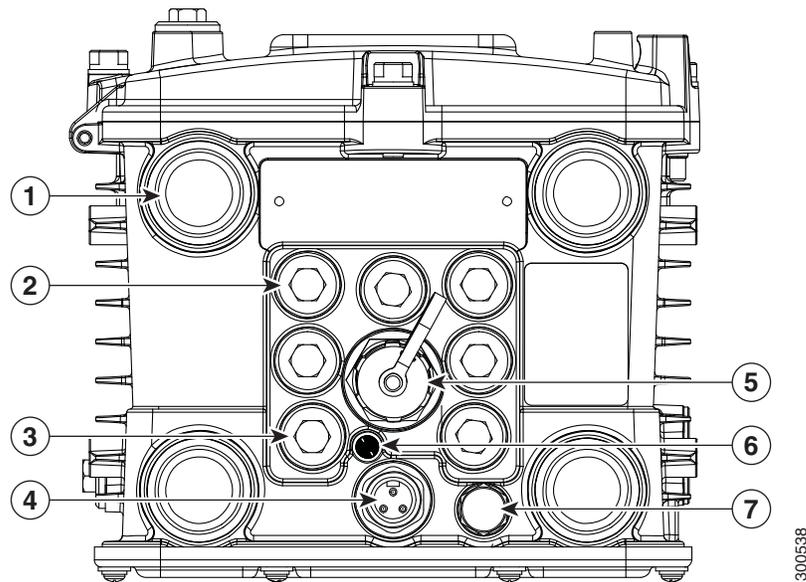


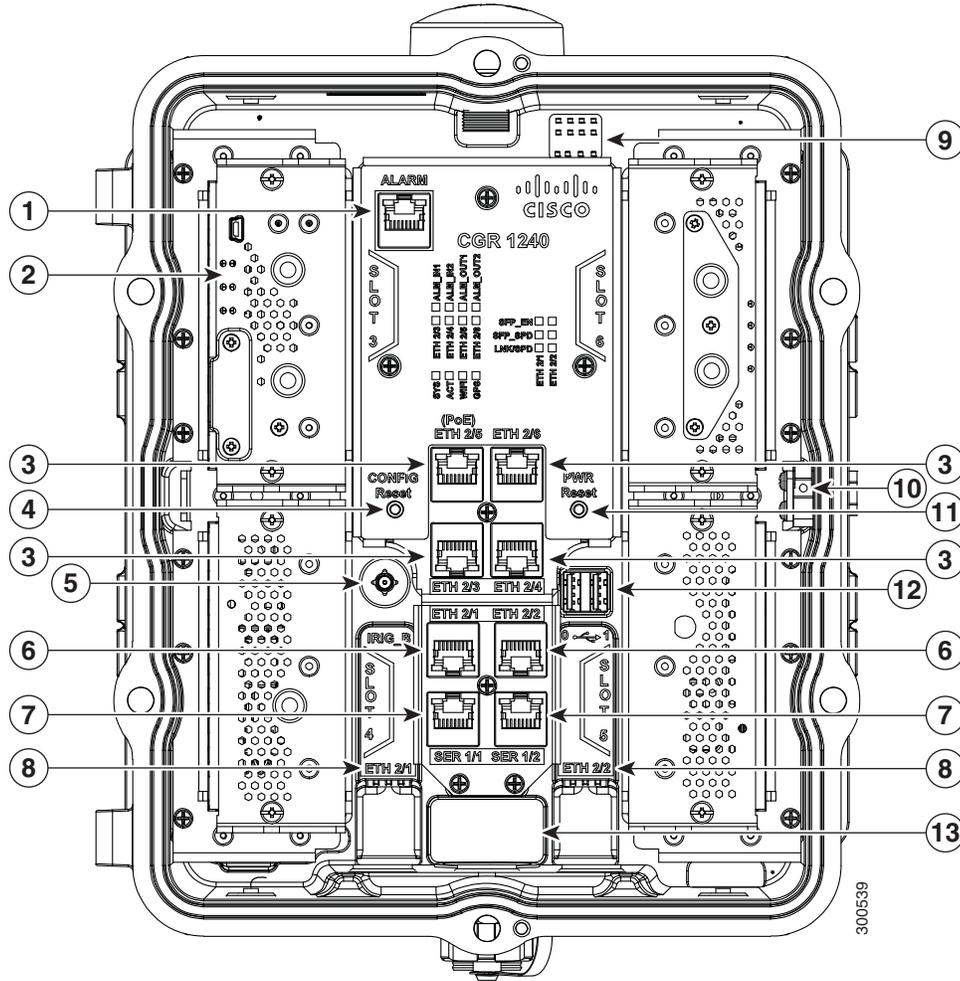
Table 8 Router Base Exterior Features

Item	Description	Detailed Information
1	Antenna connectors (4)	Install supported integrated or external antennas in these ports. For information on the router antennas, including how to find installation instructions, see Antennas, page 121 .
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 (3). See Chassis Cable Ports, page 22 for supported cable glands and plugs.
4	AC power connector	Connect the router AC power connector to a power source to power on the router. See AC Power Supply, page 26 .
5	10/100BASE-T Fast Ethernet (FE) port	Use this connector to connect the router to a 10/100BASE-T Ethernet network without requiring access to the router interior. This port is connected to the router ETH 2/5 port inside the router chassis. See Connecting the Ethernet Ports, page 104 .
6	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 Router LED Locations and States, page 181 .
7	Protective vent	The chassis vent relieves pressure buildup inside the router chassis. See Protective Vent, page 26 .

Interior Hardware Overview

This section illustrates the router front panel hardware features and includes a brief description of each feature. See [Hardware Features Detailed Description, page 22](#).

Figure 8 Interior Front Panel Hardware Features



Note: In Table 9 on page 18, items indicated with **Footnote 1** are currently not supported, and will be supported in a future software release.

Table 9 Interior (Front Panel) Features

Item	Label	Description
1	ALARM	Connect this alarm port to an alarm system to monitor system errors and events. See Alarm Port , page 27.
2	SLOT 3, SLOT 4, SLOT 5, SLOT 6	Install Cisco Connected Grid modules in these four module slots. See Module Slots , page 29 and Module Installation Locations , page 117.
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. See Fast Ethernet Ports , page 32.
4	CONFIG Reset	Press the CONFIG Reset button to reset the router to the default software configuration. See Reset Buttons , page 30.
5	IRIG_B (Not supported with IOS)	Connect the IRIG-B timing port (time source: router—see the GPS Module , page 41) to any device that requires precise time. See IRIG-B Timing Port , page 38.

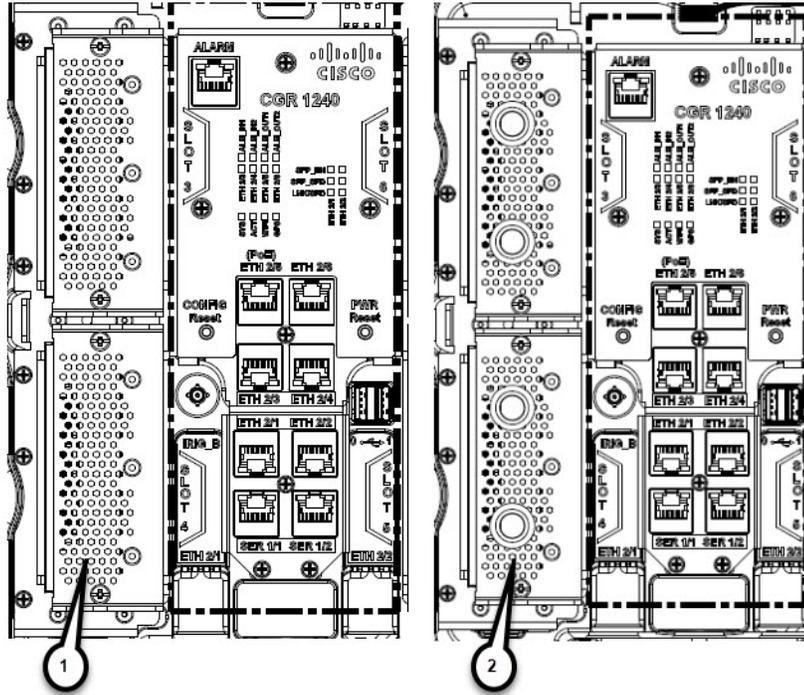
Table 9 Interior (Front Panel) Features (continued)

Item	Label	Description
6	ETH 2/1, ETH 2/2	<p>Make 100/1000 Mbps Ethernet network connections using these two Gigabit Ethernet ports.</p> <p>See Gigabit Ethernet Ports, page 32.</p> <p>These physical ports share the ETH 2/1 and ETH 2/2 interfaces with the SFP ports, as described in the Combo Ports, page 35.</p>
7	SER 1/1, SER 1/2	<p>Connect the router to legacy devices, such as RTUs, using these two serial ports.</p> <p>See Serial Ports, page 36.</p>
8	ETH 2/1, ETH 2/2	<p>Install supported small form factor pluggable (SFP) modules in these two SFP ports.</p> <p>For supported SFPs, see Small Form-Factor Pluggable (SFP) Ports, page 33.</p> <p>These physical ports share the ETH 2/1 and ETH 2/2 interfaces with the 100/1000 Mbps ports, as described in Combo Ports, page 35.</p>
9	-	<p>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 Figure 8 on page 18).</p> <p>See Router LED Locations and States, page 181.</p>
10	-	<p>The door alarm switch triggers the router to generate a syslog event and send an SNMP alarm when the door is opened.</p> <p>See Opening and Closing the Router Chassis, page 75.</p>
11	PWR RESET	<p>Press the PWR RESET button to power cycle the router.</p> <p>See Reset Buttons, page 30.</p>
12	1  2	<p>Connect these USB ports to supported, external USB devices.</p> <p>See USB Ports, page 39.</p>
13	-	<p>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.</p> <p>See Installing the Router, page 85.</p>

CGR1240 Filler Panels

When there is an empty slot in the chassis, it is important that it is covered by a blank plate, known as a Filler Panel. There are two types of Filler Panels on the CGR1240 represented by [Figure 9](#).

Figure 9 Filler Panels



The original filler panel (1) is being phased out by the newer type (2) that has access holes for cables or wires. Graphics displayed in this guide show the original type.

Depending on your Product ID and slot, there will be a number of different hole populations possible. Refer to [Table 10](#)

Table 10 Filler Panel Hole Population

Chassis Product ID (PID)	Slot 3 Hole Population		Slot 4 Hole Population		Slot 5 Hole Population		Slot 6 Hole Population	
	Top Hole	Bottom Hole	Top Hole	Bottom Hole	Top Hole	Bottom Hole	Top Hole	Bottom Hole
CGR1240/K9=	To Antenna Position #4	To Antenna Position #3	To Antenna Position #5	Not Populated	To Antenna Position #8	Not Populated	To Antenna Position #1	To Antenna Position #2
CGR1240/K9-0CONN=	To Antenna Position #4	To Antenna Position #3	To Antenna Position #5	Not Populated	Not Populated	Not Populated	Not Populated	Not Populated
CGR1240/K9-1CONN=	To Antenna Position #4	To Antenna Position #3	To Antenna Position #5	Not Populated	Not Populated	Not Populated	Not Populated	Not Populated
CGR1240/K9-2CONN=	To Antenna Position #4	To Antenna Position #3	To Antenna Position #5	Not Populated	Not Populated	Not Populated	Not Populated	Not Populated

Refer to [Antenna Installation Location](#) within this guide for exact details.

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* at:
<http://www.cisco.com/en/US/docs/routers/connectedgrid/cgr1000/rcsi/cgr1000.rsci.html>

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 Hardware Exterior Features, page 22](#)
- [Router Hardware Interior Features, page 27](#)

Router Hardware Exterior Features

This section includes detailed information about the exterior hardware features and contains the following topics:

- [Chassis Enclosure, page 22](#)
- [Chassis Cable Ports, page 22](#)
- [Console Port, page 24](#)
- [SD Flash Memory Module, page 25](#)
- [10/100BASE-T Fast Ethernet Connector, page 26](#)
- [Protective Vent, page 26](#)
- [AC Power Supply, page 26](#)

Chassis Enclosure

The Cisco CGR 1240 Router industrial enclosure (see [Figure 1 on page 11](#)) meets Type 4X and IP67 standards and is designed for deployment in extreme weather. The enclosure can be painted to comply with aesthetic requirements.

Caution: Painting or otherwise modifying the router enclosure can affect the chassis operating temperature limitations.

UV testing has not been performed on the unit. The chassis has TGIC (triglycidyl isocyanurate) powder coating, so UV will not harm the device. The antennas are a polycarbonate blend and are UV stabilized. The exact life of the device is unknown. However, the device is designed for approximately 10-15 years of life, and there are devices in the field for 10 years already.

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
Operating temperature	-40 to +158° F (-40 to +70° C)

Additional Information

For router regulatory compliance information, see the *Regulatory Compliance and Safety Information for the Cisco 1000 Series Routers* on Cisco.com, at: www.cisco.com/go/cgr1000-docs

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 on page 12](#), provide support for third party radio cabling. The router supports installation of a compatible radio, as described in [Installing External Non-Cisco Modules, page 173](#).
- **Chassis**—Seven cable ports on the router base, shown in [Figure 7 on page 17](#), provide support for router network cabling, as described in [Installing the Router, page 85](#).

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.

Note: Cable Glands are ordered separately.

Figure 10 Cable Gland



Table 11 Supported Cisco Cable Glands

Cisco Product ID	Description
CGR-IP67GLAND	Contains 1 gland and 1 tube of anti-seize compound

Specifications

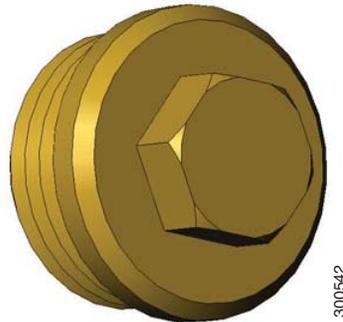
Specification	Description
Size	PG 13 Cable diameters: 0.20–0.35 inches (5.08–8.89 mm)
Environmental	Liquid Tight Type 4x & IP67

Cable Port Seals

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

Caution: Do not install the router unless all unused chassis cable ports are sealed. Leaving chassis ports unsealed can damage the router.

Figure 11 Cable Port Seal



Console Port

The router features a single, asynchronous console port (see [Figure 4 on page 14](#) and [Figure 12 on page 25](#)) 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; 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 integrated WiFi short-range access point. For more information see, [WiFi Short-Range Access Point, page 43](#).

Console Port Default Settings

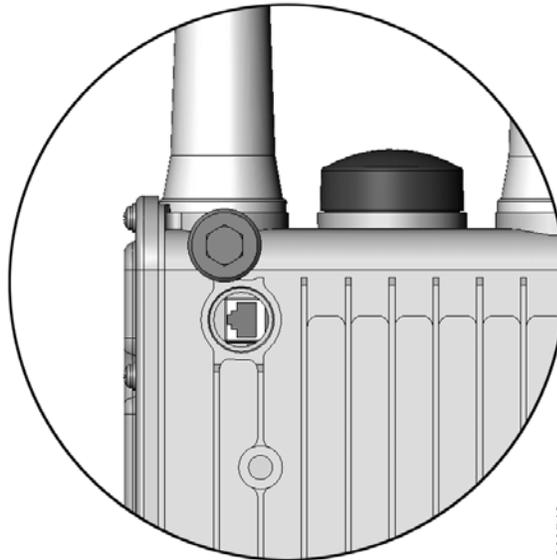
The console port does not support hardware flow control. The default settings for the port are: 9600 baud, 8 data bits, no parity, and 1 stop bit.

Connecting to the Console Port

Your router kit includes a console cable with an RJ-45 connector on one end (for connecting to the router console port) and a DB-9 connector on the other end (for connecting to a PC or terminal).

Detailed information about connecting and using the console port is in [Installing the Router, page 85](#).

Figure 12 Console Port Detail



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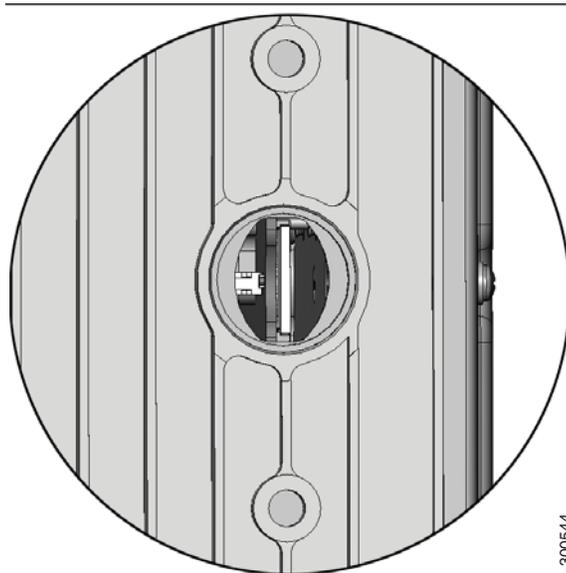
Specifications

Specification	Description
Connector type	RJ-45
Transceiver	RS-232
Cable type	EIA RJ-45
Pinout	See Connector and Cable Specifications, page 195 .

SD Flash Memory Module

The router is shipped with one 2-GB Cisco Secure Digital (SD) flash memory module (see [Figure 5 on page 15](#) and [Figure 13 on page 26](#)), which stores router software and configurations. For detailed information on using the SD flash memory module with the router, see [Using the SD Flash Memory Module, page 133](#).

Figure 13 SD Flash Memory Slot Detail



Caution: You must use only the Cisco SD card designed to support the router. Using an unsupported SD card can impact the router performance, especially in extreme environmental conditions.

10/100BASE-T Fast Ethernet Connector

The router has an external Fast Ethernet (FE) connector (see [Figure 7 on page 17](#)) that enables you to connect the router to an Ethernet hub or switch without opening the chassis.

The external connector is connected to the one of the fast Ethernet ports inside the router chassis. The internal port used depends on the router hardware configuration. If you are connecting the external Ethernet connector to an internal Ethernet port for the first time, Cisco recommends you connect it to the ETH 2/5 port. For more information, see [Fast Ethernet Ports, page 32](#).

Specifications

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

Protective Vent

The protective vent on the router base (see [Figure 7 on page 17](#)) 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: an AC power supply and the battery backup units.

The AC power supply connector on the router base (see [Figure 7 on page 17](#)) is the connection to AC power. If AC power is no longer being supplied to the router, the battery backup units will continue to supply power to the router until AC power is restored. For details about how the battery backup units operate, see [Installing Battery Backup Units \(BBUs\), page 141](#).

Note: The AC power cable part number CGR-PWRCORD-NA or CGR-PWRCORD-EU must be ordered separately.

Specifications

Specification	Description
Input voltage	100-240 Vrms AC
Output	60W
Cooling	Convection, conduction
Operating temperature range	-40 to 158° F (-40 to 70° C), external ambient

Router Hardware Interior Features

This section includes detailed information about the interior hardware features illustrated in [Router Hardware Overview, page 10](#), and contains the following topics:

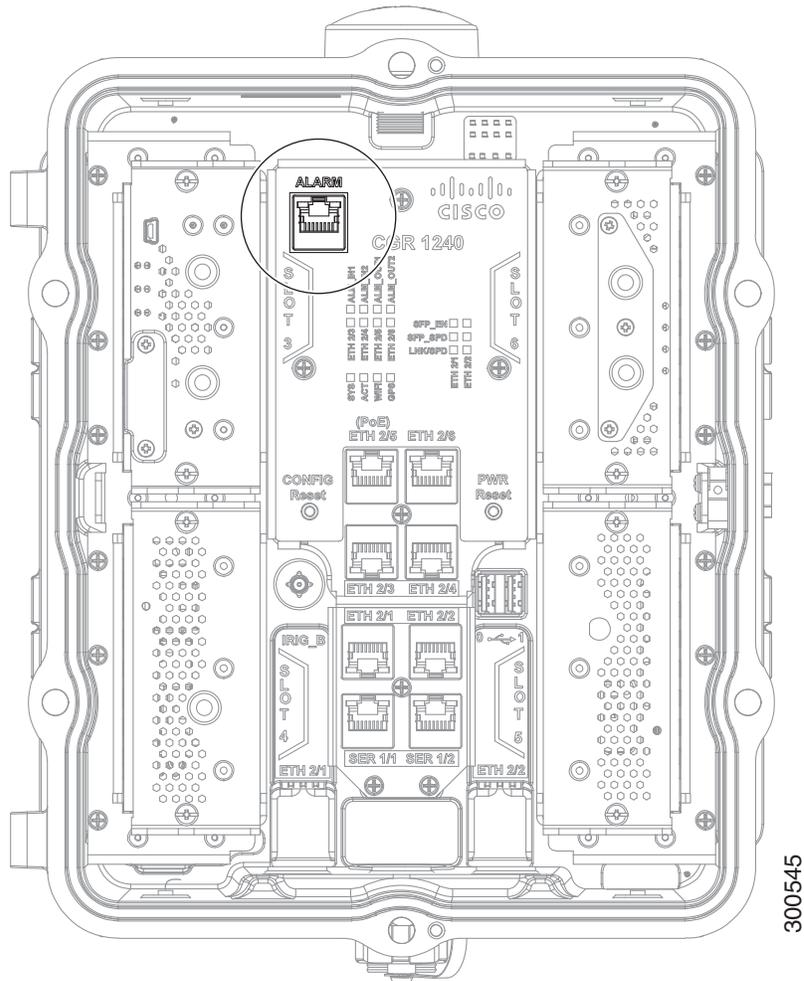
- [Alarm Port, page 27](#)
- [Module Slots, page 29](#)
- [Reset Buttons, page 30](#)
- [Fast Ethernet and Gigabit Ethernet Ports, page 31](#)
- [Small Form-Factor Pluggable \(SFP\) Ports, page 33](#)
- [Combo Ports, page 35](#)
- [Serial Ports, page 36](#)
- [IRIG-B Timing Port, page 38](#)
- [USB Ports, page 39](#)
- [Memory, page 41](#)
- [GPS Module, page 41](#)
- [WiFi Short-Range Access Point, page 43](#)

Alarm Port

Attach the alarm port inputs (see [Figure 14 on page 28](#)) to an alarm system to monitor external events that occur in the router's physical installation environment (for example, indicating that the router door has been opened). Attach the alarm port outputs to an alarm indicator such as a siren or light that is enabled by a relay dry contact open or closed circuit. The port supports two alarm inputs and two alarm outputs.

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

Figure 14 Router Alarm Port



Input Alarm Trigger Settings

- **Open**—The **open** setting indicates that the normal (non-alarm state) router operating condition has an electrical current passing through the alarm circuits (DRY contact closed). If this electrical current is no longer detected (DRY contact open), an alarm is generated.
- **Closed**—The **closed** setting indicates that the normal (non-alarm state) 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 [Connector and Cable Specifications, page 195](#).
- **Normally Closed (NC)**—This setting depends on the pinout of the cable that is connected to the alarm port. See [Connector and Cable Specifications, page 195](#).

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-50 pin spacing, the alarm port does not support AC signaling.

Specifications

Specification	Description
Connector type	RJ-50
Alarm input	8 volts @ 1 mA
Alarm output	30 volts @ 1 A

Module Slots

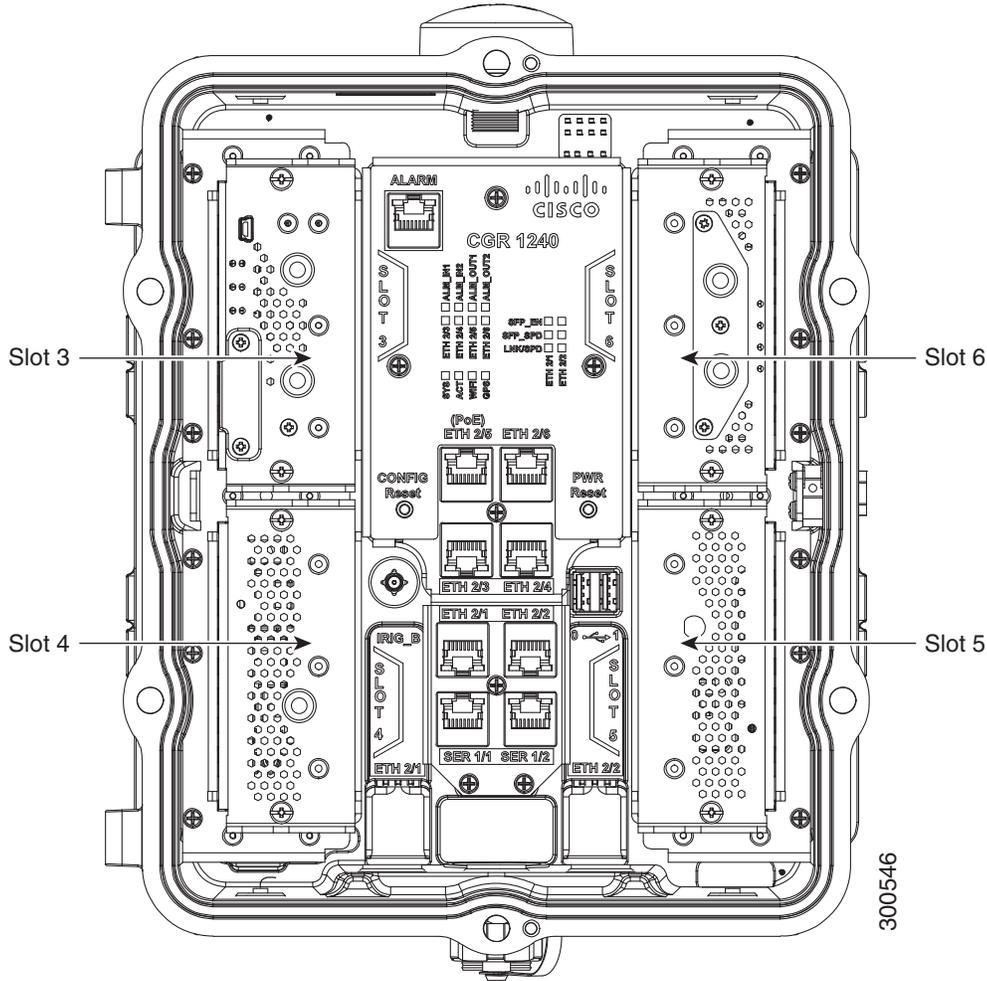
The router has four module slots to support installation of up to four compatible Cisco Connected Grid modules, for additional router WAN and NAN interfaces. Modules should be installed in the slots according to the module slot numbers shown in [Figure 15 on page 30](#) and [Module Installation Locations, page 117](#). For more information about installing modules, see the corresponding installation and configuration guide for each module at: www.cisco.com/go/cg-modules

Module Numbering

The system software uses a module numbering scheme to identify router components, including the modules. Some system software commands refer to module numbers. The numbers refer to the following router hardware components:

- The router supervisor engine (located on the CPU motherboard) is referred to as module 1.
- The router's integrated Ethernet switch module, which has four Fast Ethernet ports and two Gigabit Ethernet ports, is referred to as module 2.
- Modules are installed in the router module slots numbered 3–6 (see [Figure 15 on page 30](#) for module slot numbering). For information on the module (3G, WPAN, WiMAX) to slot allocation, see [Module Installation Locations, page 117](#).

Figure 15 Router Module Slot Numbering



Reset Buttons

Use these reset buttons (see [Figure 16 on page 31](#)) as follows:

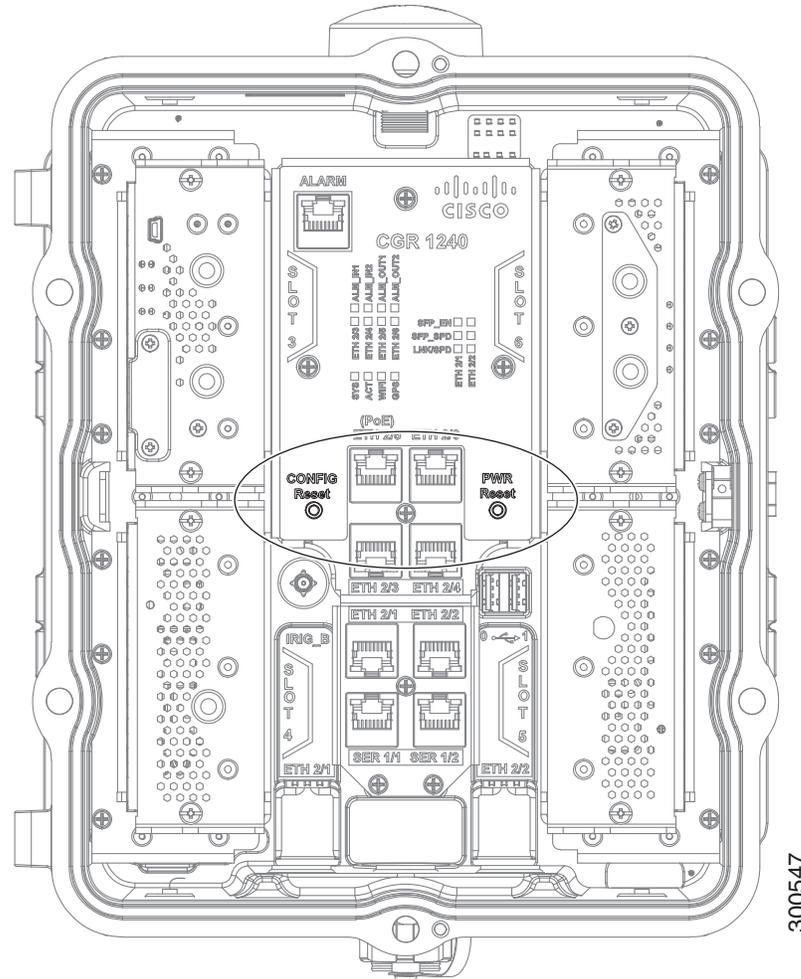
Caution: When you use the CONFIG Reset button to restore the router to the factory default software configuration, the current software configuration is permanently deleted from the router.

Note: The CONFIG Reset button operates differently whether the device is running IOS or CGOS. Both modes are described here, see the Software Configuration Guide for more details.

- **CONFIG Reset– IOS** – Press the CONFIG Reset button for at least 10 seconds to erase the startup-config, and power cycle the router. Power cycling the router turns the router off, then immediately back on. The router will temporarily stop operating on the network during the power cycle, then resume operating when the power cycle process is complete. If the CONFIG Reset button is pressed for more than 5 seconds (but less than 10 seconds), the router will only be power-cycled.
 - If the CONFIG Reset button is pressed for more than 5 seconds (but less than 10 seconds), and the config file express-setup-config exists on the flash: partition, the router configuration will be rolled back to that express-setup-config and reloaded.
 - If the CONFIG Reset button is pressed for more than 5 seconds (but less than 10 seconds), and the config file express-setup-config file does NOT exist on the flash: partition, the router will simply be power-cycled.

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

Figure 16 Router Reset Buttons



Fast Ethernet and Gigabit Ethernet Ports

The CGR 1240 router has two types of Ethernet port: fast Ethernet and Gigabit Ethernet port. These are described in the following sections:

- [Fast Ethernet Ports, page 32](#)
- [Gigabit Ethernet Ports, page 32](#)
- [Fast Ethernet and Gigabit Ethernet Port Specifications, page 33](#)

Fast Ethernet Ports

The router features four fast Ethernet (FE) ports that can be connected to LAN devices such as Intelligent Electronic Devices (IEDs), sensors, meters, protective relays, and reclosers. [Table 12 on page 32](#) describes how the Fast Ethernet ports are labeled on the router and referred to in software. The ports are shown in [Figure 17 on page 32](#).

Figure 17 Cisco CGR 1240 Router Fast Ethernet and Gigabit Ethernet Ports

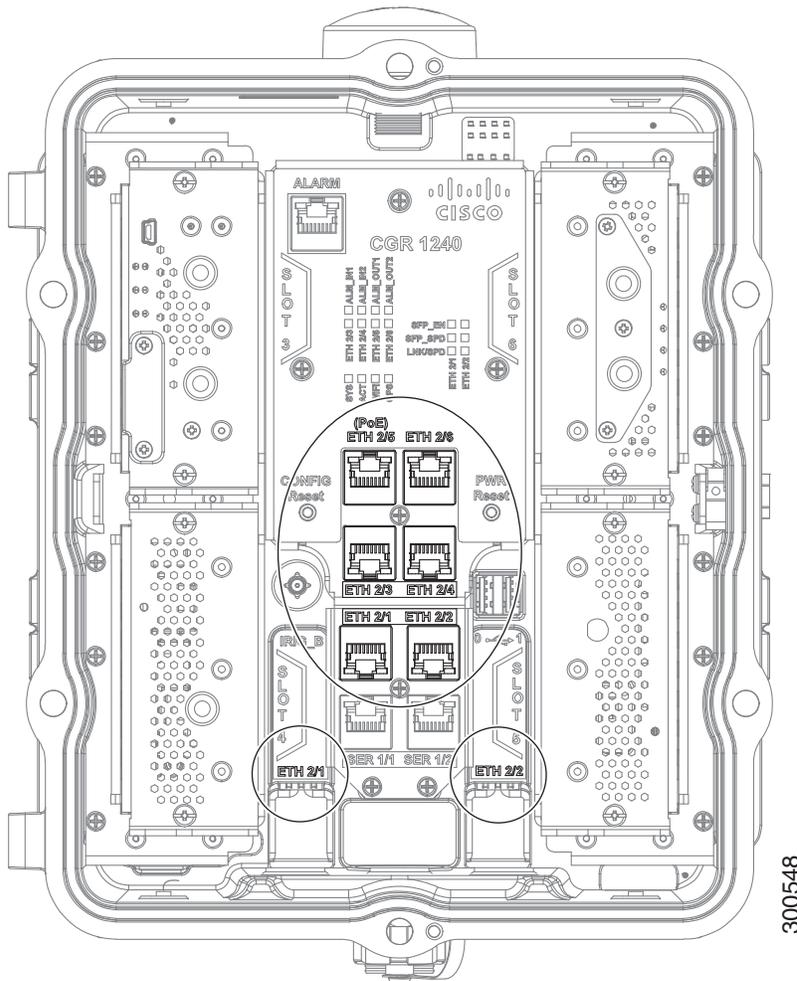


Table 12 CGR 1240 Fast Ethernet Port Naming

CGR 1240 Router Label	CG-OS Software Port Name	Cisco IOS Software Port Name
ETH 2/3	FE 2/3	FE 2/3
ETH 2/4	FE 2/4	FE 2/4
ETH 2/5 (PoE ¹)	FE 2/5	FE 2/5
ETH 2/6	FE 2/6	FE 2/6
¹ PoE = Power over Ethernet (provides up to 15.4 W per port).		

Gigabit Ethernet Ports

The router features two Gigabit Ethernet (GE) ports that can be used to enable WAN connectivity to a primary substation or a control center. The ports are shown in [Figure 19 on page 36](#).

Table 13 on page 33 describes how the GE ports are labeled on the router and referred to in software.

Table 13 CGR 1240 Gigabit Ethernet Port Naming

CGR 1240 Router Label	Cisco CG-OS Software Port Name	Cisco IOS Software Port Name
ETH 2/1	GE 2/1	GE 2/1
ETH 2/2	GE 2/2	GE 2/2

Note: Interfaces ETH 2/1 and ETH 2/2 are also used by the small form-factor pluggable (SFP) ports (see [Small Form-Factor Pluggable \(SFP\) Ports, page 33](#)). For more information about how these ports are used together, see [Combo Ports, page 35](#).

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.

Fast Ethernet and Gigabit Ethernet Port Specifications

Table 14 Fast Ethernet and Gigabit Ethernet Port Specification Overview

Specification	Description
Ethernet Standard	IEEE 802.3.
Connector type	RJ-45
Interface speed	10BASE-T, 100BASE-TX, 1000-BASE-TX
Pinouts	See Connector and Cable Specifications, page 195 .

Table 15 Fast Ethernet and Gigabit Ethernet Port Specification Detail

Speed	Descriptions	Cable Type	Distance
1000BASETX	1000 Mbps full-duplex transmission	Category 5 or better	328 feet (100 meters)
100BASE-TX	100 Mbps full-duplex transmission	Category 5 or better shielded twisted-pair (STP) cable	328 feet (100 meters)
10BASE-T	10 Mbps full-duplex transmission	Category 5 or better shielded twisted-pair (STP) cable	328 feet (100 meters)

Small Form-Factor Pluggable (SFP) Ports

The router features two fiber optical SFP ports that support optional Cisco rugged SFP modules for Gigabit Ethernet WAN connectivity to a primary substation or control center.

Note: The SFPs do not come with a Cable Gland kit, Those must be ordered separately.

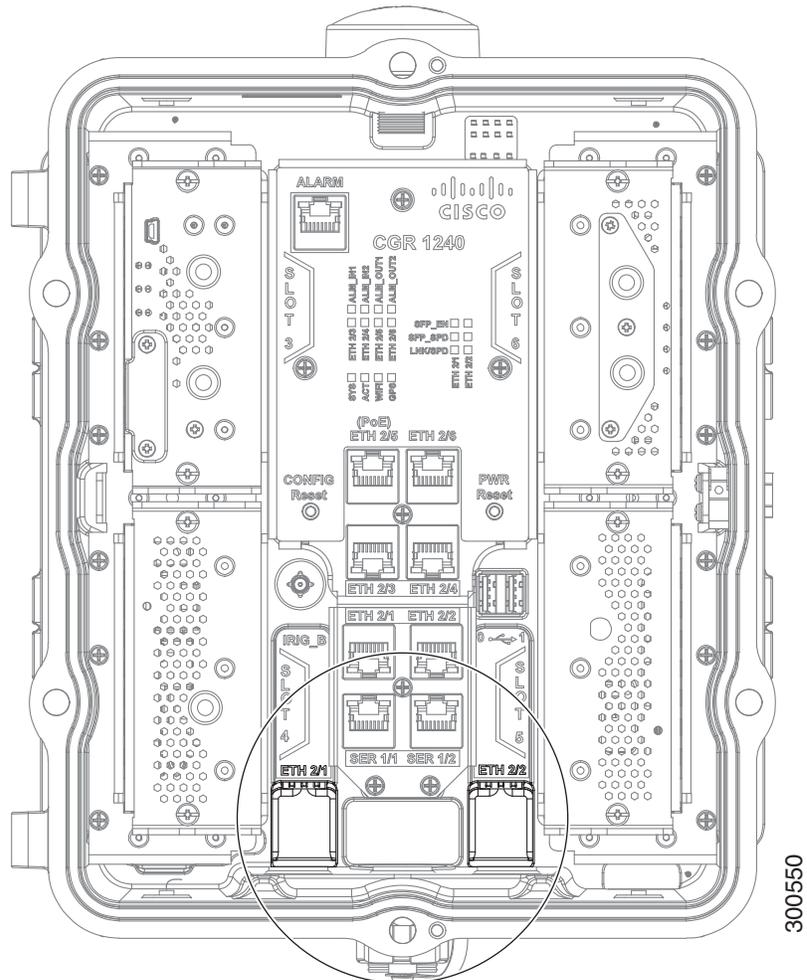
The ports are labeled as follows (see [Figure 18 on page 34](#)):

- ETH 2/1
- ETH 2/2

Note: Interfaces ETH 2/1 and ETH 2/2 are also used by the Gigabit Ethernet ports (see [Gigabit Ethernet Ports, page 32](#)). For more information about how these ports are used together, see [Combo Ports, page 35](#).

- Hot Swapping SFP Modules, page 34
- Supported SFPs, page 34
- Specifications, page 35

Figure 18 Router SFP Ports



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Hot Swapping SFP Modules

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

Supported SFPs

Table 16 on page 35 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 16 Supported SFP Modules

Cisco Product ID	Description
GLC-BX-D	1000BASE-BX10-D downstream bidirectional single fiber; with DOM
GLC-BX-U	1000BASE-BX10-U upstream bidirectional single fiber; with DOM
GLC-SX-MM-RGD	1000BASE-SX short wavelength; rugged
GLC-LX-SM-RGD	1000BASE-LX/LH long wavelength; rugged
GLC-ZX-SM-RGD	1000BASE-ZX extended distance; rugged
GLC-FE-100FX-RGD	100BASE-FX SFP; rugged
GLC-FE-100LX-RGD	100BASE-LX10 SFP; rugged

Specifications

Specification	Description
Connector type	LC
Optical Interface	100Base-FX, LX; 1000Base-SX, LX, ZX
Coding Scheme	SFP modules: <ul style="list-style-type: none">■ 1000 Mbps 8B/10B coding■ 100 Mbps 4B/5B coding
Pinouts	See Connector and Cable Specifications, page 195 .

Combo Ports

The combo ports are two Gigabit Ethernet ports and two SFP ports on the router that are labeled identically. [Figure 19 on page 36](#) shows the ports.

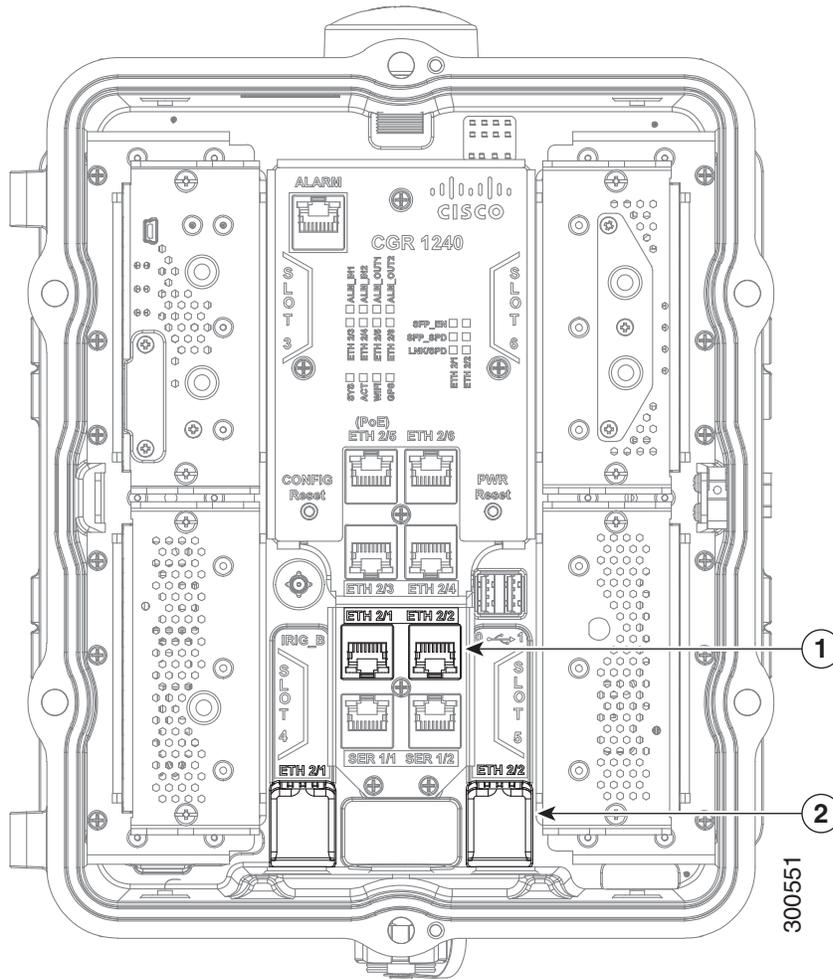
The GE and SFP ports share the same physical ports or connections and are labeled identically on the router (ETH 2/1, ETH 2/2) and in the software (GE 2/1, GE 2/2). [Table 17 on page 36](#) describes the port naming on the router and in software.

The Gigabit Ethernet ports support copper GE connections and the SFP modules support fiber optic GE connections. Only one connection on 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 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

Table 17 Cisco CGR 1240 Gigabit Ethernet and SFP Port Naming

CGR 1240 Router Label	Cisco CG-OS Software Port Name	Cisco IOS Software Port Name
ETH 2/1	GE 2/1	GE 2/1
ETH 2/2	GE 2/2	GE 2/2

Serial Ports

The router has two serial ports for connection to legacy devices, such as remote terminal units (RTUs). These ports support the following modes (selected with system software commands):

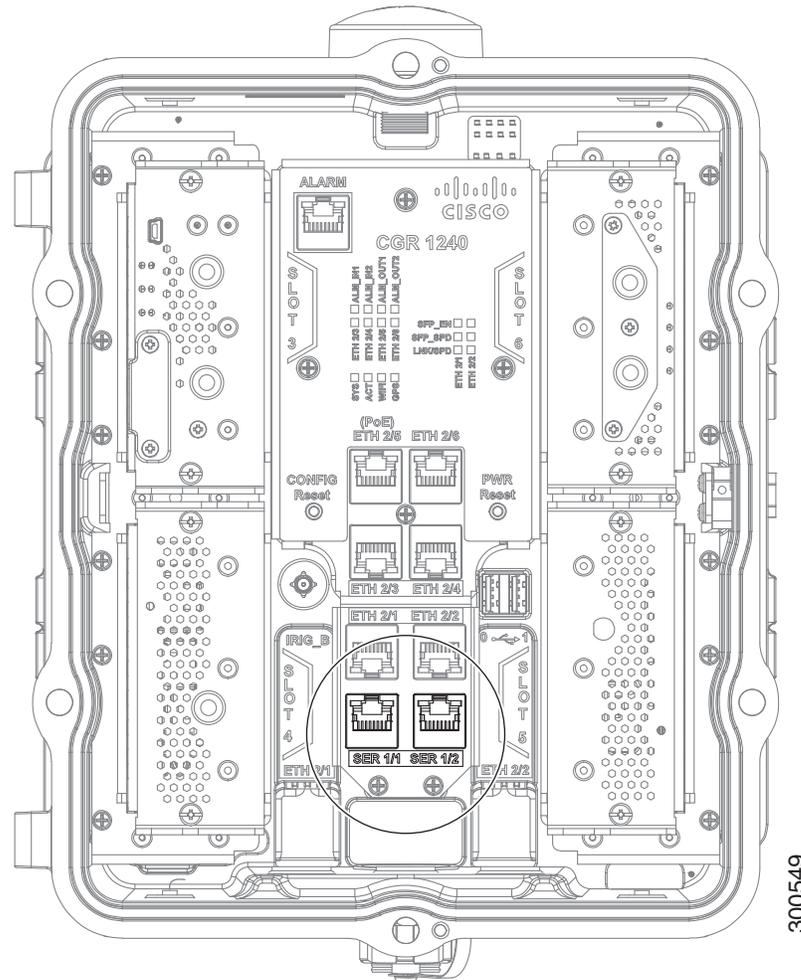
- RS232
- RS485

Note: When running IOS, these two serial ports are referred to as Async 1/1 and Async 1/2.

The ports are labeled as follows (Figure 20 on page 37):

- SER 1/1
- SER 1/2

Figure 20 Router Serial Ports



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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

Serial Port Cables

You can order a Cisco RJ-45 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.

Specifications

Table 18 Serial Signal Transmission Speeds and Distances

Rate (bps)	Distance for EIA/TIA-232	
	Feet	Meters
2400	200	60
4800	100	30
9600	50	15
19200	25	7.6
38400	12	3.7
56000	8.6	2.6
1544000 (T1)	–	–

Specification	RS232	RS485
Connector type	RJ-45	RJ-45
Cable	See Serial Port Cables, page 37	See Serial Port Cables, page 37
Signaling	Single-ended	Differential
Max. drivers	1	32
Max. receivers	1	256
Operating mode	Full duplex	Half duplex Full duplex
Network topology	Point-to-point	Multipoint Note: Multipoint is not enabled by software.
Max. distance (standard)	15 m	1200 m
Max speed (at 12 m/1200 m)	20 Kbps/1 Kbps	35 Mbms/100 Kbps
Pinouts	See Connector and Cable Specifications, page 195 .	

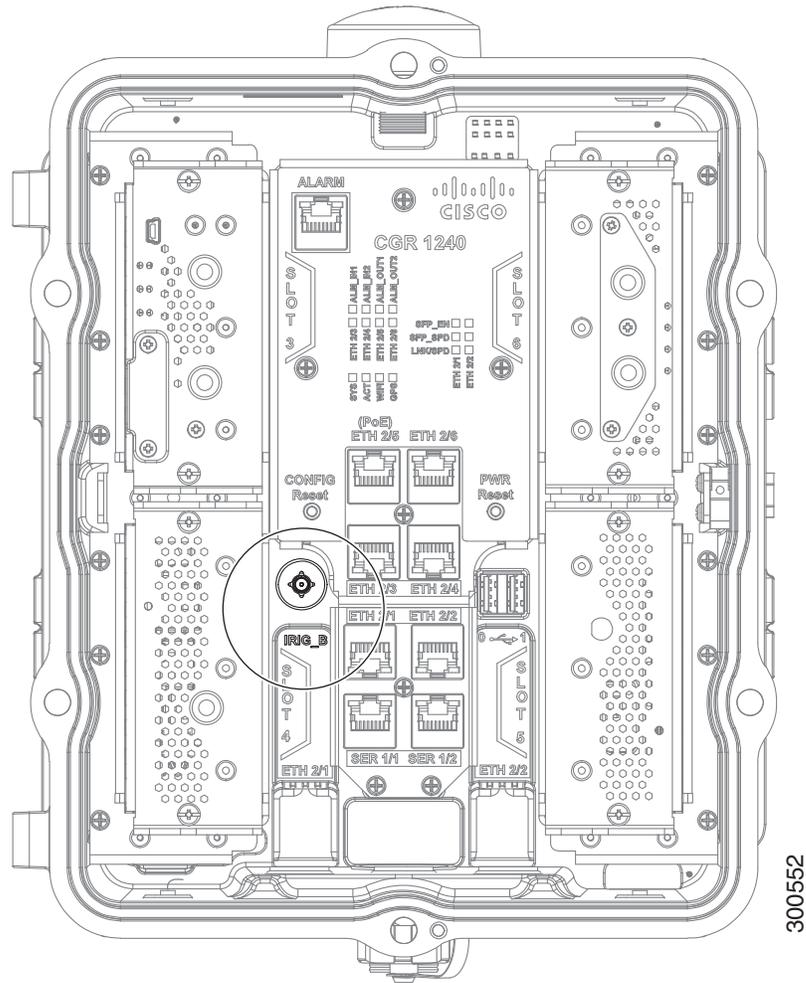
IRIG-B Timing Port

The router features a single IRIG-B timing port (see [Figure 21 on page 39](#)), 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.

Note: There is no IOS support for the IRIG-B Timing Port.

Figure 21 Router IRIG-B Timing Port



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Table 19 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 B120

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.

These ports are labeled as follows (see [Figure 22 on page 40](#)):

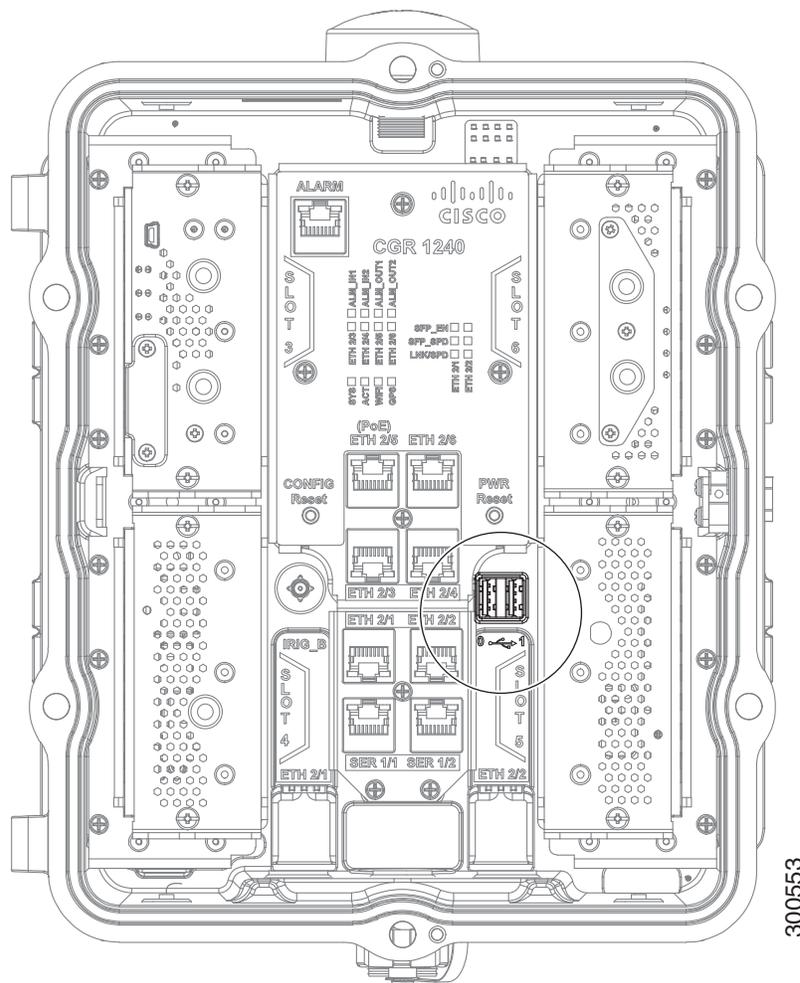


The USB ports operate at the following speeds:

- 1 Mbps
- 12 Mbps
- 480 Mbps

Note: Supported by the Guest Operating System on the IOx bundle.

Figure 22 Router USB Ports



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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 USB devices from being stolen or accidentally removed, secure any connected USB device with a locking mechanism.

Specifications

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

Memory

SD Flash Memory

The router supports a single SD Flash Memory module (SD card), which can be accessed from the router exterior. See [SD Flash Memory Module, page 25](#) and [Using the SD Flash Memory Module, page 133](#).

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.

DC Power for External Devices

The router 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 [Installing External Non-Cisco Modules, page 173](#).
- Pinouts for the Molex Micro-Fit 3.0 connector are in [Connector and Cable Specifications, page 195](#).

Specifications

Specification	Description
Voltage	12 VDC +/-5%
Maximum Power	12 W (continuous)
DC Power Connector	Molex Micro-Fit 3.0 (4-pin receptacle)

GPS Module

The router has an internal Global Positioning System (GPS) module, which receives precise time and location information from the GPS network, and provides this information to the system software. If the router is running IOS, GPS can also be a source clock for the IOS NTP server.

This section has information on:

- [GPS LED, page 42](#)

- [GPS Specifications, page 42](#)
- [Using the CLI to Display GPS Current Time and Location for a Cisco Router, page 42](#)

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 [Router LED Locations and States, page 181](#).

GPS Specifications

[Table 20 on page 42](#) shows the GPS specifications for the Cisco Connected Grid 1000 Series Routers.

Table 20 GPS Specifications for Cisco Connected Grid 1000 Series Routers

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)

Using the CLI to Display GPS Current Time and Location for a Cisco Router

- [Displaying GPS Current Time and Location for a Cisco CG-OS Router, page 42](#)
- [Displaying GPS Current Time and Location for a Cisco IOS Router, page 42](#)

Displaying GPS Current Time and Location for a Cisco CG-OS Router

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:

```
CGR1240# show gps time
8:46:9.923 UTC Fri Oct 10 2013
```

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

```
CGR1240# show gps location
Latitude: 37.4090637
Longitude -121.9523598
```

Displaying GPS Current Time and Location for a Cisco IOS Router

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

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

```
CGR1240# show platform gps time
0:55:26.588 UTC Tue May 14 2013
```

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

```
CGR1000# show platform gps location
Latitude: 37.4184227
Longitude -121.9190216
```

WiFi 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.

When running IOS, Wi-Fi can be used as an access point for up to 5 devices, but also as a layer-3 interface.

WiFi Hardware

The CGR 1240 router is equipped with an 802.11b/g/n 2.4GHz radio that works as the access point to provide WiFi connectivity to the router. The WiFi hardware is a Broadcom BCM4325 chipset based radio with an external WiFi antenna.

WiFi Default Settings

The default WiFi interface identity settings for the Cisco CG-OS and Cisco IOS operating systems are detailed in [Table 21 on page 43](#).

Note: The CGR 1240 WiFi interface is assigned to module 2 and cannot be changed.

Table 21 Default WiFi Interface Identity Settings

Cisco Operating System	Interface Identity
Cisco CG-OS	wifi 2/1
Cisco IOS	dot11Radio 2/1

For more information on the WiFi configuration and setting it, see the *Cisco 1000 Series Connected Grid Routers WiFi Software Configuration Guide* on Cisco.com, at: www.cisco.com/go/cgr1000-docs.

Related Commands

- [Displaying WiFi Configuration Information for a Cisco CG-OS Router, page 43](#)
- [Displaying WiFi Configuration Information for a Cisco IOS Router, page 43](#)

Displaying WiFi Configuration Information for a Cisco CG-OS Router

Note: For a CGR 1240 router using the Cisco CG-OS operating system, the WiFi interface is identified as ‘wimax 2/1’.

To display WiFi configuration information, enter any or all of the following commands in privileged EXEC or user EXEC mode:

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

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

Displaying WiFi Configuration Information for a Cisco IOS Router

Note: For a CGR 1240 router using the Cisco IOS operating system, the WiFi interface is identified as ‘Dot11Radio 2/1’.

To display WiFi configuration information, enter any or all of the following commands in privileged EXEC or user EXEC mode:

- **show interface dot11Radio 2/1**—Displays the status of the interface as up or down, the five second input and output rate and the number of input and output packets. Also displays hardware details such as radio type (802.11N, 2.4 GHz radio), MAC address and MTU setting.
- **show controller dot11Radio 2/1**—Displays the serial number, software version, and configured frequency and power settings.

For detailed information on how to use these commands, see the *Cisco 1000 Series Connected Grid Routers WiFi Software Configuration Guide* on Cisco.com, at: www.cisco.com/go/cgr1000-docs.

Real-Time Clock (RTC)

The router features an integrated real-time clock (RTC) with battery backup that supplies the system software with accurate date and time information.

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 router configuration guide on Cisco.com at: www.cisco.com/go/cgr1000-docs