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Making Network Connections

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

These topics are discussed:

■ Before Installing, page 53

■ Basic Network Connections, page 54

■ Additional Router Connections, page 58

■ Installing Modules and Antennas, page 63

Note: This chapter describes router installation procedures. For detailed, technical information about the router hardware, including hardware specifications and connector and cable descriptions, see Router Hardware Description, page 11 and Connector and Cable Specifications, page 93.

Before Installing

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

■ Installation Site Preparation, page 53

■ Installation Safety Information, page 53

■ Connecting the Router to Power, page 53

■ Preventing Electrostatic Discharge Damage, page 54

■ Cabling Guidelines, page 54

Installation Site Preparation

The procedures in this section assume that you prepared the installation site according to the information in Installation Safety and Site Preparation, page 5.

Installation Safety Information

Before performing any of the tasks in this section, read the safety warnings in this section and in Installation Safety and Site Preparation, page 5.

Connecting the Router to Power

Before you make network connections, your router should be connected to the AC power source and powered on as described in Connecting the Router to Power, page 43.

Preventing Electrostatic Discharge Damage

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

To prevent ESD damage, follow these guidelines:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.

- Connect the equipment end of the strap to an unfinished chassis surface.

- Place a removed memory card on an antistatic surface or in a static shielding bag. If the card will be returned to the factory, immediately place it in a static shielding bag.

- Avoid contact between the card and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.

- Do not remove the wrist strap until the installation is complete.

Cabling Guidelines

Follow these guidelines for using cables with the router:

- Follow the recommended router orientation when mounting it to prevent cable strain. For more information, see the Router Orientation When Mounting, page 35.

- Position cables so that they do not place strain on the router connectors.

- Organize cables into bundles when necessary to avoid intertwining.

- Inspect cables to ensure adequate routing and bend radius.

- Install cable ties that comply with your site requirements.

Basic Network Connections

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

Connect to the Ethernet Network

The steps in this section require that an Ethernet network connection is available at the installation location. There are two options for connecting to the Ethernet network:

- Connecting the Ethernet Ports, page 54

- Connecting the SFP Ports, page 55
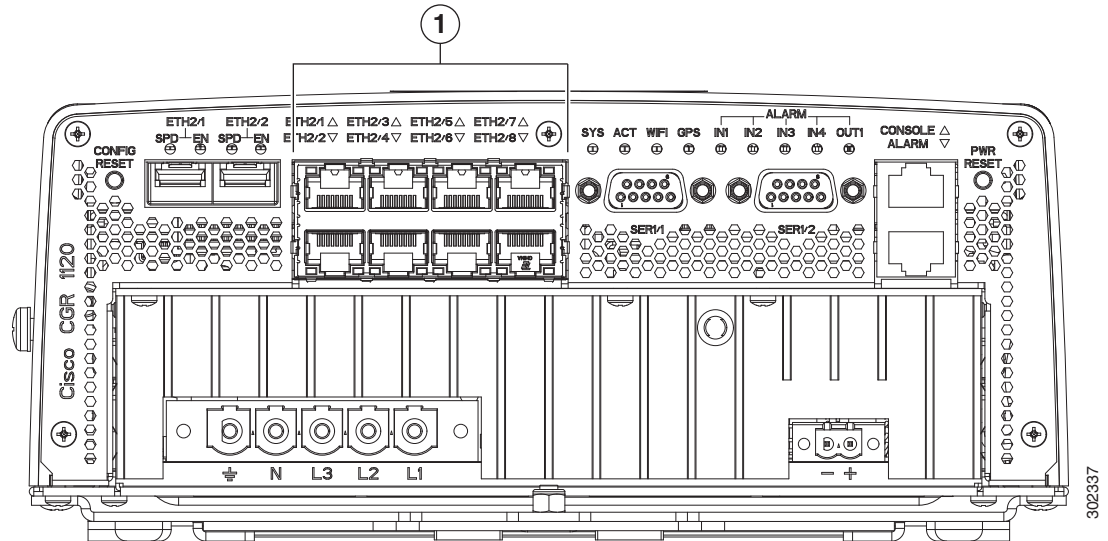
Connecting the Ethernet Ports

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

- See Figure 1 on page 55 for the Ethernet port locations.

- One or two Ethernet cables are typically provided with the router. Additional cables and transceivers can be ordered from Cisco. For ordering information, contact your reseller or Cisco customer service.

- The GE ports (ETH 2/1 and ETH 2/2) have identical labels to the SFP ports because the SFP ports share physical ports with the GE ports. For detailed information about how to use these ports (called combo ports), see Combo Ports, page 24.

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

Figure 1   Ethernet Ports

1   Ethernet ports

Item	Description
1	4–Fast Ethernet ports ■ ETH 2/3 ■ ETH 2/4 ■ ETH 2/5 ■ ETH 2/6
2	2–Gigabit Ethernet port (combo ports) ■ ETH 2/1 ■ ETH 2/2

Connecting the SFP Ports

Small Form–Factor Pluggable (SFP) modules are devices that plug into the router SFP connectors shown in Figure 2 on page 57. The transceiver connects the electrical circuitry of the module with the optical or copper network.

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

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

Warning: Class 1 laser product. Statement 1008

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

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

Materials and Tools You Supply

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

- Wrist strap or other personal grounding device to prevent ESD occurrences.

- Antistatic mat or antistatic foam to set the transceiver on.

- Fiber-optic end-face cleaning tools and inspection equipment. For complete information on inspecting and cleaning fiber-optic connections, see the white-paper document at this URL:

    http://www.cisco.com/en/US/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml

Connecting

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

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

When installing or removing SFP modules, observe these guidelines:

- Removing and installing an SFP module can shorten its useful life. Do not remove and insert any module more often than is absolutely necessary.

- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.

To install SFP modules:

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

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

3. Position the SFP transceiver module in front of the socket opening, and insert the SFP into the socket until you feel the connector latch into place.

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

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

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

7. Attach the network interface cable connector to the SFP transceiver module.

Related Information

- For supported SFP modules, see .

- For detailed information on connecting the SFP module cables to the network, see Cisco.com for the documentation for your SFP module.

Figure 2 SFP Ports
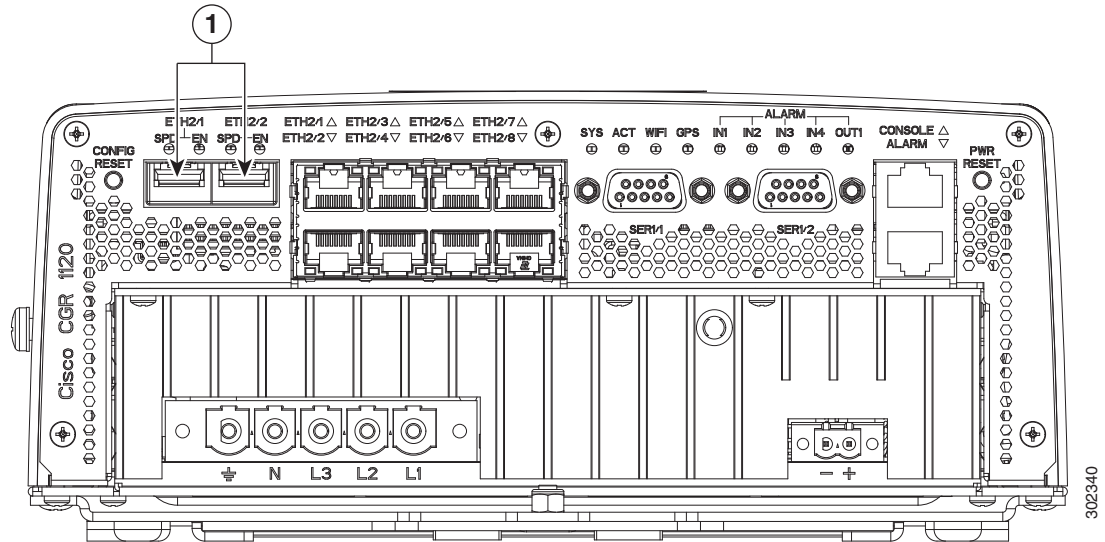
| 1 | SFP ports |

Verify Ethernet Connection with System Software CLI

Note: The **show interface** command works on routers using the Cisco CG-OS or Cisco IOS operating systems. The example shown is for a router using a CG-OS operating system.

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

```
CGR1120> show interface
Ethernet0 is up, line protocol is up
  Hardware is Cisco, address is 0019.076c.1a78 (bia 0019.076c.1a78)
  Internet address is 192.0.2.111/23
  MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255
  Encapsulation ARPA, loopback not set, keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 5/75, 32 drops
  5 minute input rate 10000 bits/sec, 27 packets/sec
  5 minute output rate 10000 bits/sec, 26 packets/sec
     16076431 packets input, 1280716531 bytes, 27 no buffer
     Received 1809290 broadcasts, 0 runts, 0 giants
     1105 input errors, 0 CRC, 0 frame, 0 overrun, 1105 ignored, 0 abort
     0 input packets with dribble condition detected
     16196175 packets output, 1011044938 bytes, 0 underruns
     19 output errors, 184 collisions, 3 interface resets
     0 babbles, 0 late collision, 1474 deferred
     19 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Serial0 is administratively down, line protocol is down
  Hardware is HD64570
```

```
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
Encapsulation HDLC, loopback not set, keepalive set (10 sec)
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0 (size/max/drops); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/64/0 (size/threshold/drops)
   Conversations 0/0 (active/max active)
   Reserved Conversations 0/0 (allocated/max allocated)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
   0 packets input, 0 bytes, 0 no buffer
   Received 0 broadcasts, 0 runts, 0 giants
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
   0 packets output, 0 bytes, 0 underruns
   0 output errors, 0 collisions, 1 interface resets
   0 output buffer failures, 0 output buffers swapped out
   0 carrier transitions
   DCD=down  DSR=down  DTR=down  RTS=down  CTS=down
```

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

Additional Router Connections

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

■

■

■

■

■

Connecting the Console Port

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

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

Figure 3   Console Port (Item 1)
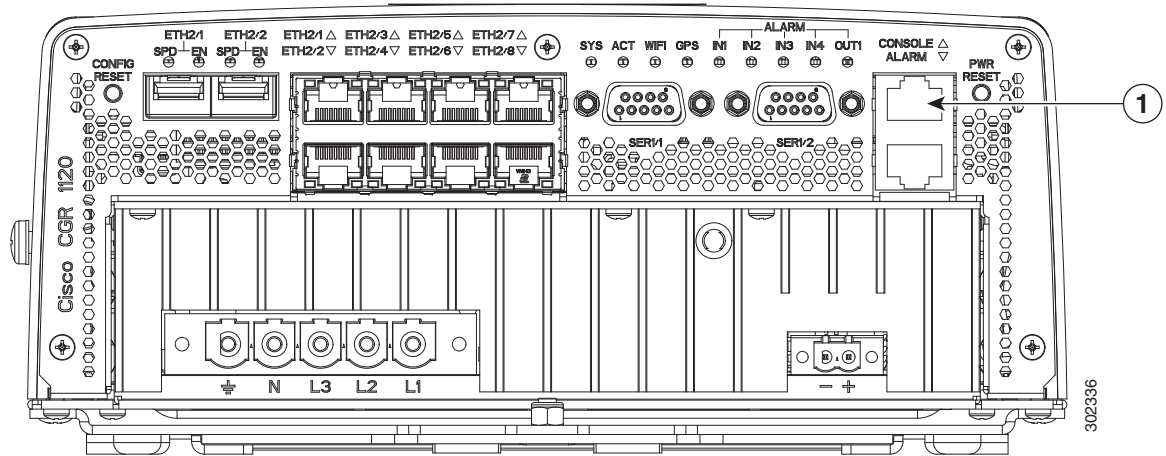
| 1 | Console port |

Connecting

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

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

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

■ RJ-45-to-RJ-45 rollover cable

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

To connect a PC or PC terminal to the console port:

1. Connect one end of the RJ-45-to-RJ-45 rollover cable to the console port on the router.

2. Connect the adapter you provide to the other end of the RJ-45 cable.

3. Connect the adapter end of the cable to the router.

Related Information

■ For information about starting a terminal session over the console port with Microsoft Windows, Mac OS X, or Linux, see Starting a Router Terminal Session, page 91.

■ For more information about this port, see Router Hardware Description, page 11.

Connecting the Serial Port

Before you connect a device to the router serial port (Figure 4 on page 60), you need to know the following:

■ Type of device, data terminal equipment (DTE) or data communications equipment (DCE)

■ Type of connector, male or female, required to connect to the device

■ Signaling standard required by the device

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

| Serial Devices	Network Options	Network Protocols	Network Topology
Devices such as RTU or IED with serial asynchronous interface **Note:** No synchronous serial protocol support	CGR 1120 serial interface can connect through DB9 connector devices with RS232 and RS485 asynchronous full-duplex or half-duplex support	■ IP over SLIP or PPP asynchronous lines ■ Raw Socket and SCADA protocol translation (DNP3 to DNP3/IP and IEC 60870-5-101 to IEC 60870-5-104)	Point-to-Point

Connecting

■ You must provide or purchase separately the correct serial cable. The cable does not ship with the router. Contact your Cisco reseller to purchase the correct cable from Cisco.

■ You can connect a device to this port while the router is operating normally.

■ The serial ports are labeled **SER 1/1** and **SER 1/2**.

Related Information

For more information about this port, including supported standards and signaling, see Router Hardware Description, page 11.

Figure 4   Serial Ports (Item 1)
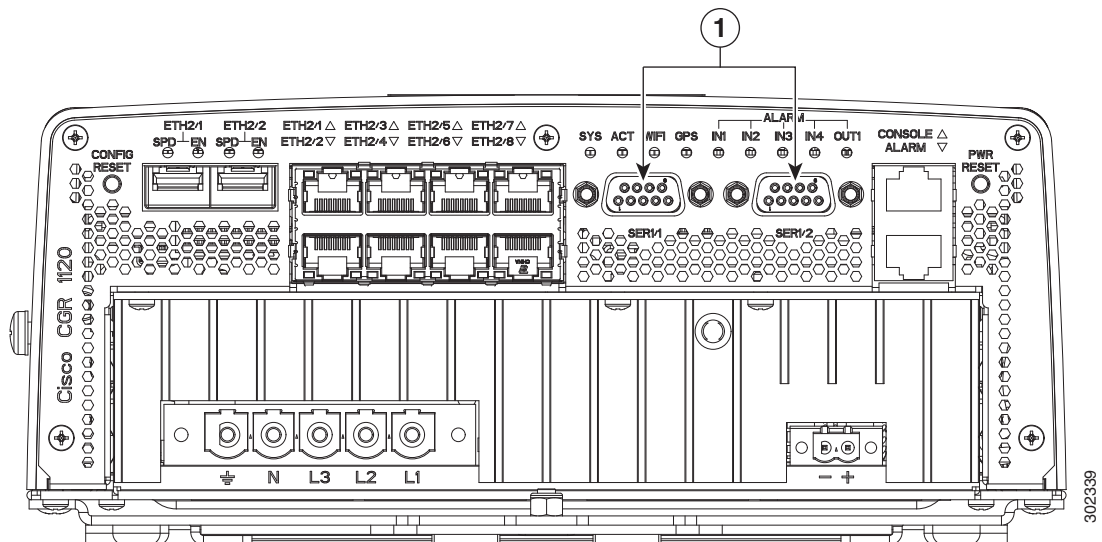
1   Serial ports

Connecting the USB Port

You can connect an optional USB device to the router USB port (Figure 5 on page 61), which will provide power to the USB device. You can also connect USB devices that are powered by an external source, such as an AC adapter or batteries.
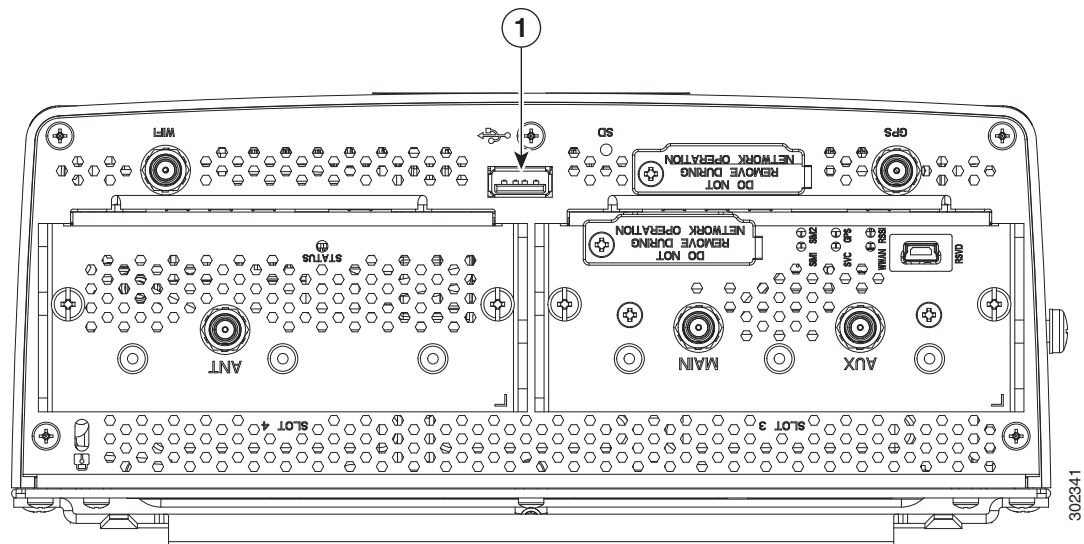
Connecting

- You can connect devices to the USB port while the router is operating normally.

- The USB port is labeled with universal USB icon.

- Depending on the USB devices you connect to these ports, you might require a USB extension cable to connect devices to these ports.

- To prevent connected USB devices from being stolen or accidentally removed, secure any connected USB device with a locking mechanism designed for this purpose.

Related Information

For detailed information about these ports, including supported USB standards and power output, see Router Hardware Description, page 11.

Figure 5   USB Port

| 1 | USB port |

Connecting the Alarm Port

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

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

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

Connecting

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

- If you use an alarm system on your network, connect the alarm port to an alarm system with an alarm cable that you provide.

Related Information

Router Hardware Description, page 11 includes detailed information about this port, including:

- Alarm input and output

- Location on the router

- Link to pinout information

Figure 6   Alarm Port
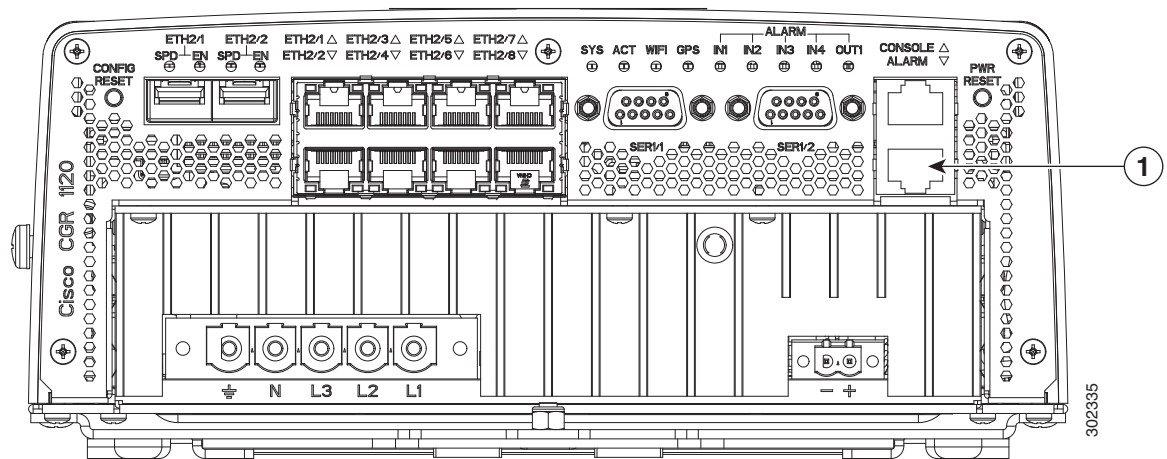
1	Alarm port

SD Flash Memory Module Card

For detailed information about the router SD Flash Memory Module card, including specifications, supported SD cards, and installation procedures, see Using the SD Flash Memory Module, page 77. For information about the antennas that ship with the router, see Using the SD Flash Memory Module, page 77.

Figure 7   SD Card Slot
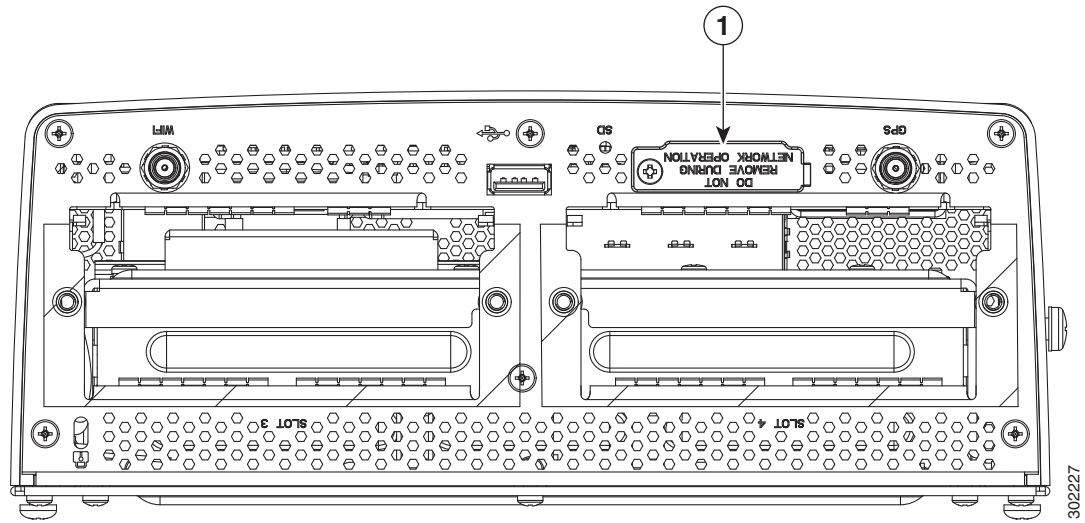
| 1 | SD card slot |

Installing Modules and Antennas

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

Related Information

- For information about supported router antennas, see About Connected Grid Antennas, page 71.

- For information about supported modules, see About Connected Grid Modules, page 65.

- For detailed installation instructions for all Connected Grid modules and antennas, see the documentation on Cisco.com at: www.cisco.com/go/cg-modules