



Antennas

This section contains information about supported antennas for the Cisco 1240 Connected Grid Router. Router antennas provide connectivity to the GPS satellite constellation and provide connectivity to a WiFi access unit, as well as to the Cisco Connected Grid modules installed in the router.

Note: For the purposes of this document antennas that mount directly to the chassis are referred to as integrated antennas. External antennas are any antennas that are connected to the router antenna port N-connector (see [Figure 77 on page 122](#)) with an external cable. Ensure that you torque the integrated antennas to 6–7 ft-lbs (72–84 lbs-in).

These topics are discussed:

- [Installing or Replacing Antennas, page 121](#)
- [Antenna Overview, page 122](#)
- [Antenna Port States and Numbering, page 125](#)
- [Safety Information, page 129](#)
- [Antenna Technical Specifications, page 129](#)

Installing or Replacing Antennas

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

However, you might need to install an antenna when:

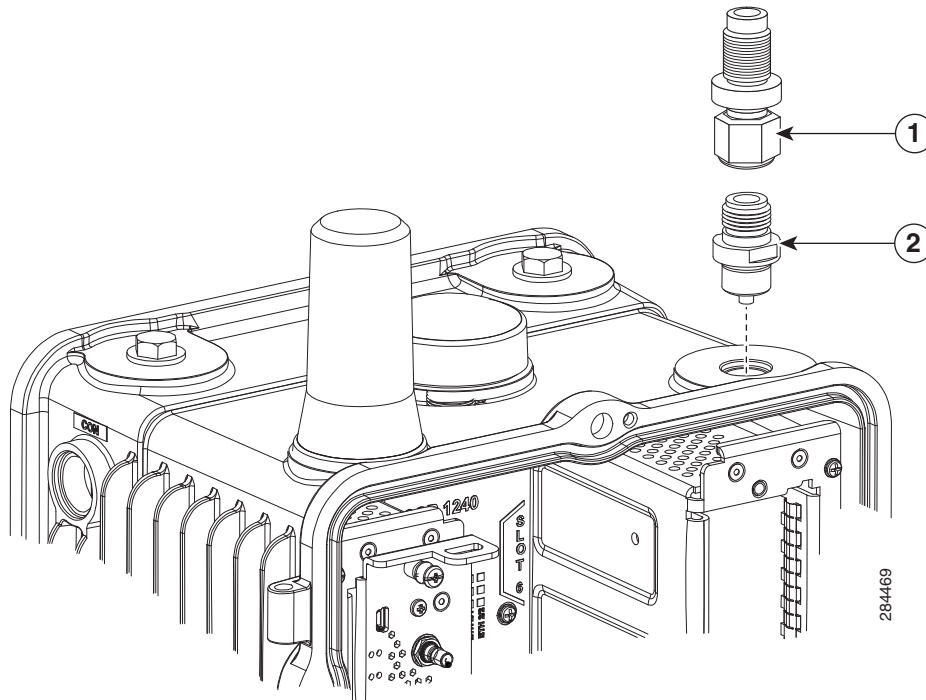
- You purchase a module separately from the router. The antenna is included with the module, and must be installed on the router to complete the module installation.
- You purchase an antenna separately to replace a faulty or damaged antenna.

For procedures and safety information required to install or replace antennas, see the Connected Grid antennas documentation, at: www.cisco.com/go/cg-modules.

Lightning Arrestor

Every external antenna that is installed on the router requires a lightning arrestor. [Figure 77 on page 122](#) shows an antenna port, N-connector, and lightning arrestor assembly. You can order lightning arrestors from Cisco using product ID (PID) CGR-LA-NM-NF.

Figure 77 Antenna Port, N-connector, and Lightning Arrestor Assembly



1 Lightning arrestor

2 N-connector

External antennas are any antennas that are connected to the router antenna port N-connector.

For information about the lightning arrestor and how to install it, see the Connected Grid antennas and accessories documentation, at: www.cisco.com/go/cg-modules

Cisco Connected Grid Modules

- For instructions on how to install or replace modules in the router, see the Connected Grid module documentation at: www.cisco.com/go/cg-modules

Antenna Overview

This section describes the type of antennas to use with the router.

Default Antennas

The router ships with two pre-installed antennas:

- [GPS Antenna, page 123](#)
- [WiFi Antenna, page 123](#)

Module Antennas

Depending on configuration selected by the customer, the router may ship with additional antennas pre-installed. The router supports up to seven module antennas. See [Connected Grid Module Antennas, page 124](#).

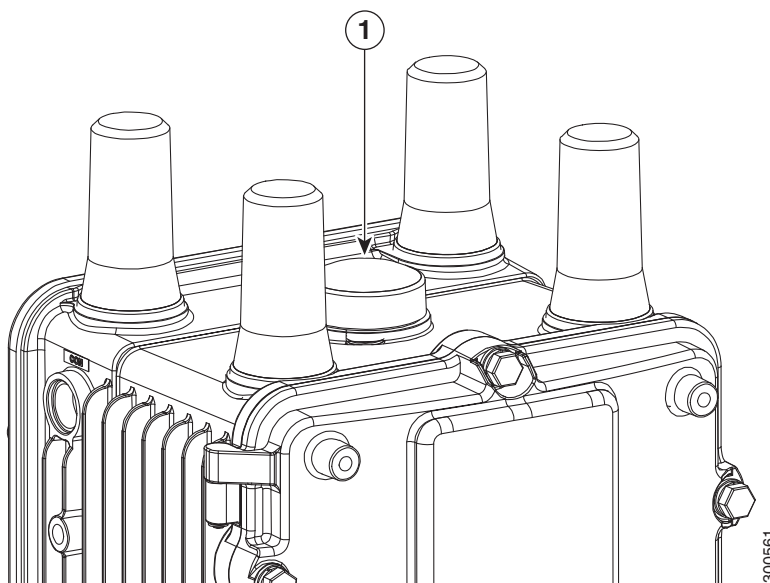
GPS Antenna

The router ships with one outdoor GPS antenna pre-installed and connected internally to the on-board GPS module on the CGR 1240 motherboard. The GPS is used to identify the router location after the router is installed and is in use.

The pre-installed GPS antenna is not a field-replaceable component.

- For detailed technical information about the GPS antenna, see [GPS Antenna Specification, page 130](#).
- For information about the GPS status LED, located inside the router chassis, see [Router LED Locations and States, page 181](#).
- For more information about the GPS module, see [GPS Module, page 41](#).

Figure 78 GPS Antenna—Cisco CGR 1240 Router



| Item | Description |
|------|-------------|
| 1 | GPS antenna |

WiFi Antenna

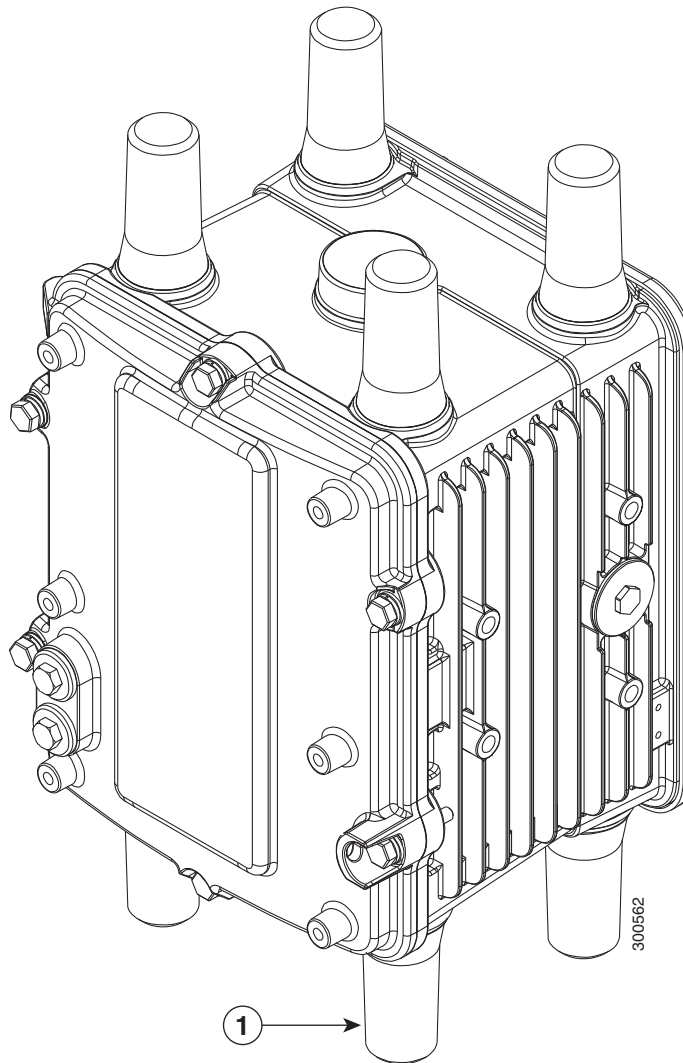
The router ships with a WiFi antenna already installed and connected to the router internal short-range access point. The router WiFi link enables users to connect to the router from anywhere within WiFi range. For example, a technician can check the status of the router from the ground (instead of having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

For detailed technical information about the WiFi antenna, see [WiFi Antenna Specification, page 130](#).

For more information about WiFi functionality:

- See [Router LED Locations and States, page 181](#) to learn about the WiFi status LED.
- See [WiFi Short-Range Access Point, page 43](#) to learn about the WiFi connection to the router.

Figure 79 WiFi Antenna—Cisco CGR 1240 Router



| Item | Description |
|------|-----------------------|
| 1 | WiFi antenna location |

Connected Grid Module Antennas

In addition to the two pre-installed antennas (GPS and WiFi), the router supports up to seven additional antennas, which provide connectivity to the modules installed in the router. The additional antennas are mounted on the exterior of the router and connected through chassis antenna ports to the module installed inside the router. For information on the location of the additional antenna ports, see [Antenna Port Numbering, page 127](#).

The router supports up to four modules. Each module requires one antenna or two antennas (one main antenna and one auxiliary antenna). Auxiliary antennas (also known as diversity antennas) improve the quality and reliability of the wireless connection. Because they are placed in different locations on the router, main and auxiliary antennas detect different amounts of desired signal as well as different amounts of interference. The router uses the a digital signal processing called Maximal Ratio Combining (MRC) method to weight, adjust and combine the signals from the two antennas in order to maximize the desired signal level and minimize undesired interference level thereby optimizing the signal to interference plus noise ratio (SINR).

The total number of antennas installed on the router depends on:

- Number of modules installed in the router
- Module types that are installed in the router
- For detailed information about these antennas, see the Connected Grid antennas documentation, at: www.cisco.com/go/cg-modules

Antenna Port States and Numbering

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

- [Antenna Port States, page 125](#)
- [Antenna Port Numbering, page 127](#)

Antenna Port States

- [Antenna Port with Integrated Antenna Installed, page 125](#)
- [Antenna Port in Unused State, page 125](#)
- [Antenna Port in Ready for External Antenna State, page 126](#)
- [Antenna Port in External Antenna Connected State, page 127](#)

Antenna Port with Integrated Antenna Installed

Note: An integrated antenna is an antenna that mounts directly to the chassis. The antenna is mounted in an antenna port. Ensure that you torque the integrated antennas to 6–7 ft-lbs (72–84 lbs-in).

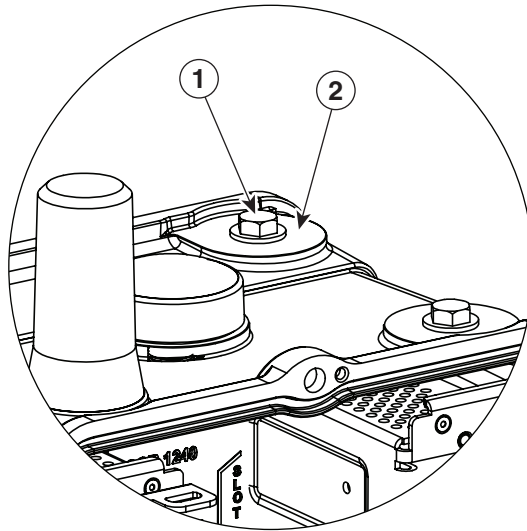
The router ships with two antenna ports containing the following integrated antenna:

- GPS antenna—see [Figure 78 on page 123](#)
- WiFi antenna—see [Figure 79 on page 124](#)

Antenna Port in Unused State

Waterproof port plugs cover unused antenna ports.

Figure 80 Unused Antenna Port with Port Plug Installed



1 Port plug

2 Antenna port

Antenna Port in Ready for External Antenna State

A female N-connector can be installed in any unused antenna port to prepare it for connection to an external antenna. The N-connector protects the router interior from environmental elements including water, heat, cold, and dust. The N-connector must have a watertight dust cap attached to ensure that it is watertight.

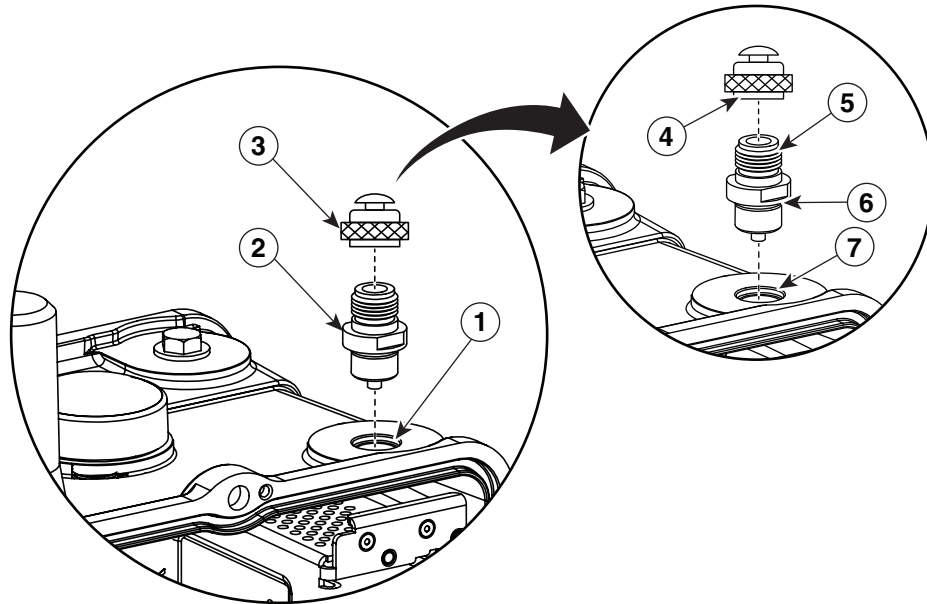
Caution: Do not remove N-connectors from antenna ports on the rear side of the unit. This will cause the cable connected to it to drop inside of the device.

Note: Ensure that you torque the female N-connector to 6-7 ft-lbs. Ensure that you torque the integrated antennas to 6-7 ft-lbs (72-84 lbs-in).

Note: When installing an antenna plug, be sure to torque the plug to 6-7 ft-lbs. Ensure that you torque the integrated antennas to 6-7 ft-lbs (72-84 lbs-in).

Note: A dust cap is *not* required when the lightning arrestor, coaxial cable and external antenna are connected to the N-connector.

Figure 81 Antenna in Ready for External Antenna State with N-Connector Installed



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- | | | | |
|---|------------------------|---|------------------------|
| 1 | Antenna port | 5 | 5/8-24 UNEF-2A threads |
| 2 | N-connector | 6 | 5/8-24 UNEF-2A threads |
| 3 | Water-tight dust cap | 7 | 5/8-24 UNEF-2B threads |
| 4 | 5/8-24 UNEF-2B threads | | |

Antenna Port in External Antenna Connected State

An antenna port with an external antenna connected has the following items installed:

- N-connector
- Lightning arrester
- External antenna cable
- External antenna

For information about the lightning arrester, see the [Lightning Arrester for the Cisco 1240 Connected Grid Router](#) guide on Cisco.com

For detailed instructions for installing antennas and lightning arrestors, see the [Connected Grid Antennas Installation Guide](#) on Cisco.com.

Antenna Port Numbering

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

Antenna Installation Location

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

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

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

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

Figure 82 Top of Router—Antenna Port Numbering

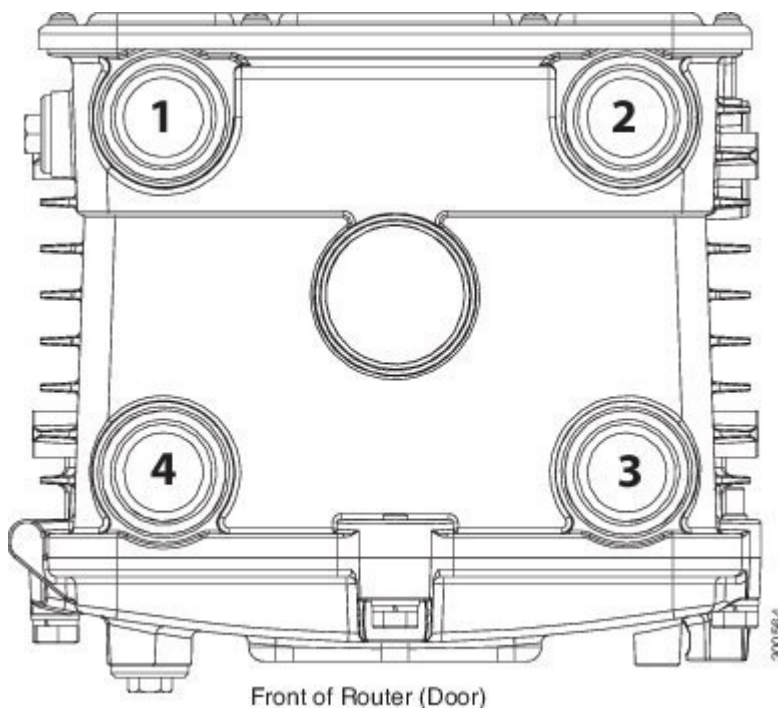
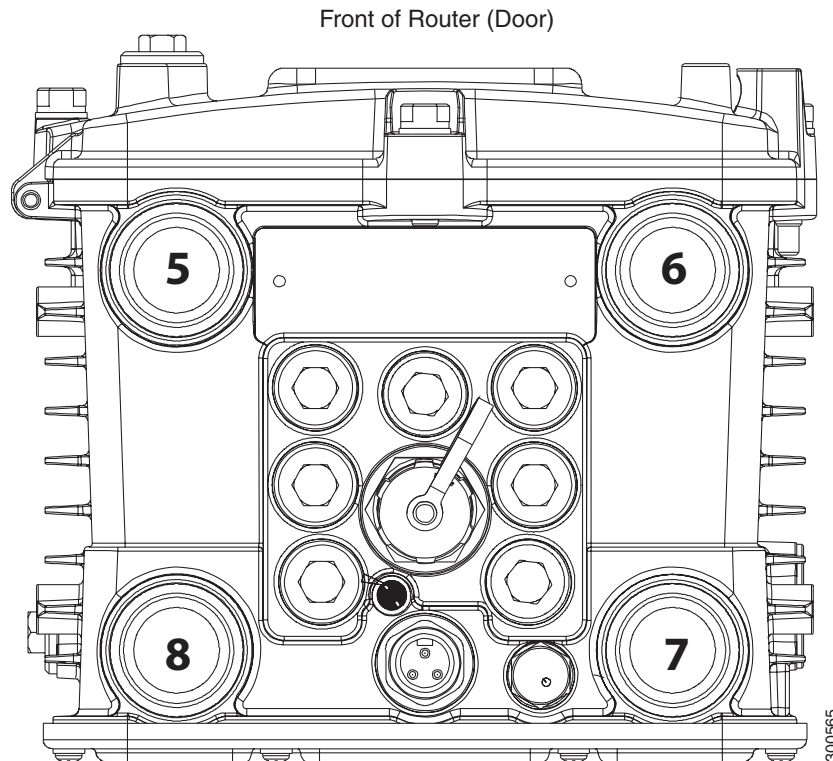


Figure 83 Bottom of Router—Antenna Port Numbering



| Antenna Port | Antenna Type |
|--------------|--|
| 1 | 4GLTE/WIMAX auxiliary antenna |
| 2 | 4GLTE/WIMAX main antenna |
| 3 | 3G/4G main antenna |
| 4 | 3G/4G auxiliary antenna |
| 5 | 900 MHz antenna |
| 6 | Integrated WiFi antenna (router ships with this antenna installed) |
| 7 | - |
| 8 | - |

Safety Information

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

Antenna Technical Specifications

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

- [GPS Antenna Specification, page 130](#)
- [WiFi Antenna Specification, page 130](#)

For more information about Cisco Connected Grid antennas see the [Connected Grid Antennas Installation Guide](#).

GPS Antenna Specification

Table 24 GPS Antenna Specification

| Specification | GPS Antenna |
|--------------------------------|------------------------------------|
| Type | Active GPS, chassis mounted |
| Frequency | 1575.42 MHz |
| Height | 22.1 mm |
| Base diameter | 50 mm |
| Maximum gain (dBi) | 5 |
| Polarization | RHCP |
| Coaxial cable length | 10 in. (25.4 cm) |
| Coaxial cable type | 50 Ohms, double-shielded, LMR-100A |
| Connector | MCX |
| Environment | Outdoor |
| Temperature range, operational | -40 to 185° F (-40 to 85° C) |
| Temperature range, storage | -40 to 185° F (-40 to 85° C) |

WiFi Antenna Specification

Table 25 WiFi Antenna Specification

| Specification | WiFi Antenna |
|---------------------------|--|
| Type | Monopole |
| Environment | Outdoor |
| Height | 3.2 in. (8.13 cm) |
| Width (maximum, at base) | 1.75 in. (4.45 cm) |
| Operating frequency range | 806-960 MHz 1710-2170 MHz 2300-2700MHz |
| Characteristic impedance | 50 ohm |
| VSWR | Nominal (Maximum) 806-960 MHz (2.5:1) 1710-2170 MHz (2.3:1) 2300-2700 MHz (2.2:1) |
| Peak gain | Nominal (Maximum) 806-960 MHz (2.5 dBi +/- 1.0 dB) 1710-2170 MHz (1.0 dBi +/- 1.0 dB) 2300-2500 MHz (1.0 dBi +/- 1.0 dB) 2500-2700 MHz (2.5 dBi +/- 1.2 dB) |

Table 25 WiFi Antenna Specification (continued)

| Specification | WiFi Antenna |
|--------------------------------|------------------------------|
| Polarization | Linear Vertical |
| Coaxial cable length | 8 inches (20.3 cm), LMR-100A |
| Connector | MCX |
| Temperature range, operational | -40 to 185° F (-40 to 85° C) |
| Temperature range, storage | -40 to 185° F (-40 to 85° C) |
| Maximum input power | 10 W (avg.) |
| Compliance | RoHS |

