

Cisco One-Year Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranty applicable to Cisco software, is available on Cisco.com. Follow these steps to access and download the *Cisco Information Packet* and your warranty document from Cisco.com.

1. Launch your browser, and go to this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpkc/cetrans.htm

The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:
 - a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-02F0 is highlighted.
 - b. Select the language in which you would like to read the document.
 - c. Click **Go**.

The Cisco Limited Warranty and Software License page from the Information Packet appears.

- d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).



Note

You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from Adobe's website: <http://www.adobe.com>

3. To read translated and localized warranty information about your product, follow these steps:
 - a. Enter this part number in the Warranty Document Number field:
78-10747-01C0
 - b. Select the language in which you would like to view the document.
 - c. Click **Go**.
The Cisco warranty page appears.
 - d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

http://www.cisco.com/public/Support_root.shtml.

Duration of Hardware Warranty

One (1) Year

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for reference.

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

Preface

This guide is designed to make you familiar with the Cisco Aironet 1400 Series Wireless Bridge. The guide identifies the major components of the bridge and describes their functions within the bridge system. Installation and configuration processes are also discussed in fundamental terms.



Warning

Read the installation instructions before you connect the system to its power source.



Warning

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

Related Documents

The following documents provide additional information about the wireless bridge:

- *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide*
- *Cisco Aironet 1400 Series Bridges Software Configuration Guide*

- *Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges*
- *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions*
- *Cisco Aironet 1400 Series Wireless Bridge 9-dBi Omnidirectional Antenna*
- *Cisco Aironet 1400 Series Wireless Bridge 9.5-dBi Sector Antenna*
- *Cisco Aironet 1400 Series Wireless Bridge 28-dBi Dish Antenna*

These documents are available on Cisco.com. Follow these steps to access them:

1. Browse to <http://www.cisco.com>
2. Click **Products and Services**. A Products and Services window appears.
3. Click **Wireless LAN Products**. The Cisco Wireless LAN Products page appears.
4. Click **Cisco Aironet 1400 Series**. The Cisco Aironet 1400 Series page appears.
5. In the left-hand frame, click **Instructions and Guides**. A list of instructions and guides for the bridge appears.
6. Select the document you wish to view.

Introduction to the Wireless Bridge

The Cisco Aironet 1400 Series Wireless Bridge is a high-performance outdoor-deployable wireless bridge that provides wireless connectivity between multiple network locations within a metro area with a low total cost of ownership. The bridge operates in the unlicensed UNII-3 frequency band (5725 to 5825 MHz) and provides high-speed data transfer rates of 6 to 54 Mbps.

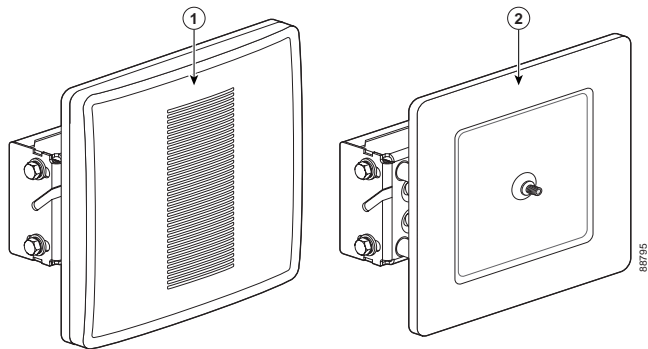
The bridge is designed for applications requiring high data throughput over intermediate ranges. For a point-to-point link, the bridge provides a maximum speed of 54 Mbps at ranges of up to 7.8 mi. (12.5 km) using the integrated antenna. The system is also configurable for point-to-multipoint operation over distances of up to 2.0 mi. (3.2 km) using a 9-dBi gain omnidirectional antenna at the root bridge site and a 22.5-dBi gain antenna at the non-root bridge site.

In addition, two point-to-point bridge links can be stacked to increase data throughput or provide aggregation and redundancy.

Two configurations of the bridge are available:

- Integrated (built-in) 22.5-dBi antenna
- External antenna (connects an optional antenna)

The following illustration shows the two configurations:



1	Integrated antenna configuration	2	External antenna configuration
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The bridge system includes these major components:

- Bridge
- Bridge Power Injector LR
- Power module
- Grounding block
- Multi-function mount

Network Configurations

The following sections describe the bridge's role in three common network configurations: point-to-point, point-to-multipoint, and port aggregation or redundancy.

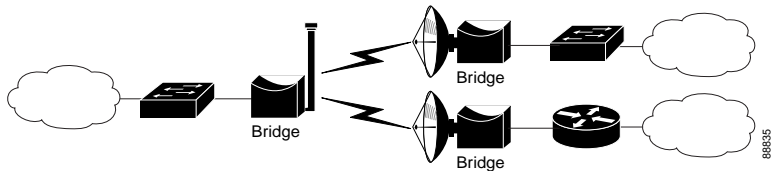
Point-to-Point Configuration

In a point-to-point configuration, two bridges connect two LAN networks together using a wireless communication link. The following illustration shows a typical point-to-point configuration.



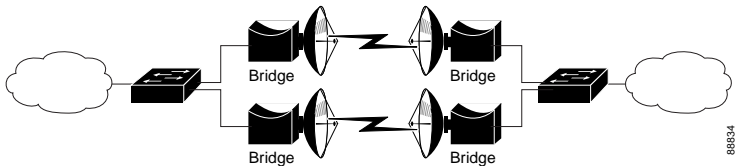
Point-to-Multipoint Configuration

The point-to-multipoint configuration connects the main LAN network to multiple remote LAN networks. The following illustration shows a typical point-to-multipoint configuration.



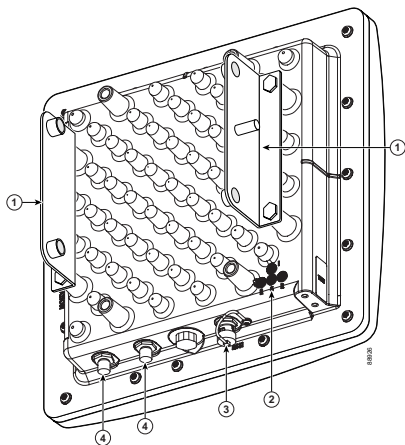
Port Aggregation or Redundancy Configuration

The port aggregation or redundancy configuration increases bandwidth or backup redundancy communications between two LANs. Port aggregation for increased bandwidth occurs when both wireless links simultaneously pass Ethernet traffic. Backup communication redundancy is achieved when the second wireless bridge link is used if the first link fails. The maximum number of bridges allowed for redundancy configurations is two. The following illustration shows a typical port aggregation or redundancy configuration.



The Bridge

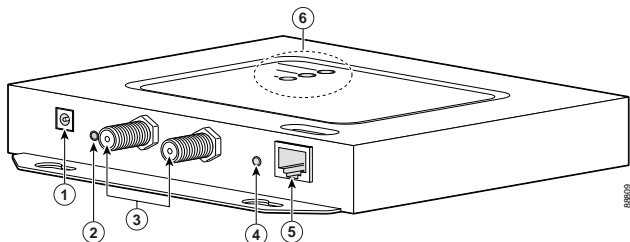
The bridge is typically installed outdoors and provides all IOS software and radio functionality. The following illustration shows the bridge and identifies its interfaces.



1	Mounting bracket	3	RSSI voltage port
2	Status and RSSI LEDs	4	Power Injector LR coax interfaces

Bridge Power Injector LR

The bridge Power Injector LR delivers 48-VDC power to the bridge. It also serves as an Ethernet repeater between the internal LAN and bridge and provides surge protection for any charge that might build up on the Ethernet cable inner conductor. Power and data are transmitted to the bridge through two 75Ω coaxial cables. The Power Injector LR receives 48-VDC power from the power module. It receives Ethernet data from the internal LAN via an RJ-45 connector. The following illustration shows the bridge power injector and identifies its interfaces.

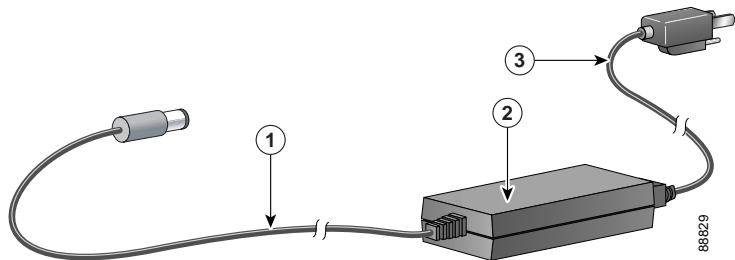


1	48-VDC power connector	4	Mode button
2	Power LED	5	RJ-45 Ethernet port
3	Power Injector LR coax interface	6	Status LEDs

Two lengths of dual 75Ω coaxial cable are provided: 20 ft (6.1 m) and 50 ft (15.2 m). These cables connect the Power Injector LR to the bridge through the grounding block.

Power Module

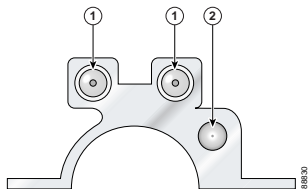
The power module provides 48-VDC power at up to 60W to the Power Injector LR, which in turn provides power to the entire bridge system. The following illustration shows the power adapter and identifies its interfaces.



1	48-VDC output cable	3	AC input cord
2	Power adapter		

Grounding Block

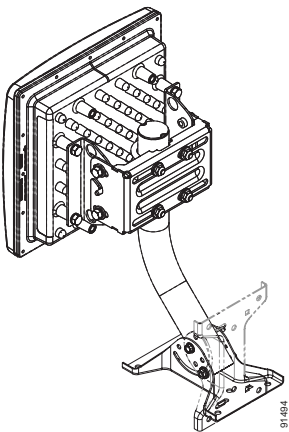
The grounding block provides lightning provides surge protection for any charge that might build up on the Ethernet cable inner conductor. It is normally installed inline with the 75Ω dual coaxial cables at the building entrance. The following illustration shows a typical grounding block.



1	F-type coaxial connectors	2	Ground wire lug
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Multi-Function Mount

The multi-function mount enables you to mount the bridge on a mast or on a roof. The mount permits easy azimuth and elevation adjustments for antenna alignment. The following illustration shows how to use the multi-function mount to mount the bridge on a roof or wall using an optional roof or wall mount.

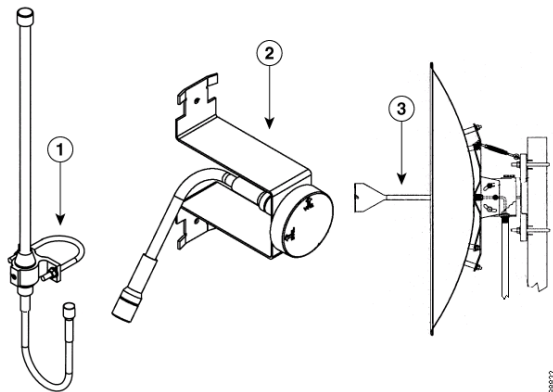


Antenna Options

The following optional antennas are available for the external antenna model of the bridge:

- 9-dBi omnidirectional antenna
- 9.5-dBi sector antenna
- 28-dBi dish antenna

The following illustration shows these antennas.



1	9-dBi omnidirectional antenna	3	28-dBi dish antenna
2	9.5-dBi sector antenna		



Note

To meet regulatory restrictions, these antennas must be professionally installed.

Do not install 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, because 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).

9-dBi Omnidirectional Antenna

The 9-dBi omnidirectional antenna covers 360 degrees, so it can receive signals from any direction. See the *Cisco Aironet 1400 Series Wireless Bridge 9-dBi Omnidirectional Antenna* document that ships with the antenna (and is also on Cisco.com) for additional information.

9.5-dBi Sector Antenna

The 9.5-dBi sector antenna covers a 90-degree sector, so it can receive signals from multiple bridges within range within that sector. See the *Cisco Aironet 1400 Series Wireless Bridge 9.5-dBi Sector Antenna* document that ships with the antenna (and is available on Cisco.com) for additional information.

28-dBi Dish Antenna

The 28-dBi dish antenna provides a highly directional pattern that results in extended ranges between devices. See the *Cisco Aironet 1400 Series Wireless Bridge 28-dBi Dish Antenna* document that ships with the antenna (and is available on Cisco.com) for additional information.

Unpacking the Bridge

Each version of the bridge is shipped with the following items:

- Bridge
- Bridge Power Injector LR
- Power module
- Grounding block
- Mounting kit and hardware
- Two dual-coaxial cables, 20 ft (6.1 m) and 50 ft (15.2 m)
- Weather-proofing kit (Coax Seal and anti-corrosion gel)
- *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions*
- This guide

If anything is missing, contact your Cisco representative for support.

Installing the Bridge

Typically, the bridge is installed on a rooftop, mast, tower, wall, or a suitable flat surface. Because there are so many ways to install the bridge, this guide provides an overview with references to specific installation documents.

Personnel installing the bridge must understand wireless bridging techniques, particularly antenna alignment and adjustment. The integrated antenna version can be installed by an experienced IT personnel, but the external antenna version must be professionally installed.

There are three basic types of bridge installations:

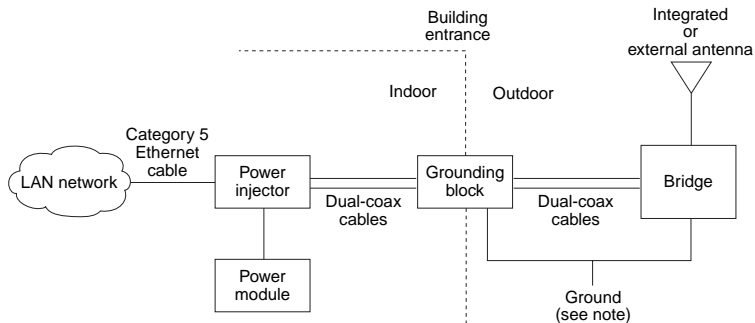
- Rooftop with short mast
- Mast top (tall mast)
- Tower



Note

Each of these installation types requires different approaches to the installation process. These approaches are described in detail in the *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions* that shipped with your bridge.

The following illustration shows how the bridge components are connected in a typical installation.



888396



Note

Ground wires must comply with Sections 810 and 820 of the National Electrical Code and Section 54 of the Canadian Electrical Code.



Caution

To ensure correct installation and grounding, install the bridge in compliance with your local and national electrical codes: National Fire Protection Association (NFPA) 70, National Electrical Code (U.S.); Canadian Electrical Code, Part 1, CSA 22.1 (Canada). If local or national electrical codes are not available, refer to IEC 364, Part 1 through Part 7 (other countries).



Warning

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Before You Install the Bridge

Prior to installing a bridge system, develop a preinstallation checklist that covers all aspects of the installation. A well-developed plan identifies potential problems early so that they can be solved before the installation process begins.

The installation process involves two critical phases:

- Conducting a site survey
- Installing and linking the bridges

Conducting a Site Survey

A site survey is essential to the success of the installation and is highly recommended before you install your bridge system. The site survey helps you produce a clear plan of action for installing the bridges and establishing communications between them quickly and efficiently.

The site survey helps you examine path clearance for radio signal propagation. The path clearance data you collect establishes the parameters necessary to obtain a clear line-of-sight signal path for the link. Use this data to install and initially align the bridge's antennas and establish an efficient radio link.

Contact your Cisco representative for additional information about site surveys.

Installing and Linking the Bridges

Installing and linking the bridges should be performed by experienced IT personnel or, if your installation uses external antennas, professional installers. The process is complex and is beyond the scope of this guide;

therefore, only a summary is presented in the following paragraphs. The process is described in detail in the *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions* that shipped with your bridge.

When powered up the first time, the bridge searches for a DHCP server. If it finds one, the bridge uses the assigned address. If a DHCP server is not found, the bridge becomes a DHCP server and assigns itself an IP address of 10.0.0.1 with a subnet mask of 255.255.255.224. When the bridge destined to be part of the link is powered up, it goes through the same process. Because the first bridge is a DHCP server, it assigns the second bridge an IP address when radio communications are established. This is done to prevent conflicting IP addresses so that the bridges can associate. The bridge also defaults to an automatic installation mode. In this mode, the bridge is configured so you can establish a link and align the antenna without connecting it to a computer or network.

The antenna alignment process verifies that the antenna provides an optimum signal path for the link. You determine that the antenna is properly aimed by panning and tilting it through the link's signal path (a predetermined number of degrees of azimuth and elevation) while observing the bridge's RSSI LEDs. As the antenna is panned and tilted, the LEDs indicate signal strength by displaying varying amber patterns. The goal is to obtain as many continuous amber RSSI LEDs as possible. All RSSI LEDs continuously amber indicates maximum signal strength.

To verify the alignment and make finer adjustments, you can connect a voltmeter to the bridge's RSSI voltage port. The port provides a DC voltage proportional to the received RF signal level. Panning and tilting the antenna through the signal path produces varying voltage readings. The maximum voltmeter reading (peak) indicates the optimum antenna position.

Aligning the Antennas

The antenna alignment process for the integrated antenna model is described below in simplified terms. Optional antenna model procedures are similar.



Note Polarization for the antennas you are aligning must be the same.

Begin at the root bridge location and perform the following steps:

1. Position the bridge's antenna to the azimuth, elevation, and polarization recommended by the site survey.
2. Power up the bridge and confirm that it is a root bridge and is in installation mode. (Wait until the Install LED changes from blinking amber to blinking green.)
3. Proceed to the non-root bridge location.

4. Position the non-root bridge's antenna to the azimuth, elevation, and polarization recommended by the site survey. If the site survey data is correct, the two antennas are pointed towards each other close to the line-of-site signal path.
5. Power up the non-root bridge.
6. Observe the non-root bridge LEDs and confirm that the bridge has associated to the root bridge. (Install LED is continuous amber.)
7. Pan the bridge's antenna from side to side and tilt it up and down while observing the RSSI LEDs. The goal is to obtain as many continuous amber LEDs as possible.
8. Optional—Fine tune the alignment using a voltmeter.
9. Secure the non-root bridge mounting fasteners.
10. Return to the root bridge location.
11. Observe the root bridge LEDs and confirm that the bridge is associated with the non-root bridge. (Install LED is green.)
12. Repeat Steps 7 and 8.
13. Secure the root bridge mounting fasteners.

The bridges are ready to be configured and incorporated into your network.

Configuring the Bridge

After the bridge link is established, the next phase of the process is to configure the bridges so that they become part of your network. You can configure the bridge using its command line interface (CLI) to issue IOS commands or using its graphical user interface (GUI). This guide describes the GUI and shows you how to access its Express Setup page and perform an initial configuration.

The entire configuration process using the GUI is described in the *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide*. Advanced configuration information and using the CLI to issue IOS commands are described in the *Cisco Aironet 1400 Series Wireless Bridge Software Configuration Guide* and the *Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges*. These documents are available at Cisco.com.

After establishing a link, you must place the bridges in the normal mode. To accomplish this, browse to the bridge's Express Setup page and change the Role in Radio Network parameter to either a root or non-root bridge as appropriate. Then change the bridge's SSID to conform to your wireless network. These and other parameters are described in the following sections.

If you are at the root bridge site make configuration changes in the non-root bridge first, then the root bridge. This sequence is required because the link is lost when the non-root parameters take effect, but it reassociates after the root bridge's parameters take effect.

If you are at the non-root bridge site, make configuration changes to the root bridge first, then the non-root bridge.

Accessing the Setup Pages

Before accessing the bridge's setup pages, obtain the necessary configuration information from your network administrator. Then follow these steps to browse to the bridge's Express Setup page.

1. Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x or later).
2. Enter the bridge's IP address in the browser address line and press **Enter**. An Enter Network Password window appears.

The default IP address for the root bridge is 10.0.0.1. The IP address for the non-root bridge can be found by going into the root bridge's Associations page and clicking on the MAC address of the non-root bridge.

3. Enter the case-sensitive username *Cisco* and press the **Tab** key to advance to the Password field.
4. Enter the case-sensitive password *Cisco* and press **Enter**. The Home: Summary Status page appears.
5. Click **Express Setup**. The Express Setup page appears.

Cisco Aironet 1400 Series Wireless Bridge

The screenshot shows the configuration interface for a Cisco Aironet 1400 Series Wireless Bridge. The page title is "Cisco Aironet 1400 Series Wireless Bridge". On the left is a navigation menu with items: HOME, EXPRESS SET UP (highlighted), NETWORK MAP, ASSOCIATION, NETWORK INTERFACES (+), SECURITY (+), SERVICES (+), SYSTEM SOFTWARE (+), and EVENT LOG (+). The main content area is titled "Express Set-Up" and shows the following configuration details:

- Hostname: bridge
- bridge uptime is 1 minute
- Express Set-Up**
- System Name: bridge
- MAC Address: 0005.9a3c.6242
- Configuration Server Protocol: DHCP Static IP
- IP Address: 10.0.0.1
- IP Subnet Mask: 255.255.255.224
- Default Gateway: 0.0.0.0
- SNMP Community: defaultCommunity
 - Read-Only
 - Read-Write
- Radio0 802.11A**
- SSID: autoinstall
- Broadcast SSID in Beacon: Yes No
- Role in Radio Network: Root Non-Root Install-Mode
- Optimize Radio Network for: Throughput Range Default Custom

At the bottom right of the configuration area are "Apply" and "Cancel" buttons. A small vertical number "88819" is visible on the right edge of the interface.

6. Enter the configuration settings for your network provided by your network administrator. The window's configurable settings are identified and described briefly below.

System Name—The system name provides an identifier for the bridge. The default system name is *Bridge*.

Configuration Server Protocol—Click the button that matches your network’s method of IP address assignment:

- **DHCP**—IP addresses are automatically assigned by your network’s DHCP server. This is the default setting unless a DHCP server cannot be found.
- **Static IP**—IP addresses are assigned manually.

IP Address—Displays the current IP address. The default IP address is *10.0.0.1*. Use this setting to assign or change the bridge’s IP address. Use the IP setup utility (IPSU) to determine the IP address if it was assigned by a DHCP server. See Chapter 4 of the *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide*.

IP Subnet Mask—Enter the IP subnet mask. The default IP subnet mask is *255.255.255.224*. The subnet mask determines the subnet to which the bridge’s IP address belongs. If DHCP is not enabled for your network, the IP and subnet address you enter is the bridge’s IP and subnet address. If DHCP is enabled, these two fields provide the IP and subnet mask address only if no server responds to the bridge’s DHCP request.

Default Gateway—Enter the default gateway IP address. The default gateway IP address is *0.0.0.0*. The default gateway is the node on your network that serves as an entrance to another network.

SNMP Community—Enter the SNMP community the bridge will use for network management and assign the attributes for the community: read-only or read-write.

Radio Service Set ID (SSID)—Enter the case-sensitive SSID. The SSID is a unique identifier that makes the bridge part of a specific wireless network. When the bridge is powered up for the first time, its default SSID is *autoinstall*. After a static IP address is assigned or the role in the radio network is changed from Install-Mode, the default SSID is *tsunami*.

Broadcast SSID in Beacon—Use this setting to allow bridges that do not specify an SSID to connect to the bridge.

- **Yes**—This is the default setting; it allows bridges that do not specify an SSID to associate with the bridge.
- **No**—Other bridges must specify an SSID to associate with the bridge. When No is selected, the SSID used by the non-root bridges must match exactly the bridge's SSID.

Role in Radio Network—Click on the button that describes the role of the bridge on your network:

- **Root**—The bridge is connected to the main wired LAN.
- **Non-Root**—The bridge is connected to the remote wired LAN to which it provides a wireless link to the main wired LAN.
- **Install-Mode**—The bridge is configured for automatic installation. This setting enables an installer to establish a link between bridges for antenna alignment purposes. This is the default setting.

Optimize Radio Network for—Selects a preset configuration or enables you to customize a configuration that determines how the radio performs.

- **Throughput**—Maximizes the data volume handled by the bridge. This is the default setting.
- **Range**—Maximizes the bridge's range but might reduce its throughput.
- **Custom**—Uses settings you configure on the Network Interfaces: Radio-802.11A Settings page.

7. Click **Apply** to save your settings.

The express setup puts the bridge on the network but will probably require additional configuring to conform with your network's operational and security requirements. Consult the *Cisco Aironet 1400 Series Wireless Bridge Software Configuration Guide* or the *Cisco Aironet Access Points and Bridges Running Cisco IOS Command Reference* to obtain the information needed to complete the configuration. These documents are available on Cisco.com.

Safety Information

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. When used with approved Cisco Aironet antennas, Cisco Aironet products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper installation of this radio according to

the instructions found in this manual and the *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide* will result in user exposure that is substantially below the FCC recommended limits.

- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise the radio may be damaged.
- Antenna use:
 - Do not hold any component so that the front of the antenna is very close to or touching any exposed parts of your body, especially the face and eyes, while transmitting.
 - The external antennas for this bridge must be professionally installed. Cisco recommends that you contact your professional installer, VAR, or antenna manufacturer to obtain proper installation requirements.

Warnings

Translated versions of the following safety warnings are provided in Appendix A of the *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide*.



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 (e.g. U.S.:NFPA 70, National Electrical Code, Article 810, in Canada: Canadian Electrical Code, Section 54).



Warning

Installation of this antenna near power lines is dangerous. For your safety, follow the installation directions.



Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).



Warning

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.



Warning

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



Warning

Do not operate your wireless network device near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use.



Warning

Industry standards relating to radio frequency (RF) exposure limits for this product require that the antennas should be positioned no less than 6.6 ft. (2 m) from your body or nearby persons.

Compliance Information

This type-accepted equipment is designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in accordance with the instruction manual, may cause harmful interference to radio communications.