



**DRAFT - CISCO CONFIDENTIAL**



## **Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide**

May, 2003

### **Corporate Headquarters**

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
<http://www.cisco.com>  
Tel: 408 526-4000  
800 553-NETS (6387)  
Fax: 408 526-4100

Customer Order Number:  
Text Part Number: OL-4072-01



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCIP, CCSP, the Cisco Arrow logo, the Cisco *Powered* Network mark, Cisco Unity, Follow Me Browsing, FormShare, and StackWise are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, and iQuick Study are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Empowering the Internet Generation, Enterprise/Solver, EtherChannel, EtherSwitch, Fast Step, GigaStack, Internet Quotient, IOS, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, LightStream, MGX, MICA, the Networkers logo, Networking Academy, Network Registrar, *Packet*, PIX, Post-Routing, Pre-Routing, RateMUX, Registrar, ScriptShare, SlideCast, SMARTnet, StrataView Plus, Stratm, SwitchProbe, TeleRouter, The Fastest Way to Increase Your Internet Quotient, TransPath, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

All other trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0304R)



- Objectives vii
- Audience vii
- Organization vii
- Conventions viii
- Related Publications ix
- Obtaining Documentation x
  - Cisco.com x
  - Documentation CD-ROM x
  - Ordering Documentation x
  - Documentation Feedback xi
- Obtaining Technical Assistance xi
  - Cisco.com xi
  - Technical Assistance Center xii
    - Cisco TAC Website xii
    - Cisco TAC Escalation Center xii
- Obtaining Additional Publications and Information xiii

**CHAPTER 1**

- Overview 1-1**
  - Key Features 1-2
    - Power 1-2
    - External Antenna 1-3
    - Integrated Antenna 1-3
    - Dual-Coax Ethernet Ports 1-3
    - Metal Enclosure 1-3
    - Indicators 1-4
    - Receive Signal Strength Indicator Port 1-5
  - Network Configuration Examples 1-5
    - Point-to-Point Configuration 1-5
    - Port Aggregation or Redundancy Configuration 1-5
    - Point-to-Multipoint Configuration 1-6
  - Bridge Specifications 1-6

**CHAPTER 2**

- Installation Overview 2-1**
  - Warnings 2-2

**DRAFT - CISCO CONFIDENTIAL**

- Safety Information 2-3
  - FCC Safety Compliance Statement 2-3
  - Safety Precautions 2-3
  - Typical Bridge Installation Components 2-4
- Installation Guidelines 2-5
- Site Surveys 2-5
- Unpacking the Bridge 2-5
  - Package Contents 2-6
- Before Beginning the Installation 2-6
- Installation Summary 2-8

**CHAPTER 3**

**Mounting and Alignment Overview 3-1**

- Mounting the Bridge 3-2
- Mounting Hardware 3-2
  - Multi-function Mount 3-2
  - Bridge Brackets 3-2
  - Mast Bracket 3-3
- Bridge LED Indicators 3-3
- Aligning the Antenna Using LED Indications 3-5
- Aligning the Antenna Using the RSSI Voltage 3-6

**CHAPTER 4**

**Configuring the Bridge for the First Time 4-1**

- Before You Start 4-2
  - Resetting the Bridge to Default Settings 4-2
- Obtaining and Assigning an IP Address 4-3
- Connecting to the Bridge Locally 4-3
- Assigning Basic Settings 4-4
  - Default Settings on the Express Setup Page 4-8
- What To Do Next 4-8
  - Output Power Level 4-8
  - Protecting Your Wireless LAN 4-9
- Using the IP Setup Utility 4-9
  - Obtaining and Installing IPSU 4-9
  - Using IPSU to Find the Bridge's IP Address 4-10
  - Using IPSU to Set the Bridge's IP Address and SSID 4-10
- Assigning an IP Address Using the CLI 4-12
- Using a Telnet Session to Access the CLI 4-12

**DRAFT - CISCO CONFIDENTIAL****CHAPTER 5****Troubleshooting 5-1**

Checking the LED Indicators	5-2
Bridge Installation Mode LED Indications	5-3
Bridge Normal Mode LED Indications	5-4
Power Injector LED Indicators	5-5
Checking Basic Configuration Settings	5-7
SSID	5-7
Security Settings	5-7
Antenna Alignment	5-8
Resetting to the Default Configuration	5-8
Using the MODE Button	5-9
Using the Web Browser Interface	5-9
Reloading the Bridge Image	5-10
Using the MODE button	5-10
Web Browser Interface	5-11
Browser HTTP Interface	5-11
Browser TFTP Interface	5-11
Obtaining the Bridge Image File	5-12
Obtaining the TFTP Server Software	5-12

**APPENDIX A****Translated Safety Warnings A-1**

Warning Definition	A-2
Installation Warning	A-3
Installation and Grounding Warning	A-4
Circuit Breaker Warning	A-6
Ground Conductor Warning	A-7
Installation Warning	A-9
Lightning Activity Warning	A-10
Explosive Device Proximity Warning	A-11
Bridge Antenna Exposure Limits -TBD	A-11

**APPENDIX B****Declarations of Conformity and Regulatory Information B-1**

Manufacturers Federal Communication Commission Declaration of Conformity Statement	B-2
Department of Communications—Canada	B-3
Canadian Compliance Statement	B-3
Declaration of Conformity for RF Exposure	B-4

***DRAFT - CISCO CONFIDENTIAL***

---

**APPENDIX C**

**Channels and Antenna Settings C-1**

Channels C-2

IEEE 802.11a (5.8-GHz Band) C-2

Maximum Power Levels C-2

5.8-GHz Band C-2

---

**GLOSSARY**

---

**INDEX**

## Preface

---

This section describes the objectives, audience, organization, and conventions of the *Cisco Aironet 1400 Series Wireless Bridge Hardware Installation Guide*.

## Objectives

This publication explains the steps for initial setup and basic configuration of the Cisco Aironet 1400 Series Wireless Bridge (hereafter called bridge) supporting 5.8-GHz operation. This publication also provides troubleshooting information and detailed specifications.

## Audience

This publication is for the person installing and configuring a bridge for the first time. The installer should be familiar with network structures, terms, and concepts.

## Organization

This guide contains the following sections:

[Chapter 1, “Overview,”](#) describes the major components, features, and specifications of the bridge.

[Chapter 2, “Installation Overview,”](#) provides warnings, safety information, and information needed before you begin the installation of your bridge system.

[Chapter 3, “Mounting and Alignment Overview,”](#) provides an overview of components and features used during bridge mounting and antenna alignment operations.

[Chapter 4, “Configuring the Bridge for the First Time,”](#) describes how to enter basic bridge configuration settings.

[Chapter 5, “Troubleshooting,”](#) provides solutions to potential problems encountered during setup.

[Appendix A, “Translated Safety Warnings,”](#) lists translations of the safety warnings in this publication.

[Appendix B, “Declarations of Conformity and Regulatory Information,”](#) describes the regulatory conventions to which the bridge conforms and provides guidelines for operating bridges in Japan.

[Appendix C, “Channels and Antenna Settings,”](#) describes the channels and antenna settings supported by the regulatory organizations.

**DRAFT - CISCO CONFIDENTIAL**

# Conventions

This publication uses the following conventions to convey instructions and information:

- Commands and keywords are in **boldface** type.

**Note**

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

**Warning**

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix "Translated Safety Warnings.")**

**Waarschuwing**

**Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel "Translated Safety Warnings" (Vertalingen van veiligheidsvoorschriften) raadplegen.)**

**Varoitus**

**Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)**

**Attention**

**Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité).**

**Warnung**

**Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise).)**



## DRAFT - CISCO CONFIDENTIAL

Avvertenza	<b>Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza).</b>
Advarsel	<b>Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler].)</b>
Aviso	<b>Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança").</b>
¡Advertencia!	<b>Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings.")</b>
Varning!	<b>Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar].)</b>

## Related Publications

For more information about bridges and related products, refer to the following publications:

- *Quick Start Guide: Cisco Aironet 1400 Series Wireless Bridge* describes the bridge, system components, and how to obtain bridge documentation. This document is included in the shipping box with your bridge.
- *Cisco Aironet 1400 Series Wireless Bridge Software Configuration Guide* describes the bridge's management system and explains how to configure the bridge. This document is available on the Cisco CCO web site at the following URL:  
[TBD](#)
- *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions* that was shipped with your bridge provides detailed instructions for mounting the bridge and aligning the antenna .
- *Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges* describes the IOS commands supported by Cisco Aironet access points and bridges. This document is available on the Cisco CCO web site at the following URL:  
[TBD](#)

## **DRAFT - CISCO CONFIDENTIAL**

- *Release Notes for Cisco Aironet 1400 Series Wireless Bridge* describes features and caveats for the bridge running IOS release 12.2(11)JA. This document is available on the Cisco CCO web site at the following URL:

[TBD](#)

- Cisco Secure Access Control Server for Windows 2000/NT Servers Version 3.0 User Guide provides complete instructions for using Cisco Secure ACS, including steps for configuring Cisco Secure ACS to support access points and bridges. This document is available on the Cisco CCO web site at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_soft/csacs4nt/csnt30/user/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_soft/csacs4nt/csnt30/user/index.htm)

## Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

### Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

International Cisco websites can be accessed from this URL:

[http://www.cisco.com/public/countries\\_languages.shtml](http://www.cisco.com/public/countries_languages.shtml)

### Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package. The Documentation CD-ROM is updated regularly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual or quarterly subscription.

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

[http://www.cisco.com/en/US/partner/ordering/ordering\\_place\\_order\\_ordering\\_tool\\_launch.html](http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html)

All users can order monthly or quarterly subscriptions through the online Subscription Store:

<http://www.cisco.com/go/subscription>

### Ordering Documentation

You can find instructions for ordering documentation at this URL:

[http://www.cisco.com/univercd/cc/td/doc/es\\_inpk/pdi.htm](http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm)

## **DRAFT - CISCO CONFIDENTIAL**

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:  
<http://www.cisco.com/en/US/partner/ordering/index.shtml>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

## **Documentation Feedback**

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can e-mail your comments to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems  
Attn: Customer Document Ordering  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

## **Obtaining Technical Assistance**

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

## **Cisco.com**

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

<http://tools.cisco.com/RPF/register/register.do>

**DRAFT - CISCO CONFIDENTIAL**

## Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The type of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration. There is little or no impact to your business operations.
- Priority level 3 (P3)—Operational performance of the network is impaired, but most business operations remain functional. You and Cisco are willing to commit resources during normal business hours to restore service to satisfactory levels.
- Priority level 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively impacted by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.
- Priority level 1 (P1)—An existing network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

### Cisco TAC Website

The Cisco TAC website provides online documents and tools to help troubleshoot and resolve technical issues with Cisco products and technologies. To access the Cisco TAC website, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://tools.cisco.com/RPF/register/register.do>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, we recommend that you open P3 and P4 cases online so that you can fully describe the situation and attach any necessary files.

### Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

## DRAFT - CISCO CONFIDENTIAL

Before calling, please check with your network operations center to determine the Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

# Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

[http://www.cisco.com/en/US/products/products\\_catalog\\_links\\_launch.html](http://www.cisco.com/en/US/products/products_catalog_links_launch.html)

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco quarterly publication that provides the latest networking trends, technology breakthroughs, and Cisco products and solutions to help industry professionals get the most from their networking investment. Included are networking deployment and troubleshooting tips, configuration examples, customer case studies, tutorials and training, certification information, and links to numerous in-depth online resources. You can access *Packet* magazine at this URL:

<http://www.cisco.com/go/packet>

- iQ Magazine is the Cisco bimonthly publication that delivers the latest information about Internet business strategies for executives. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

- Internet Protocol Journal is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

[http://www.cisco.com/en/US/about/ac123/ac147/about\\_cisco\\_the\\_internet\\_protocol\\_journal.html](http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html)

- Training—Cisco offers world-class networking training. Current offerings in network training are listed at this URL:

[http://www.cisco.com/en/US/learning/le31/learning\\_recommended\\_training\\_list.html](http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html)

***DRAFT - CISCO CONFIDENTIAL***



## Overview

---

The Cisco Aironet 1400 Series Bridge (hereafter called the *bridge*) is a wireless device designed for building to building wireless connectivity. Operating in the 5.8 GHz UNII 3 band (5725 to 5825 MHz), derived from the 802.11a standard, the bridge delivers 6-54 Mbps data rates without the need for a license. The bridge is a self contained unit designed for outdoor installations, providing differing antenna gains as well as coverage patterns and supports both point-to-point and multipoint configurations.

The bridge uses a browser-based management system, but you can also configure the bridge using Cisco IOS commands or Simple Network Management Protocol (SNMP).

This chapter provides information on the following topics:

- [Key Features, page 1-2](#)
- [Network Configuration Examples, page 1-5](#)
- [Bridge Specifications, page 1-6](#)

**DRAFT - CISCO CONFIDENTIAL**

# Key Features

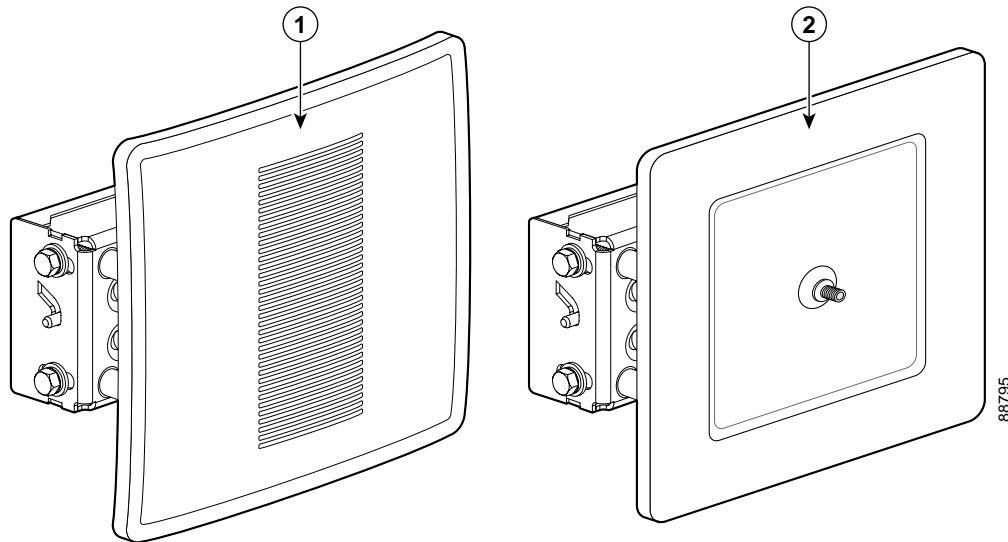
Key features of the bridge:

- Unlicensed UNII-3 5.8-GHz radio operation
- Metal enclosure supports outdoor installations
- Industrial temperature rating
- Integrated antenna or external antenna configurations (see [Figure 1-1](#))
- Dual-coax 100 Mbps Ethernet ports
- Four LED indicators on bridge
- Inline power over dual-coax Ethernet cables
- Receive Signal Strength Indicator (RSSI) voltage port for easy antenna alignment
- Bridge control using IOS commands, Internet browser, or SNMP

**Note**

The bridge communicates only with other bridges and does not support associations with wireless client adapters.

**Figure 1-1 Bridge Configurations**



<b>1</b>	Integrated antenna bridge configuration	<b>2</b>	External antenna bridge configuration
----------	---	----------	---------------------------------------

## Power

The bridge receives inline power from the Cisco Aironet Power Injector LR (hereafter called the *power injector*). Dual-coax Ethernet cables are used to provide Ethernet data and power from the power injector to the bridge. The power injector is an external unit designed for operation in a sheltered environment, such as inside a building. The power injector also functions as an Ethernet repeater by connecting to a Category 5 LAN backbone and using the dual-coaxial cable interface to the bridge.



## DRAFT - CISCO CONFIDENTIAL

The power injector uses an external 48 VDC power module and after detecting the presence of the bridge, injects the DC voltage into the dual coax cables to power the bridge.

**Note**

The power injector and the power module should not be placed in an outdoor unprotected environment.

## External Antenna

The bridge is available with an N-type RF connector on the front of the unit (see [Figure 1-1](#)) for an external 5.8-GHz antenna. The supported external antennas connect to the bridge antenna connector using the antenna's 4.9 ft (1.5 m) long coax cable.

- 9 dBi omnidirectional external antenna with vertical polarization
- 9.5 dBi sector external antenna
- 28 dBi dish external antenna

**Note**

To meet regulatory restrictions, the external antenna bridge configuration and the external antenna must be professional installed.

## Integrated Antenna

The bridge is available with an integrated 22.5 dBi patch array antenna. The antenna is covered with a special radome cover to protect the antenna from environmental elements. When configured with the integrated antenna, the antenna polarization is controlled by the mounting orientation of the bridge. The bridge must be physically rotated 90 degrees to obtain either horizontal or vertical polarization. A special polarization mark is designed into the bridge housing to indicate the polarization direction.

## Dual-Coax Ethernet Ports

The bridge's dual Ethernet ports accepts a pair of 75 ohm F-type connectors, linking the bridge to your 100BASE-T Ethernet LAN through the power injector. The dual coax cables are used to send and receive Ethernet data, plus the cables supply inline 48 VDC power from the power injector. For the location of the ports, refer to [Figure 1-2](#).

**Tip**

You can connect the dual coax cable connectors to either of the bridge's Ethernet ports. The bridge senses the Ethernet signals and automatically switches internal circuitry to match the cable connections.

## Metal Enclosure

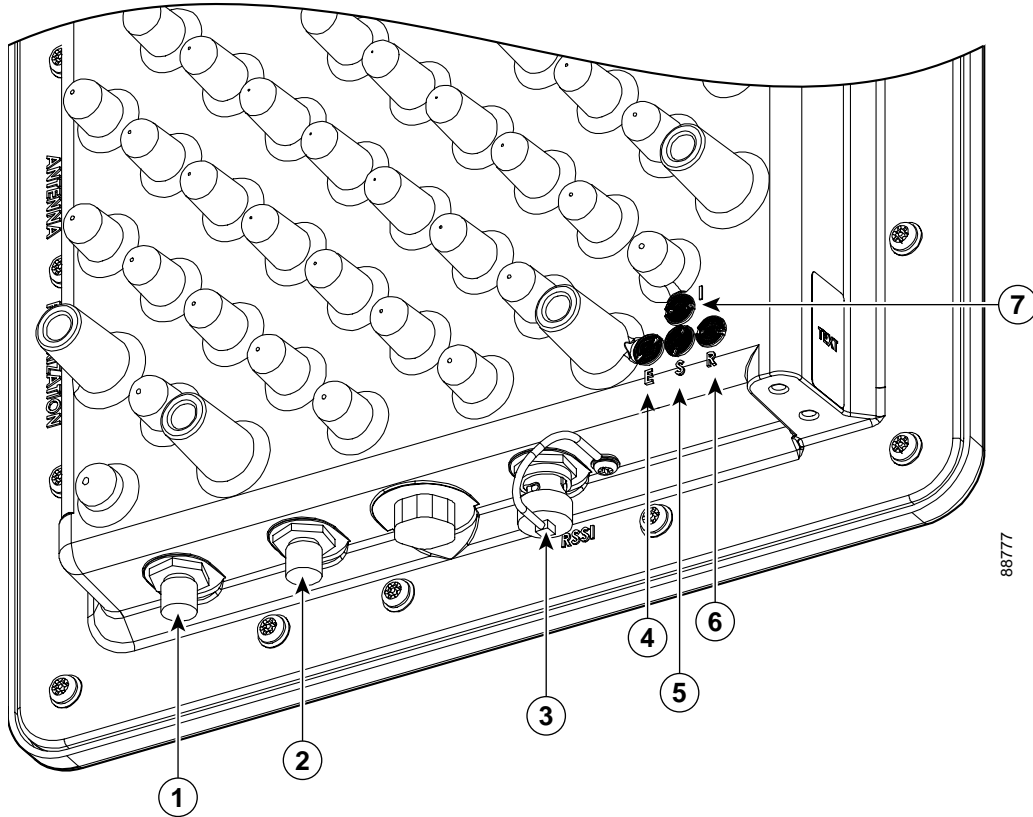
The bridge uses a metal enclosure that supports outdoor operating environments and supports an industrial temperature operating range (refer to [Bridge Specifications, page 1-6](#)).

**DRAFT - CISCO CONFIDENTIAL**

# Indicators

Four indicators are located on back of the housing to report installation/alignment conditions, bridge status, radio activity, and Ethernet activity. The indicators are shown in [Figure 1-2](#).

**Figure 1-2 Bridge Connectors and Indicators**



1	Power injector dual-coax ports	5	Status LED
2		6	Radio LED
3	RSSI voltage port	7	Install LED
4	Ethernet LED		

- The install indicator indicates installation mode is activated. During installation mode, the other indicators provide signal strength readings used for antenna alignment.
- The radio indicator blinks green to indicate radio traffic activity. The light is normally off, but it blinks green whenever a packet is received or transmitted over the bridge radio link. This indicator also provides signal strength readings during installation mode.
- The status indicator signals bridge association status. Blinking green indicates that the bridge is not associated with another bridge. Steady green indicates that the bridge is associated with at least one other bridge. This indicator also provides signal strength readings during installation mode.

**DRAFT - CISCO CONFIDENTIAL**

- The Ethernet indicator signals Ethernet traffic. This indicator blinks green when a packet is received or transmitted over the Ethernet infrastructure. The indicator is off when the Ethernet link not working or the port is shutdown. This indicator also provides signal strength readings during installation mode.

For additional information on the LED indicators, refer to “[Checking the LED Indicators](#)” section on page 5-2.

## Receive Signal Strength Indicator Port

The bridge supports a radio signal strength indicator (RSSI) port for use in antenna alignment. The RSSI port produces a DC voltage proportional to the strength of the received radio signal. The highest voltage indicates the best antenna alignment position. The RSSI port is a male BNC connector located on the bottom of the bridge housing (see [Figure 1-2](#)).



**Note**

The RSSI port requires the use of a voltmeter and a cable with a female BNC connector.

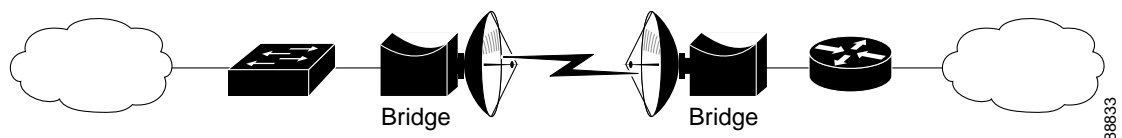
## Network Configuration Examples

This section describes the bridge’s role in three common wireless network configurations.

### Point-to-Point Configuration

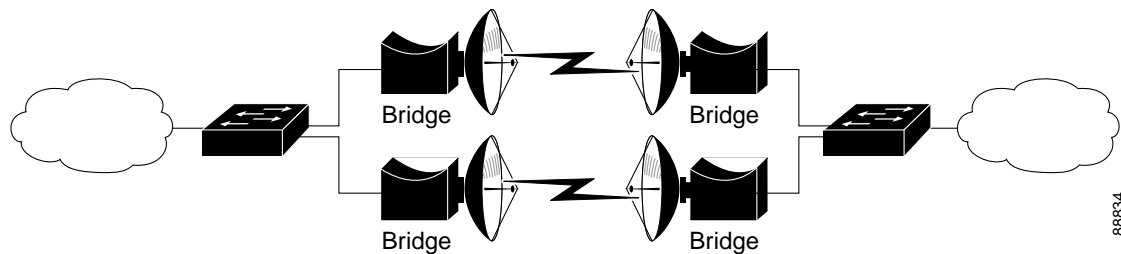
In a point-to-point configuration, two bridges are used to interconnect two remote LAN networks together using a wireless communication link (see [Figure 1-3](#)). The bridge connected to the main LAN network is classified as a root bridge and the other bridge is classified as a repeater bridge.

**Figure 1-3 Point-to-Point Bridge Configuration**



### Port Aggregation or Redundancy Configuration

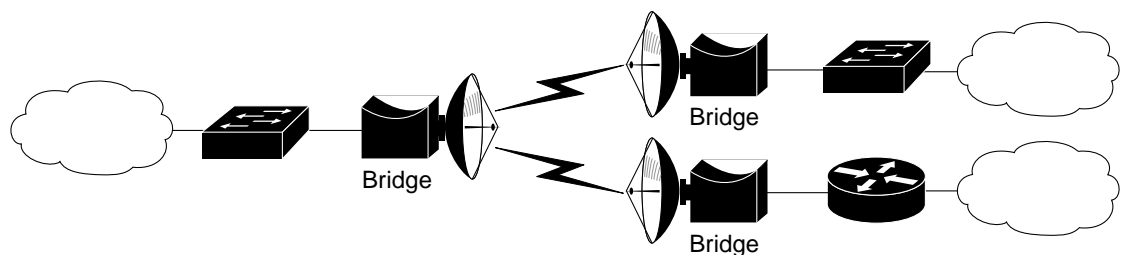
The port aggregation or redundancy configuration ([Figure 1-4](#)) is used to provide increased bandwidth or backup redundancy communications between two LANs. Port aggregation or increased bandwidth occurs when both wireless links are used to simultaneously pass Ethernet traffic. Backup communication redundancy can be achieved with this configuration when one wireless bridge link is used only if the other wireless bridge link fails.

**DRAFT - CISCO CONFIDENTIAL****Figure 1-4 Port Aggregation or Redundancy Bridge Configuration**

88834

## Point-to-Multipoint Configuration

The point-to-multipoint configuration (Figure 1-5) is used to interconnect the main LAN network to multiple remote LAN networks.

**Figure 1-5 Point-to-Multipoint Bridge Configuration**

88835

## Bridge Specifications

The bridge, power injector, and power module specifications are listed in Table 1-1.

**Table 1-1 Bridge, Power Injector, and Power Module Specifications**

Category	Bridge	Power Injector
Size	Integrated antenna configuration: 11.6 in. W x 11.6 in. H x 3.6 in. D 29.46 cm W x 29.46 cm H x 9.14 cm D  External antenna configuration: 11.4 in. W x 11.4 in. H x 4.2 in. D 28.96 cm W x 28.96 cm H x 10.67 cm D	Power injector: 6.25 in. W x 6.38 in. H x 1.31 in. D 15.88 cm W x 16.21 cm H x 3.33 cm D  Power module: 6.0 in. W x 2.75 in. H x 1.75 in. D 15.24 cm W x 6.99 cm H x 4.45 cm D
Indicators	Four indicators on the back panel: Installation and Alignment Mode, Ethernet traffic, bridge status, and radio traffic	Three indicators on the front panel: Uplink activity, injector status, Ethernet activity  One indicator on the side panel: Power

**DRAFT - CISCO CONFIDENTIAL****Table 1-1 Bridge, Power Injector, and Power Module Specifications (continued)**

Category	Bridge	Power Injector
Connectors	Bottom panel (left to right): Ethernet port 1 and port 2 (two F-type connectors), RSSI port (male BNC connector) Front Panel (external antenna configuration): antenna Type N connector	Side panel (left to right): 48VDC power connector, two coaxial uplink F-type connectors, and Ethernet RJ-45 connector for 100BASE-T Ethernet
Operating Temperature	-22 to 131°F (-30 to 55°C)	32 to 122°F (0 to 50°C)
Cold Start Temperature	-22°F (-30°C)	na
Warm-up time (for full performance)	15 minutes after cold start	na
Non-Operational Temperature	-40 to 185°F (-40 to 85°C)	-40 to 158°F (-40 to 70°C)
Operational Altitude	6,562 ft (2000 m)	6,562 ft (2000 m)
Non-Operational Altitude	16,000 ft (4877 m)	16,000 ft (4877 m)
Humidity	0 to 100% (condensing)	0 to 90% (non-condensing)
Operational Vibration	0.001 G <sup>2</sup> /Hz from 5-100 Hz	0.001 G <sup>2</sup> /Hz from 5-100 Hz
Non-Operational Vibration	0.01 G <sup>2</sup> /Hz from 5-100 Hz	0.01 G <sup>2</sup> /Hz from 5-100 Hz
Environmental Testing Compliance	Integrated antenna configuration: The enclosure has been successfully tested for protection against the ingress of particulate matter and fluids in compliance with a NEMA Type 4 (IP56) enclosure rating. External antenna configuration: The enclosure has been successfully tested and is in compliance with a NEMA Type 4 (IP56) enclosure rating.	na
Weight	Integrated antenna configuration: 11 lbs (4.99 kg) External antenna configuration: 10 lbs (4.54 kg)	Power injector—1.4 lbs (0.6 Kg) Power Module— <b>TBD</b>
Input Voltage	48 VDC nominal (supplied by Ethernet dual-coax cables)	Power injector—48 VDC nominal Power module—100-240 VAC
Power Consumption	41 W (typical) <b>TBD</b> W (maximum)	<b>TBD</b> W (maximum)
Transmit Power	24, 23, 22, 21, 18, 15, 12 dBm	na
Frequency	UNII 3—5.725 to 5.825 GHz (Depending on the regulatory domain)	na
Wireless modulation	Coded Orthogonal Frequency Division Multiplexing (COFDM)	na

**DRAFT - CISCO CONFIDENTIAL****Table 1-1 Bridge, Power Injector, and Power Module Specifications (continued)**

Category	Bridge	Power Injector
Subcarrier modulation	BPSK (6 Mbps and 9 Mbps) QPSK (12 Mbps and 18 Mbps) 16-QAM (24 Mbps and 36 Mbps) 64-QAM (48 Mbps and 54 Mbps)	na
Data rates	6, 9, 12, 18, 24, 36, 48, and 54 Mbps	na
Non-overlapping channels	4	na
Antenna	Integrated antenna—22.5 dBi patch array External antennas: 9 dBi omnidirectional 9.5 dBi sector 28 dBi dish	na
Range (typical)	Point-to-Point orientation <ul style="list-style-type: none"> <li>Two 22.5 dBi integrated antennas: <ul style="list-style-type: none"> <li>7.8 miles at 54 Mbps</li> <li>15.5 miles at 6 Mbps</li> </ul> </li> <li>Two 28 dBi dish antennas: <ul style="list-style-type: none"> <li>11.9 miles at 54 Mbps</li> <li>23.4 miles at 6 Mbps</li> </ul> </li> </ul> Point-to-Multipoint orientation <ul style="list-style-type: none"> <li>9 dBi omnidirectional antenna at the root location and 22.5 dBi integrated antenna at the non-root location: <ul style="list-style-type: none"> <li>2.0 miles at 54 Mbps</li> <li>8.3 miles at 6 Mbps</li> </ul> </li> <li>9.5 dBi sector antenna at the root location and 22.5 dBi integrated antenna at the non-root location: <ul style="list-style-type: none"> <li>2.2 miles at 54 Mbps</li> <li>8.5 miles at 6 Mbps</li> </ul> </li> <li>9 dBi omnidirectional antenna at the root location and 28 dBi dish antenna at the non-root location: <ul style="list-style-type: none"> <li>3.0 miles at 54 Mbps</li> <li>9.8 miles at 6 Mbps</li> </ul> </li> <li>9.5 dBi sector antenna at the root location and 28 dBi dish antenna at the non-root location: <ul style="list-style-type: none"> <li>3.4 miles at 54 Mbps</li> <li>10.2 miles at 6 Mbps</li> </ul> </li> </ul>	na

**DRAFT - CISCO CONFIDENTIAL****Table 1-1 Bridge, Power Injector, and Power Module Specifications (continued)**

Category	Bridge	Power Injector
Safety	Bridge, power injector, and power module: UL 60950 CSA C22.2 No. 60950 IEC 60950 EN 60950  <b>Note</b> The power injector and the power module must be used in an indoor environment.	
Electromagnetic Compatibility (EMC)	Bridge, power injector, and power module: FCC Part 15.107 and 15.109 Class B ICES-003 Class B (Canada) EN 55022 Class B EN 55024	
Radio Type Approvals	Bridge radio: FCC Part 15.207, 15.407, and 15.209 Class B ICES-003 Class B (Canada) Canada DGTP-010 FCC Bulletin OET-65C Industry Canada RSS-102, RSP100, and RSS 210 Issue 5	na
RF Exposure	Bridge antenna: AIR-ANT58G28SDA-NAironet AIR-ANT58G10SSA-NAironet AIR-ANT58G9VOA-NAironet	na

***DRAFT - CISCO CONFIDENTIAL***





## Installation Overview

---

This chapter provides warnings, safety information, and information needed before you begin the installation of your bridge system. This chapter includes the following sections:

- [Warnings, page 2-2](#)
- [Safety Information, page 2-3](#)
- [Unpacking the Bridge, page 2-5](#)
- [Before Beginning the Installation, page 2-6](#)
- [Installation Summary, page 2-8](#)

**DRAFT - CISCO CONFIDENTIAL****Warnings**

Translated versions of the following safety warnings are provided in [Appendix A, “Translated Safety Warnings.”](#)

**Warning**

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix “Translated Safety Warnings.”)**

**Warning**

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

**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**

**This product relies on the building’s installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:  
120Vac, 15A U.S. (240Vac, 10A International)**

**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**

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

**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.**

**DRAFT - CISCO CONFIDENTIAL****Warning**

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

## Safety Information

Follow the guidelines in this section to ensure proper operation and safe use of the bridge.

### FCC Safety Compliance Statement

The FCC, with its action in ET Docket 96-8, has adopted a safety standard for human exposure to 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 operation of this radio device according to the instructions in this publication results in user exposure substantially below the FCC recommended limits.

### Safety Precautions

**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).**

Each year hundreds of people are killed or injured when attempting to install an antenna. In many of these cases, the victim was aware of the danger of electrocution, but did not take adequate steps to avoid the hazard.

For your safety, and to help you achieve a good installation, please read and follow these safety precautions. They may save your life!

1. If you are installing an antenna for the first time, for your own safety as well as others, seek professional assistance.
2. Select your installation site with safety, as well as performance in mind. Remember: electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.
3. Call your electric power company. Tell them your plans and ask them to come look at your proposed installation. This is a small inconvenience considering your life is at stake.
4. Plan your installation carefully and completely before you begin. Successful raising of a mast or tower is largely a matter of coordination. Each person should be assigned to a specific task, and should know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
5. When installing your antenna, remember:
  - a. Do not use a metal ladder.
  - b. Do not work on a wet or windy day.

**DRAFT - CISCO CONFIDENTIAL**

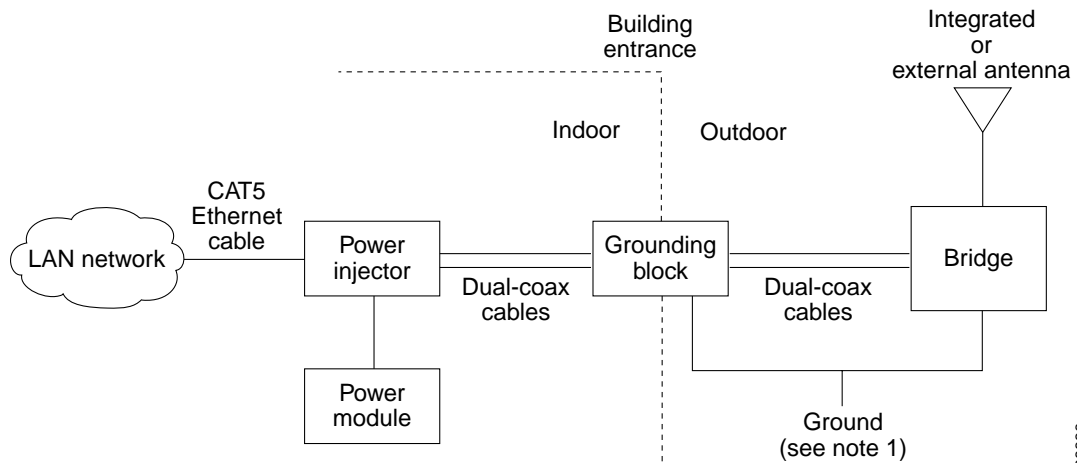
- c. Do dress properly—shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
6. If the assembly starts to drop, get away from it and let it fall. Remember, the antenna, mast, cable, and metal guy wires are all excellent conductors of electrical current. Even the slightest touch of any of these parts to a power line complete an electrical path through the antenna and the installer: you!
7. If any part of the antenna system should come in contact with a power line, don't touch it or try to remove it yourself. Call your local power company. They will remove it safely.

If an accident should occur with the power lines call for qualified emergency help immediately.

## Typical Bridge Installation Components

The bridge is designed to be installed in an outdoor environment, typically, on a tower or a tall building. A typical bridge installation diagram is shown in [Figure 2-1](#).

**Figure 2-1 Typical Bridge Installation Diagram**

**Note**

1) 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 I, CSA 22.1 (Canada); and if local or national electrical codes are not available, refer to IEC 364, Part 1 through 7 (other countries).

**DRAFT - CISCO CONFIDENTIAL**

## Installation Guidelines

Because the bridge is a radio device, it is susceptible to common causes of interference that can reduce throughput and range. Follow these basic guidelines to ensure the best possible performance:

- Install the bridge in an area where structures, trees, or hills do not obstruct radio signals to and from the bridge.
- Install the bridge at a height sufficient to provide line-of-sight orientations.

## Site Surveys

Because of differences in component configuration, placement, and physical environment, every network application is a unique installation. Before installing multiple bridges, you should perform a site survey to determine the optimum utilization of networking components and to maximize range, coverage, and network performance.

Consider the following operating and environmental conditions when performing a site survey:

- Data rates—Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver sensitivity occurs as the radio data increases.
- Antenna type and placement—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height. However, do not place the antenna higher than necessary, because the extra height also increases potential interference from other unlicensed radio systems.
- Physical environment—Clear or open areas provide better radio range than closed or filled areas.
- Obstructions—Physical obstructions such as buildings, trees, or hills can hinder performance of wireless devices. Avoid locating the devices in a location where there is an obstruction between the sending and receiving antennas.

## Unpacking the Bridge

Follow these steps to unpack the bridge:

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

**DRAFT - CISCO CONFIDENTIAL**

## Package Contents

Each bridge package contains the following items:

- Bridge unit
- Power injector unit (with mounting screws and wall anchors)
- Power module and AC power cord (with mounting screws and wall anchors)
- Two dual-coax cables [20 ft (6.1 m) and 50 ft (15.2 m)]
- Mounting kit and hardware
  - Multi-function mount (consisting of two bridge brackets and one tower or mast bracket)
  - Two tower clamps (U-bolts) with four nuts, washers, and lock washers
  - Four bolts and washers for securing the bridge brackets to the tower or mast bracket
  - Four bolts, washers, and lock washers for securing the bridge brackets to the bridge
- Grounding Block and mounting screws
- Ground lug for the bridge with screws
- Weatherproofing kit (consisting of Coax Seal and anti-corrosion gel)
- *Quick Start Guide: Cisco Aironet 1400 Series Wireless Bridge*
- *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions*
- Cisco product registration and Cisco documentation feedback cards

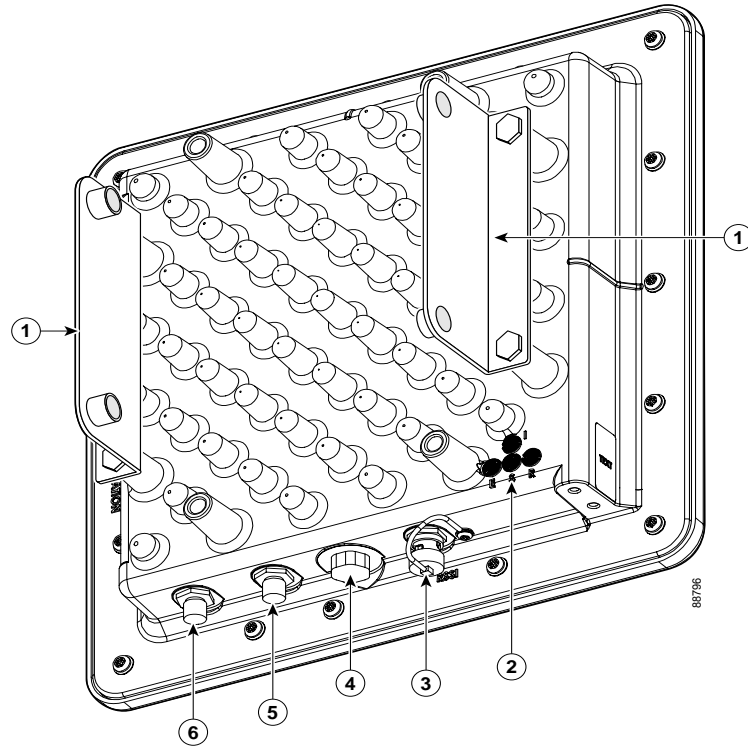
## Before Beginning the Installation

Before you begin the installation process, please carefully review the following list of figures to become familiar with the system components, connectors, indicators, cables, system interconnection, and grounding:

- Bridge block diagram ([Figure 2-1](#))
- Bridge layout ([Figure 2-2](#))
- Power injector layout ([Figure 2-3](#))
- Power module ([Figure 2-4](#))
- Grounding block ([Figure 2-5](#))

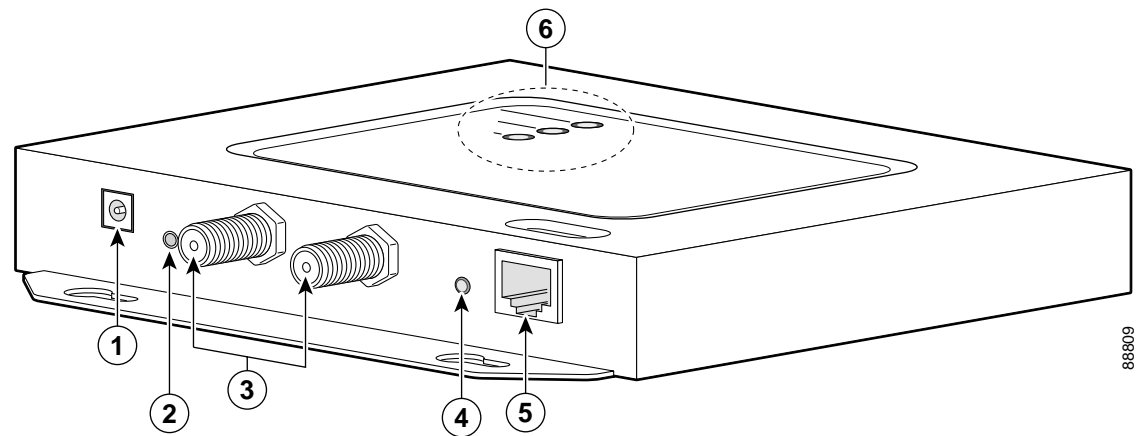
**DRAFT - CISCO CONFIDENTIAL**

**Figure 2-2 Bridge Layout and Connectors**

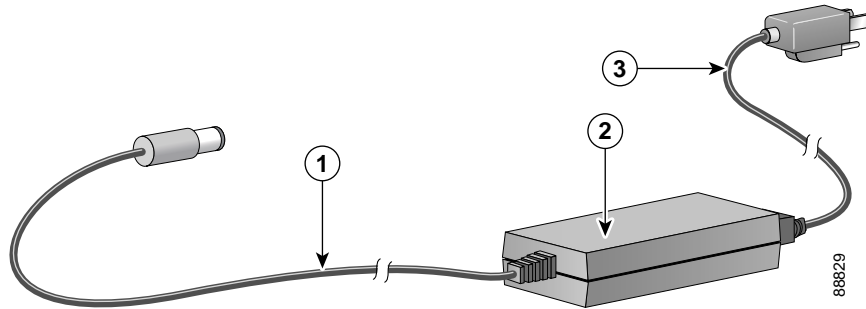


1	Bridge mounting brackets	4	
2	Bridge LED indicators	5	Power injector dual-coax ports (F-type connectors)
3	RSSI voltage port (Female BNC connector)	6	

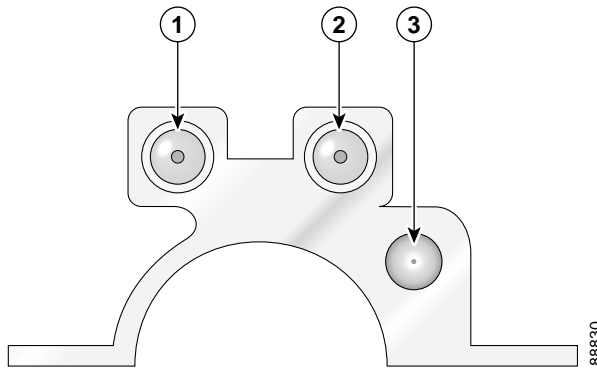
**Figure 2-3 Power Injector Indicators and Connectors**



1	Power jack (+48VDC)	4	Mode button
2	Power LED indicator	5	Ethernet port (RJ45 connector)
3	Power injector dual-coax ports (F-Type connectors)	6	Indicator LEDs

**DRAFT - CISCO CONFIDENTIAL****Figure 2-4 Power Module**

<b>1</b>	48 VDC power output cable	<b>2</b>	Power module
<b>3</b>	AC power cord		

**Figure 2-5 Grounding Block**

<b>1 and 2</b>	F-type coaxial connectors	<b>3</b>	Ground wire lug
----------------	---------------------------	----------	-----------------

## Installation Summary

During the installation of the bridge, you will perform the following operations:

- Connect a user supplied CAT5 Ethernet cable from your wired LAN network to the power injector.
- Connect the dual-coax Ethernet cables between the power injector and the grounding block

**Tip**

You can connect the dual coax cable connectors to either of the grounding block connectors or the power injector's Ethernet ports. The bridge senses the Ethernet signals and automatically switches internal circuitry to match the cable connections.

- Connect a ground wire to the grounding block.
- Mount the bridge to the external tower or mast. For additional information, refer to the *Cisco Aironet Series 1400 Wireless Bridge Mounting Instructions* that shipped with your bridge.
- Connect a ground wire to the bridge (use the bridge ground lug)



**DRAFT - CISCO CONFIDENTIAL**

- Connect the dual-coax Ethernet cables to the grounding block and to the bridge.

**Tip**

---

You can connect the dual coax cable connectors to either of the grounding block connectors or the bridge's Ethernet ports. The bridge senses the Ethernet signals and automatically switches internal circuitry to match the cable connections.

---

- Connect the AC power cord to the 48 VDC power module.

**Tip**

---

The root bridge should be positioned and powered up before the non-root bridge.

---

- Connect the power module to the power injector and plug the AC cord into an AC power receptacle.
- Align the bridge antenna. For additional information, refer to the *Cisco Aironet 1400 Series Wireless Bridge Mounting Instructions* that shipped with your bridge.
- Configure basic settings (refer to [Chapter 4, “Configuring the Bridge for the First Time”](#)).
- Seal all external connectors with special weather sealing material.
- Configure security and other bridge options. For additional information, refer to the *Cisco Aironet 1400 Series Wireless Bridge Software Configuration Guide*.

***DRAFT - CISCO CONFIDENTIAL***



## Mounting and Alignment Overview

---

This chapter provides an overview of bridge mounting and antenna alignment. The following sections are included in this chapter:

- [Mounting the Bridge, page 3-2](#)
- [Mounting Hardware, page 3-2](#)
- [Bridge LED Indicators, page 3-3](#)
- [Aligning the Antenna Using LED Indications, page 3-5](#)
- [Aligning the Antenna Using the RSSI Voltage, page 3-6](#)

**DRAFT - CISCO CONFIDENTIAL**

## Mounting the Bridge

Typically, the bridge is installed on a rooftop, mast, tower, wall, or a suitable flat surface. Each of these installation methods requires different approaches to the installation process. This document provides a mounting overview, refer to the *Cisco Aironet 1400 Series Wireless Bridge Installation Instructions* that shipped with your bridge for detailed mounting instructions.

The bridge is available in two configurations

- Integrated antenna bridge (with 22.5 dBi directional antenna)
- External antenna bridge (with antenna connector for use with an external antenna)

**Note**

---

To meet regulatory restrictions, the external antenna bridge configuration and the external antenna must be professional installed.

---

Personnel installing the bridge must understand wireless bridging techniques, antenna alignment and adjustment, and grounding methods. The integrated antenna configuration can be installed by an experienced IT professional.

## Mounting Hardware

The bridge is shipped with the following mounting hardware:

- Multi-function mount (consisting of two bridge brackets, and one mast bracket)
- Fastener hardware (consisting of nuts, bolts, washers, and U-bolts)

### Multi-function Mount

The multi-function mount provides a method for mounting the bridge on a mast, tower, or an optional roof mast mount. The multi-function mount permits easy azimuth and elevation adjustments for antenna alignment purposes. The basic mounting procedure is shown below:

- Mount the two bridge brackets to the bridge with the support pins facing the sides of the bridge.
- Mount the mast bracket to the tower or mast using the supplied U-bolts.
- Suspend the bridge on the mast bracket using the bridge bracket support pins.
- Secure the bridge brackets to the mast bracket using the supplied nuts, bolts, and washers (hand tighten).
- Align the bridge and tighten the nuts and bolts.

### Bridge Brackets

The two bridge brackets mount on the back side of the bridge housing. Each bracket mounts on two screw posts on opposite ends of the unit. The support pin on the bridge bracket must be facing the side of the unit. These support pins are used to suspend the bridge in the notches on the mast mounting bracket until you secure the mounting bolts.

**DRAFT - CISCO CONFIDENTIAL**

The bridge brackets must be positioned to obtain the correct antenna polarization that matches the remote antenna. The bridge housing contains an antenna polarization mark consisting of an arrow on the side of the housing. When the bridge is positioned so that the arrow is pointing up, the bridge antenna is vertically polarized. For horizontal polarization, the arrow should be pointing from left to right. All bridges must use the same antenna polarization for best operation.

**Mast Bracket**

The mast bracket attaches to a mast or tower support and is used to secure the bridge. The procedure for attaching the mounting bracket to the support depends on the pipe diameter, as shown in [Table 3-1](#).

**Table 3-1 Mast Bracket Attachment Methods**

<b>Mast Type</b>	<b>Mast Diameter</b>	<b>Mast Attachment Method</b>
Roof mount, small mast, or tower	1.25 to 2.5 inches (30.5 to 63.5 mm)	Attach the pipe inside the mounting bracket, between the bracket and bridge.
Large mast	2.5 to 4.5 inches (63.5 to 115 mm)	Attach the pipe outside the mounting bracket, away from the bridge.

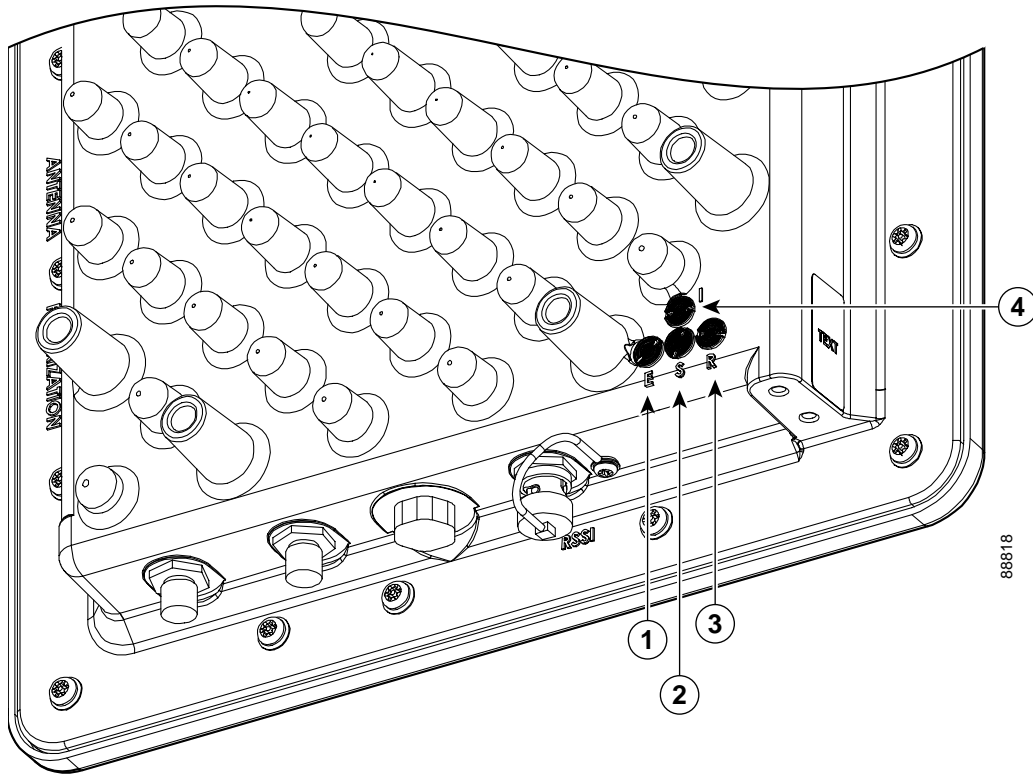
**Bridge LED Indicators**

When you power up the bridge for the first time, it starts in a special installation mode. The LEDs indicate the startup status, operating mode, association status, and received signal strength. This information simplifies the process of activating the link and positioning the antenna from the bridge mounting location.

The LEDs are mounted on the back of the housing, near the connectors (see [Figure 1](#)).

**DRAFT - CISCO CONFIDENTIAL**

**Figure 1 LED and Connector Locations**



<b>1</b>	Ethernet LED	<b>3</b>	Radio LED
<b>2</b>	Status LED	<b>4</b>	Install LED

When the bridge is initially powered-up, installation mode is activated and the bridge attempts to associate to a root bridge for 60 seconds. If it is unable to associate with a root bridge, it automatically assumes the root bridge role. The Install LED provides bridge association status during installation mode as shown in [Table 3-2](#).

**Table 3-2 Install LED Association Status**

Install LED	State	Bridge State
Off	Self test	Startup
Amber blink	Non-root, searching	Not associated (non-root mode). The bridge attempts to associate with a root bridge for 30 seconds <sup>1</sup> .
Amber solid	Non-root, associated	Associated (non-root mode)
Green blink	Root, searching	Not associated (root mode). The bridge attempts to associate with a non-root bridge indefinitely.
Green solid	Root, associated	Associated (root mode)

1. Pre-configured bridges search indefinitely.

**DRAFT - CISCO CONFIDENTIAL**

You use the Install LED to determine when the bridge successfully associates with a remote bridge and to verify its mode of operation. After association, the other three LEDs indicate signal strength (see [Table 3-3](#)).

The startup and association sequence depends on the bridge configuration, which can be one of the following types:

- Default—The bridge attempts to associate with a root bridge for 30 seconds. If it does not associate with a root bridge, it then attempts to associate with a non-root bridge.
- Pre-configured—The bridge attempts to associate with a remote bridge in the configured mode, either root or non-root. Because there are no time-outs, it is easier to align the antenna.

## Aligning the Antenna Using LED Indications

You can align the integrated antenna using LEDs after the bridge successfully associates with a remote bridge. In the installation mode before association to another bridge, the Install LED blinks amber. If the bridge associates to a root bridge, the Install LED turns steady amber. If the bridge does not associate to a root bridge in the first 30 seconds, the Install LED blinks green to indicate beacons are being transmitted and the bridge is waiting for another non-root bridge to associate. After association, the Install LED turns into steady green and the Ethernet, status, and radio LEDs then display signal strength as shown in [Table 3-3](#)).

**Note**

For the signal level (dBm), a smaller number represents a stronger signal because the signal level is given as a negative value.

**Note**

Each time you move the antenna, you must wait approximately 20 seconds before the LED patterns are valid.

**Table 3-3 LED Installation Mode Signal Strength Display**

Signal Level (dBm)	Ethernet LED	Status LED	Radio LED
>-44	On	On	On
-47 to -44	Fast blink <sup>1</sup>	On	On
-50 to -47	Medium blink <sup>2</sup>	On	On
-53 to -50	Slow blink <sup>3</sup>	On	On
-54 to -53	Off	On	On
-57 to -54	Off	Fast blink <sup>1</sup>	On
-60 to -57	Off	Medium blink <sup>2</sup>	On
-63 to -60	Off	Slow blink <sup>3</sup>	On
-66 to -63	Off	Off	On
-69 to -66	Off	Off	Fast blink <sup>1</sup>
-72 to -69	Off	Off	Medium blink <sup>2</sup>
-75 to -72	Off	Off	Slow blink <sup>3</sup>
< -75	Off	Off	Off

**DRAFT - CISCO CONFIDENTIAL**

1. Slow blinking rate of 1 Hz/sec.
2. Medium blinking rate of 2 Hz/sec.
3. Fast blinking rate of 4 Hz/sec.

When using LEDs to maximize the signal, you adjust the antenna until as many LEDs as possible are turned-on and the rest are blinking as fast as possible.

## Aligning the Antenna Using the RSSI Voltage

The RSSI port outputs a DC voltage that is proportional to the received signal level. The RSSI voltage is available whenever a signal is present, regardless of the bridge mode (installation or normal), association status, or pre-configuration role setting. The RSSI voltage provides an instantaneous reading as you move the antenna. The RSSI port is a female BNC connector on the bridge housing (see [Figure 1](#)).

The RSSI voltage increases linearly with signal level as shown in [Table 4](#).

**Note**

A larger RSSI voltage reading indicates a stronger signal.

**Table 4** *RSSI Voltage Levels*

Nominal Signal Level (dBm)	RSSI Reading (volts)
-20 or greater	2.70
-30	2.31
-40	1.93
-50	1.54
-60	1.16
-70	0.77
-80	0.39
-90 or less	0.00

The voltage varies from 0 to 2.7 volts for signals between -90 and -20 dBm, respectively. The accuracy over temperature and component variations is  $\pm 4$ dB. To obtain RSSI readings, you can use any convenient voltmeter connected to the RSSI port using a cable with a male BNC connector.





## Configuring the Bridge for the First Time

---

This chapter describes how to configure basic settings on your bridge for the first time. The contents of this chapter are similar to the instructions in the quick start guide that shipped with your bridge. You can configure all the settings described in this chapter using the CLI, but it might be simplest to browse to the bridge's web-browser interface to complete the initial configuration and then use the CLI to enter additional settings for a more detailed configuration.

This chapter contains these sections:

- [Before You Start, page 4-2](#)
- [Obtaining and Assigning an IP Address, page 4-3](#)
- [Connecting to the Bridge Locally, page 4-3](#)
- [Assigning Basic Settings, page 4-4](#)
- [What To Do Next, page 4-8](#)
- [Using the IP Setup Utility, page 4-9](#)
- [Assigning an IP Address Using the CLI, page 4-12](#)
- [Using a Telnet Session to Access the CLI, page 4-12](#)

**DRAFT - CISCO CONFIDENTIAL**

## Before You Start

Before you install the bridge, make sure you are using a computer connected to the same network as the bridge, and obtain the following information:

- The following information from your network system administrator:
  - A system name
  - The case-sensitive wireless service set identifier (SSID) for your radio network
  - If not connected to a DHCP server, a unique IP address for your bridge (such as 172.17.255.115)
  - If the bridge is not on the same subnet as your PC, a default gateway address and subnet mask
  - A Simple Network Management Protocol (SNMP) community name and the SNMP file attribute (if SNMP is in use)
- If you use IPSU to find or assign the bridge IP address, the MAC address from the label on the bottom of the bridge (such as *00164625854c*)

## Resetting the Bridge to Default Settings

If you need to start over during the initial setup process, follow these steps to reset the bridge to factory default settings using the power injector's Mode button:

- 
- Step 1** Disconnect the power jack from the power injector.
  - Step 2** Press and hold the power injector's MODE button while you reconnect the power jack.
  - Step 3** Hold the MODE button until the Status LED turns amber (approximately 1 to 3 seconds), and release the button. All bridge settings return to factory defaults.
- 

You can also use the web-browser interface to reset the bridge to defaults. Follow these steps to return to default settings using the web-browser interface:

- 
- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).
  - Step 2** Enter the bridge's IP address in the browser address line and press **Enter**. An Enter Network Password window appears.
  - Step 3** Enter your username in the User Name field. The default username is **Cisco**.
  - Step 4** Enter the bridge password in the Password field and press **Enter**. The default password is **Cisco**. The Summary Status page appears.
  - Step 5** Click **System Software** and the System Software screen appears.
  - Step 6** Click **System Configuration** and the System Configuration screen appears.
  - Step 7** Click the **Default** button.




---

**Note** If the bridge is configured with a static IP address, the IP address will not be changed.

---

**DRAFT - CISCO CONFIDENTIAL**

## Obtaining and Assigning an IP Address

To browse to the bridge's Express Setup page, you must either obtain or assign the bridge's IP address using one of the following methods:

- Use default address 10.0.0.1 when you connect to the bridge locally. For detailed instructions, see the [“Connecting to the Bridge Locally”](#) section on page 4-3.
- Use a DHCP server (if available) to automatically assign an IP address. You can find out the DHCP-assigned IP address using one of the following methods:
  - Provide your organization's network administrator with your bridge's Media Access Control (MAC) address. Your network administrator will query the DHCP server using the MAC address to identify the IP address. The bridge's MAC address is on label attached to the bottom of the bridge.
  - Use the Cisco IP Setup Utility (IPSU) to identify the assigned address. You can also use IPSU to assign an IP address to the bridge if it did not receive an IP address from the DHCP server. IPSU runs on most Microsoft Windows operating systems: Windows 9x, 2000, Me, NT, and XP. You can download IPSU from the Software Center on Cisco.com. For additional information refer to the [“Obtaining and Installing IPSU”](#) section on page 4-9.

## Connecting to the Bridge Locally

If you need to configure the bridge locally (without connecting the bridge's power injector to a wired LAN), you can connect a PC to the power injector's Ethernet port using a Category 5 Ethernet cable. You can use a local connection to the Ethernet port much as you would use a serial port connection.



---

**Note** You do not need a special crossover cable to connect your PC to the bridge's power injector; you can use either a straight-through cable or a crossover cable.

---

-----Can someone verify the following DHCP Server statement-----

If the bridge is configured with default values and not connected to a DHCP server or cannot obtain an IP address, it defaults to IP address 10.0.0.1 and becomes a mini-DHCP server. In that capacity, the bridge provides up to **twenty?** IP addresses between 10.0.0.11 and 10.0.0.30 to an Ethernet-capable PC connected to the power injector's Ethernet port.

The mini-DHCP server feature is disabled automatically when you assign a static IP address to the bridge.

**Caution**

---

When a bridge with default settings is connected on a wired LAN and does not receive an IP address from a DHCP server, the bridge provides an IP address to any DHCP requests it receives.

---

Follow these steps to connect to the bridge locally:

- 
- Step 1** Make sure that the PC you intend to use is configured to obtain an IP address automatically, or manually assign it an IP address from 10.0.0.31 to 10.0.0.40. Connect your PC to the power injector using a Category 5 Ethernet cable. You can use either a crossover cable or a straight-through cable.
- Step 2** Power up the power injector.

**DRAFT - CISCO CONFIDENTIAL**

- Step 3** Follow the steps in the “Assigning Basic Settings” section on page 4-4. If you make a mistake and need to start over, follow the steps in the “Resetting the Bridge to Default Settings” section on page 4-2.
- Step 4** After configuring the bridge, remove the Ethernet cable from your PC and connect the power injector to your wired LAN.



**Note** When you connect your PC to the bridge’s power injector or reconnect your PC to the wired LAN, you might need to release and renew the IP address on the PC. On most PCs, you can perform a release and renew by rebooting your PC or by entering **ipconfig /release** and **ipconfig /renew** commands in a command prompt window. Consult your PC operating instructions for detailed instructions.

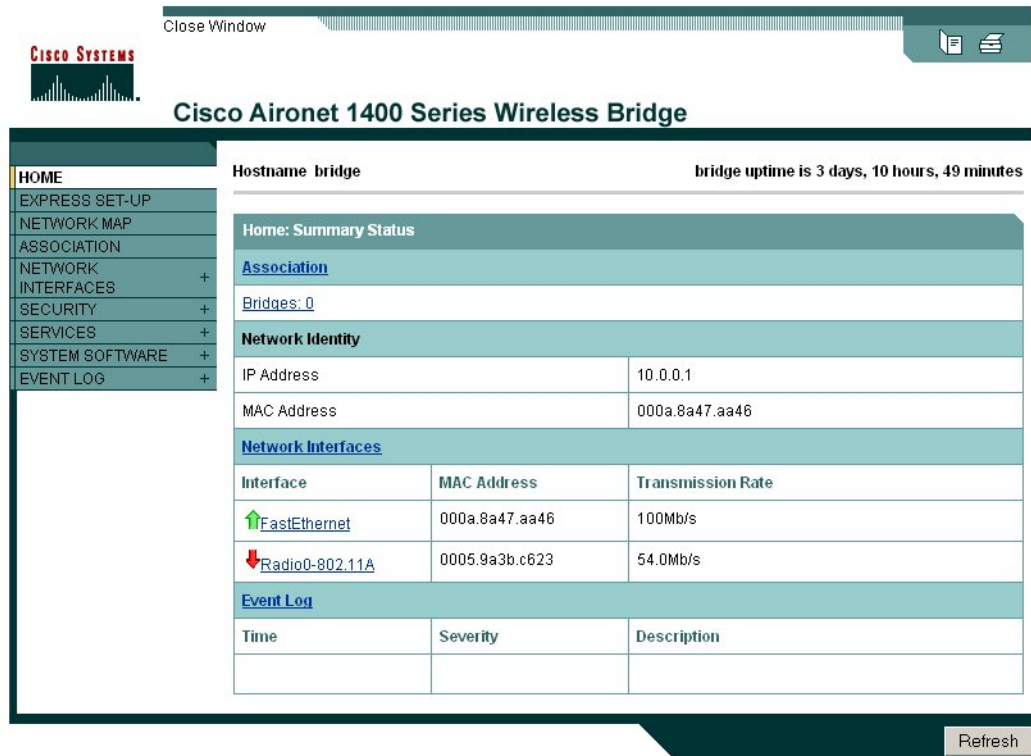
## Assigning Basic Settings

After you determine or assign the bridge’s IP address, you can browse to the bridge’s Express Setup page and perform an initial configuration. Follow these steps:

- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).
- Step 2** Enter the bridge’s IP address in the browser address line and press **Enter**. An Enter Network Password screen appears.
- Step 3** Press **Tab** to bypass the Username field and advance to the Password field.
- Step 4** Enter the case-sensitive password *Cisco* and press **Enter**. The Summary Status page appears. [Figure 4-1](#) shows the Summary Status page.

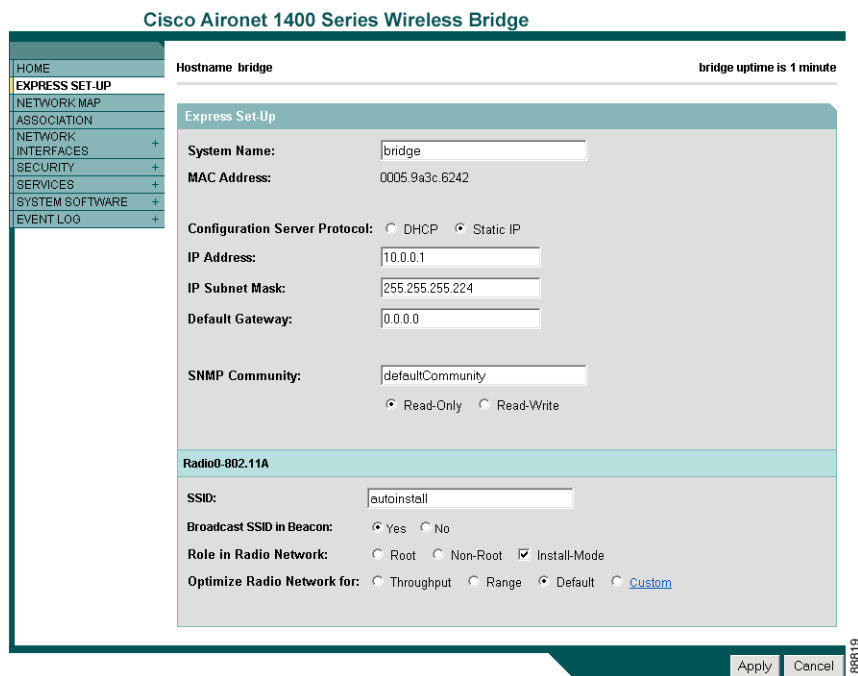
**DRAFT - CISCO CONFIDENTIAL**

Figure 4-1 Summary Status Page



Step 5 Click **Express Setup**. The Express Setup screen appears. Figure 4-2 shows the Express Setup page.

Figure 4-2 Express Setup Page



**DRAFT - CISCO CONFIDENTIAL**

**Step 6** Enter the configuration settings you obtained from your system administrator. The configurable settings include:

- **System Name**—The system name, while not an essential setting, helps identify the bridge on your network. The system name appears in the titles of the management system pages.
- **Configuration Server Protocol**—Click on the button that matches the network’s method of IP address assignment.
  - **DHCP**—IP addresses are automatically assigned by your network’s DHCP server.




---

**Note** When DHCP is enabled, the IP Address, Subnet Mask, and Default Gateway fields indicate *Negotiated by DHCP*

---

- **Static IP**—The bridge uses a static IP address that you enter in the IP address field.
- **IP Address**—Use this setting to assign or change the bridge’s IP address. If DHCP is enabled for your network, leave this field blank.




---

**Note** If the bridge’s IP address changes while you are configuring the bridge using the web-browser interface or a Telnet session over the wired LAN, you lose your connection to the bridge. If you lose your connection, reconnect to the bridge using its new IP address. Follow the steps in the [“Resetting the Bridge to Default Settings” section on page 4-2](#) if you need to start over.

---

- **IP Subnet Mask**—Enter the IP subnet mask provided by your network administrator so the IP address can be recognized on the LAN. If DHCP is enabled, leave this field blank.
- **Default Gateway**—Enter the default gateway IP address provided by your network administrator. If DHCP is enabled, leave this field blank.
- **SNMP Community**—If your network is using SNMP, enter the SNMP Community name provided by your network administrator and select the attributes of the SNMP data (also provided by your network administrator).
  - **Read-Only**—indicates the bridge allows only SNMP read accesses. Using this option, an SNMP user can not change bridge configuration settings.
  - **Read-Write**—indicates the bridge allows SNMP read and write accesses. This setting allows an SNMP user to change the bridge configuration.
- **Radio Service Set ID (SSID)**—Enter the case-sensitive SSID (32 alphanumeric characters maximum) provided by your network administrator. The SSID is a unique identifier that remote bridges use to associate with your bridge.
- **Broadcast SSID in Beacon**—Use this setting to allow devices that do not specify an SSID to associate with the bridge.
  - **Yes**—This is the default setting; it allows a remote bridge that does not specify an SSID to associate with the bridge.
  - **No**—Remote bridges must specify an SSID to associate with the bridge. With No selected, the SSID used by the remote bridge must match exactly the bridge’s SSID.

**DRAFT - CISCO CONFIDENTIAL**

- **Role in Radio Network**—Click on the checkbox and button that describes the role of the bridge on your network.
  - **Install Mode**—Activates the bridge install and alignment mode. Specifies that the bridge automatically determines the network role. If the bridge is able to associate to another root bridge within 60 seconds, the bridge assumes a non-root bridge role. If the bridge is unable to associate with another root bridge within 60 seconds, the bridge assumes a root bridge role.  
You can also pre-configure the bridge into root or non-root modes and avoid the 60 seconds automatic detection phase.
  - **Root**—Specifies the bridge connects directly to the main Ethernet LAN network and accepts associations from other bridges.
  - **Non-root**—Specifies the bridge connects to a remote LAN network and must associate with the root bridge using the wireless interface.

**Note**

---

When initially powered-up, the bridge is configured in Install mode with automatic detection activated.

---

- **Optimize Radio Network for**—Use this setting to select either preconfigured settings for the bridge radio or customized settings for the bridge radio.
  - **Throughput**—Maximizes the data volume handled by the bridge but might reduce its range.
  - **Range**—Maximizes the bridge's range but might reduce throughput.
  - **Default**—The bridge retains default radio settings that are designed to provide good range and throughput for most bridges.
  - **Custom**—The bridge uses settings you enter on the Network Interfaces: Radio-802.11a Settings page. Clicking **Custom** takes you to the Network Interfaces: Radio-802.11a Settings page.

**Step 7** Click **Apply** to save your settings. If you changed the IP address, you lose your connection to the bridge. Browse to the new IP address to reconnect to the bridge.

**Note**

---

You can restore the bridge to its factory defaults by unplugging the power injector's power jack and plugging it back in while holding down the Mode button for a few seconds, or until the Status LED turns amber.

---

**DRAFT - CISCO CONFIDENTIAL**

## Default Settings on the Express Setup Page

Table 4-1 lists the default settings for the settings on the Express Setup page.

**Table 4-1** Default Settings on the Express Setup Page

Setting	Default
System Name	bridge
Configuration Server Protocol	DHCP
IP Address	Assigned by DHCP (default setting); if DHCP is disabled, the default setting is 10.0.0.1
IP Subnet Mask	Assigned by DHCP (default setting); if DHCP is disabled, the default setting is 255.255.255.224
Default Gateway	Assigned by DHCP (default setting); if DHCP is disabled, the default setting is 0.0.0.0
SNMP	defaultCommunity Read Only
SSID	autoinstall <sup>1</sup> or tsunami <sup>2</sup>
Broadcast SSID in Beacon	Yes
Role in Radio Network	Install
Optimize Radio Network for	Throughput

1. During Install Mode, the SSID is *autoinstall*.
2. After a static IP address is assigned or the role is changed from Install, the SSID is *tsunami*.

## What To Do Next

After your bridge has basis settings, you need to complete your bridge's configuration. You might need to adjust the output power level and other network and security settings.

## Output Power Level

Your bridge's output power level might require adjustment in the following conditions:

- The bridge's output power level must be reduced when using an external dish antenna or when using the integrated antenna in a multipoint configuration (refer to [“Maximum Power Levels” section on page C-2](#)).
- When bridges are located less than 328 ft (100 m) apart, you should reduce their output power to avoid overloading the bridge's receivers.

To configure your bridge's output power level, refer to the *Cisco Aironet 1400 Series Software Configuration Guide*.



## DRAFT - CISCO CONFIDENTIAL

# Protecting Your Wireless LAN

To prevent unauthorized access to your network, you need to configure security settings. Because the bridge is a radio device, the bridge communicates beyond the physical boundaries of your building. Refer to the *Cisco Aironet 1400 Series Software Configuration Guide* to configure security features to protect your network from intruders:

- Unique SSIDs that are not broadcast in the bridge beacon.
- WEP and additional WEP features, such as TKIP and broadcast key rotation
- Dynamic WEP and EAP authentication

# Using the IP Setup Utility

IPSU enables you to find the bridge's IP address when it has been assigned by a DHCP server. You can also use IPSU to set the bridge's IP address and SSID if they have not been changed from the default settings.

**Note**

---

IPSU can be used only on the following operating systems: Windows 95, 98, NT, 2000, ME, or XP.

---

The sections below explain how to install the utility, how to use it to find the bridge's IP address, and how to use it to set the IP address and the SSID.

# Obtaining and Installing IPSU

IPSU is available on the Cisco web site. Follow these steps to obtain and install IPSU:

- 
- Step 1** Step 1 Use your web browser to go to the Cisco Software Center at the following URL:  
<http://www.cisco.com/public/sw-center/sw-wireless.shtml>
- Step 2** Select **Option #1: Aironet Wireless Software Selector**.
- Step 3** For the Product Type, select **Wireless Bridge** and click **Submit**.
- Step 4** Select **1400 Series** for the model number and click **Submit**.
- Step 5** Select **Current Release (Recommended)** and click **Submit**.
- Step 6** Under Utilities, select **IPSUvxxxxxx.exe**.
- Step 7** On the Encryption Authorization Form, enter the requested information, read the encryption information, and check the boxes that apply. Click **Submit**.
- Step 8** Read and accept the terms and conditions of the Software License Agreement.
- Step 9** Select the IPSU file again to download it.
- Step 10** Save the file to a temporary directory on your hard drive and then exit the Internet browser.
- Step 11** Double-click **IPSUvxxxxxx.exe** in the temporary directory to expand the file.
- Step 12** Double-click **Setup.exe** and follow the steps provided by the installation wizard to install IPSU. The IPSU icon appears on your computer desktop.
-

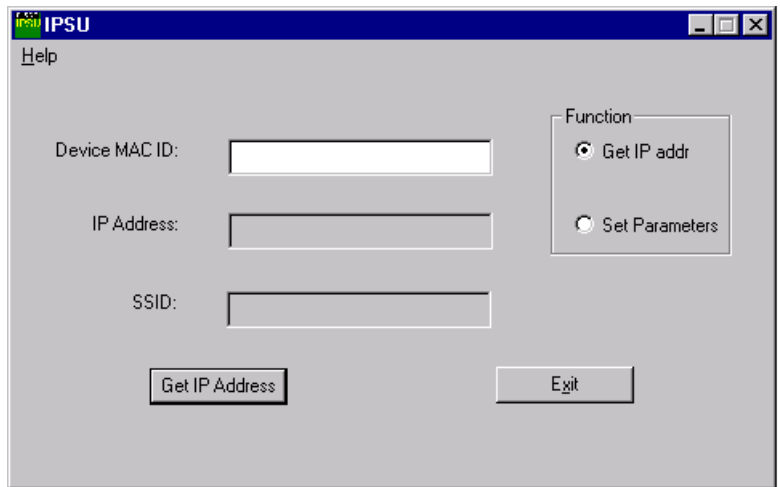
**DRAFT - CISCO CONFIDENTIAL**

## Using IPSU to Find the Bridge's IP Address

If your bridge receives an IP address from a DHCP server, you can use IPSU to find its IP address. Because IPSU sends a reverse-ARP request based on the bridge MAC address, you must run IPSU from a computer on the same subnet as the bridge. Follow these steps to find the bridge's IP address:

- Step 1** Double-click the **IPSU** icon on your computer desktop to start the utility. The IPSU screen appears (see [Figure 4-3](#)).

**Figure 4-3** IPSU Get IP Address Screen



- Step 2** When the utility window opens, make sure the *Get IP address* radio button in the Function box is selected.
- Step 3** Enter the bridge's MAC address in the Device MAC ID field. The bridge's MAC address is printed on the label on the bottom of the unit. It should contain six pairs of hexadecimal digits. Your bridge's MAC address might look like the following example:

000164xxxxxx



**Note** The MAC address field is not case-sensitive.

- Step 4** Click **Get IP Address**.
- Step 5** When the bridge's IP address appears in the IP Address field, write it down.

If IPSU reports that the IP address is 10.0.0.1, the default IP address, then the bridge did not receive a DHCP-assigned IP address. To change the bridge IP address from the default value using IPSU, refer to the [“Using IPSU to Set the Bridge's IP Address and SSID”](#) section on page 4-10.

## Using IPSU to Set the Bridge's IP Address and SSID

If you want to change the default IP address (10.0.0.1) of the bridge, you can use IPSU. You can also set the bridge's SSID at the same time.

**DRAFT - CISCO CONFIDENTIAL**

**Note** The computer you use to assign an IP address to the bridge must have an IP address in the same subnet as the bridge (10.0.0.x).

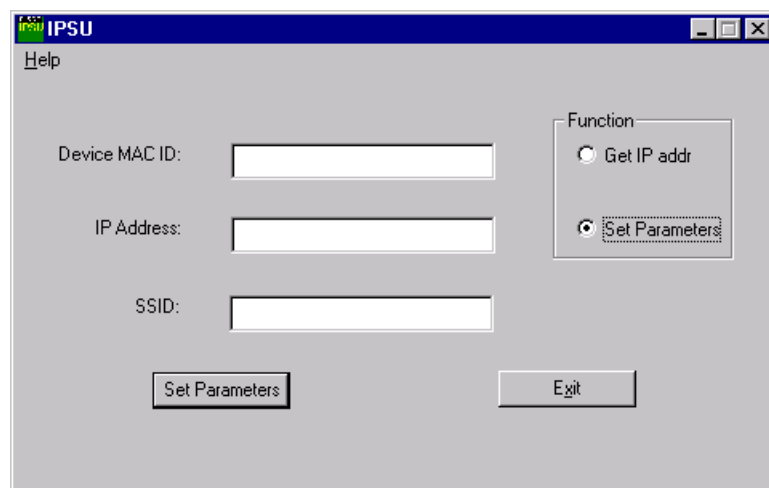


**Note** IPSU can change the bridge's IP address and SSID only from their default settings. After the IP address and SSID have been changed, IPSU cannot change them again.

Follow these steps to assign an IP address and an SSID to the bridge:

- Step 1** Double-click the **IPSU** icon on your computer desktop to start the utility.
- Step 2** Click the **Set Parameters** radio button in the Function box (see [Figure 4-4](#)).

**Figure 4-4** *IPSU Set Parameters Screen*



- Step 3** Enter the bridge's MAC address in the Device MAC ID field. The bridge's MAC address is printed on the label on the bottom of the unit. It should contain six pairs of hexadecimal digits. Your bridge's MAC address might look like this example:

004096xxxxxx



**Note** The MAC address field is not case-sensitive.

- Step 4** Enter the IP address you want to assign to the bridge in the IP Address field.
- Step 5** Enter the SSID you want to assign to the bridge in the SSID field.



**Note** You cannot set the SSID without also setting the IP address. However, you can set the IP address without setting the SSID.

- Step 6** Click **Set Parameters** to change the bridge's IP address and SSID settings.

**DRAFT - CISCO CONFIDENTIAL**

**Step 7** Click **Exit** to exit IPSU.

---

## Assigning an IP Address Using the CLI

When you connect the bridge to the wired LAN, the bridge links to the network using a bridge virtual interface (BVI) that it creates automatically. Instead of tracking separate IP addresses for the bridge's Ethernet and radio ports, the network uses the BVI.

When you assign an IP address to the bridge using the CLI, you must assign the address to the BVI. Beginning in privileged EXEC mode, follow these steps to assign an IP address to the bridge's BVI:

	Command	Purpose
<b>Step 1</b>	<b>configure terminal</b>	Enter global configuration mode.
<b>Step 2</b>	<b>interface bvi1</b>	Enter interface configuration mode for the BVI.
<b>Step 3</b>	<b>ip address <i>address</i> <i>mask</i></b>	Assign an IP address and address mask to the BVI. This step automatically saves the running configuration to the startup configuration.  <b>Note</b> You lose your connection to the bridge when you assign a new IP address to the BVI. If you need to continue configuring the bridge, use the new IP address to open another Telnet session to the bridge.

## Using a Telnet Session to Access the CLI

Follow these steps to browse to access the CLI using a Telnet session. These steps are for a PC running Microsoft Windows with a Telnet terminal application. Check your PC operating instructions for detailed instructions for your operating system.

**Step 1** Select **Start > Programs > Accessories > Telnet**.

If Telnet is not listed in your Accessories menu, select **Start > Run**, type **Telnet** in the entry field, and press **Enter**.

**Step 2** When the Telnet window appears, click **Connect** and select **Remote System**.



**Note** In Windows 2000, the Telnet window does not contain drop-down menus. To start the Telnet session in Windows 2000, type **open** followed by the bridge's IP address.

**Step 3** In the Host Name field, type the bridge's IP address and click **Connect**.

---



## Troubleshooting

---

This chapter provides troubleshooting procedures for basic problems with the bridge. For the most up-to-date, detailed troubleshooting information, refer to the Cisco TAC website at the following URL (select **Hardware Support** > **Wireless Devices**):

<http://www.cisco.com/tac>

Sections in this chapter include:

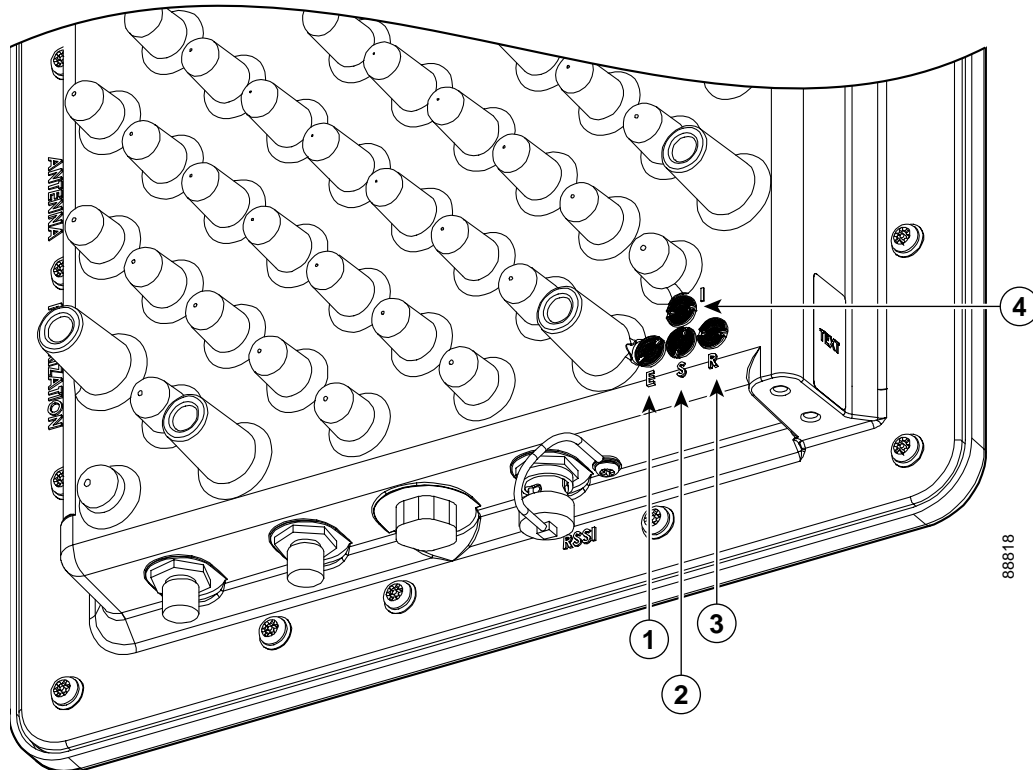
- [Checking the LED Indicators, page 5-2](#)
- [Power Injector LED Indicators, page 5-5](#)
- [Checking Basic Configuration Settings, page 5-7](#)
- [Antenna Alignment, page 5-8](#)
- [Resetting to the Default Configuration, page 5-8](#)
- [Reloading the Bridge Image, page 5-10](#)

**DRAFT - CISCO CONFIDENTIAL**

## Checking the LED Indicators

If your bridge is not associating with the remote bridge, check the four LED indicators on the back panel. You can use them to quickly assess the unit's status. [Figure 5-1](#) shows the indicators.

**Figure 5-1** Bridge LED Indicators



1	Ethernet LED	3	Radio LED
2	Status LED	4	Install LED

The indicators signals have the following meanings (for additional details refer to [Table 5-3](#)):

- The status indicator signals bridge association status. Blinking green indicates that the bridge is not associated with another bridge. Steady green indicates that the bridge is associated with at least one other bridge. This indicator also provides signal strength readings during installation mode.
- The radio indicator blinks green to indicate radio traffic activity. The light is normally off, but it blinks green whenever a packet is received or transmitted over the bridge radio link. This indicator also provides signal strength readings during installation mode.
- The Ethernet indicator signals Ethernet traffic. This indicator blinks green when a packet is received or transmitted over the Ethernet infrastructure. The indicator is off when the Ethernet link not working or the port is shutdown. This indicator also provides signal strength readings during installation mode.
- The install indicator provides installation mode association status. During installation mode, the other indicators provide signal strength readings used for antenna alignment.

**DRAFT - CISCO CONFIDENTIAL****Bridge Installation Mode LED Indications**

When the bridge is initially powered-up, installation mode is activated and the bridge attempts to associate to a root bridge for 60 seconds. If it is unable to associate with a root bridge, it automatically assumes the root bridge role. The Install LED provides bridge association status during installation mode as shown in [Table 5-1](#).

**Table 5-1 Install LED Association Status**

Install LED	State	Bridge State
Off	Self test	Startup
Amber blink	Non-root, searching	Not associated (non-root mode). The bridge attempts to associate with a root bridge for 60 seconds <sup>1</sup> .
Amber solid	Non-root, associated	Associated (non-root mode)
Green blink	Root, searching	Not associated (root mode). The bridge attempts to associate with a non-root bridge indefinitely.
Green solid	Root, associated	Associated (root mode)

1. Pre-configured bridges search indefinitely.

You use the Install LED to determine when the bridge successfully associates with a remote bridge and to verify its mode of operation. After association, the other three LEDs indicate signal strength (see [Table 5-2](#)).

**Note**

For the signal level (dBm), a smaller number represents a stronger signal because the signal level is given as a negative value.

**Table 5-2 LED Installation Mode Signal Strength Display**

Signal Level (dBm)	Ethernet LED	Status LED	Radio LED
>-44	On	On	On
-47 to -44	Fast blink	On	On
-50 to -47	Medium blink	On	On
-53 to -50	Slow blink	On	On
-54 to -53	Off	On	On
-57 to -54	Off	Fast blink	On
-60 to -57	Off	Medium blink	On
-63 to -60	Off	Slow blink	On
-66 to -63	Off	Off	On
-69 to -66	Off	Off	Fast blink
-72 to -69	Off	Off	Medium blink

**DRAFT - CISCO CONFIDENTIAL****Table 5-2 LED Installation Mode Signal Strength Display (continued)**

Signal Level (dBm)	Ethernet LED	Status LED	Radio LED
-75 to -72	Off	Off	Slow blink
< -75	Off	Off	Off

When using LEDs to maximize the signal, you adjust the antenna until as many LEDs as possible are turned-on and the rest are blinking as fast as possible. With all three LEDs turned-on, the signal is good enough to support the maximum data rate.

## Bridge Normal Mode LED Indications

During normal operation the bridge LEDs provide status information as shown in [Table 5-3](#).

**Table 5-3 Bridge Normal Mode LED Indications**

Ethernet Indicator	Status Indicator	Radio Indicator	Meaning
Off	-	-	Ethernet link is down or disabled
Green	-	-	Ethernet link is operational
Blinking green	-	-	Transmitting and receiving Ethernet packets
Blinking amber	-	-	Transmitting and receiving Ethernet errors
amber	-	-	Firmware error—You should disconnect and reconnect the power injector power jack
-	Blinking green	-	Root mode—no remote bridges are associated Non-root mode—not associated to the root bridge You should check the SSID and security settings of all bridges
-	Green	-	Root mode—associated to at least one remote bridge Non-root mode—associated to the root bridge Normal operation
-	Blinking amber	-	General warning
-	Amber	-	Loading firmware
Red	Amber	Red	Loading Firmware error—You should disconnect and reconnect the power injector power
-	-	Off	Normal operation
-	-	Blinking green	Transmitting and receiving radio packets
-	-	Blinking amber	Maximum retries or buffer full occurred on the radio interface
-	-	Amber	Radio firmware error—You should disconnect and reconnect power injector power



**DRAFT - CISCO CONFIDENTIAL**

The bridge uses a blinking code to identify various error conditions. The code sequence uses a two-digit diagnostic code that starts with a long pause to delimit the code, followed by the indicator flashing red to count out the first digit, then a short pause, followed by the indicator flashing red to count out the second digit (see [Table 5-4](#)).

**Table 5-4 Bridge LED Blinking Error Codes**

Indicator	Blinking Codes		Description
	First Digit	Second Digit	
Ethernet	2	1	Ethernet cable problem—Verify that the cable is properly connected and not defective. This error might also indicate a problem with the Ethernet link. If the cable is connected properly and not defective, contact technical support for assistance.
Radio	1	2	Radio not detected—Contact technical support for assistance.
	1	3	Radio not ready—Contact technical support for assistance.
	1	4	Radio did not start—Contact technical support for assistance.
	1	5	Radio failure—Contact technical support for assistance.
	1	6	Radio did not flash its firmware—Contact technical support for assistance.

## Power Injector LED Indicators

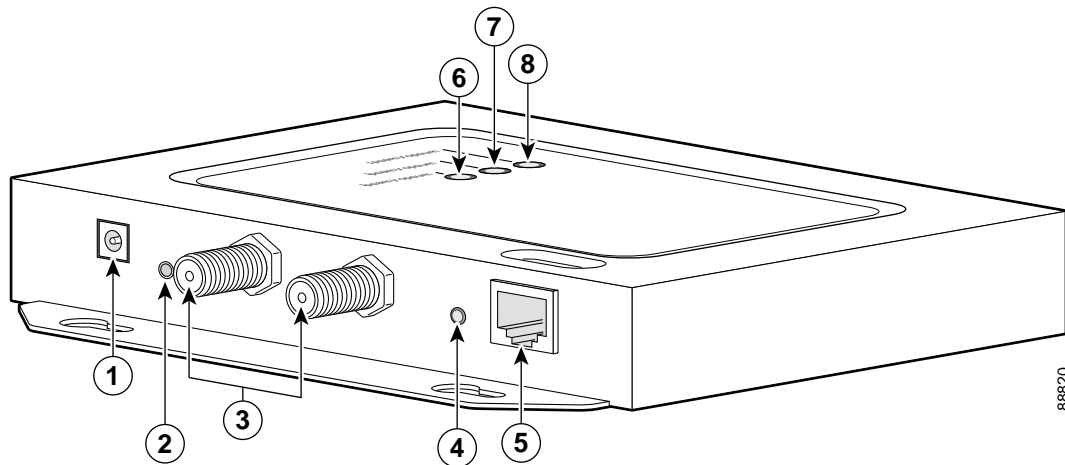
The power injector contains three LED indicators to provide status information on the wired Ethernet link, the bridge Ethernet link, and the bridge status. When the power injector is powered up, it sends a constant discovery tone on the dual-coax cables to the bridge. When the bridge is connected to the dual-coax cables, it returns the discovery tone to the power injector. When the power injector detects the returned discovery tone, it applies +48 VDC to the dual-coax cables to the bridge.

When power is applied to the bridge, the bridge activates the bootloader and begins the POST operations. The bridge begins to load the IOS image when the Post operations are successfully completed. Upon successfully loading the IOS image, the bridge initializes and tests the radio.

**DRAFT - CISCO CONFIDENTIAL**

The power injector LED indicators are shown in [Figure 5-1](#).

**Figure 5-2 Power Injector LED Indicators**



<b>1</b>	Power jack (+48VDC)	<b>5</b>	Ethernet port (RJ45 connector)
<b>2</b>	Power LED indicator	<b>6</b>	Ethernet Activity LED
<b>3</b>	Power injector dual-coax ports (F-Type connectors)	<b>7</b>	Injector Status LED
<b>4</b>	Mode button	<b>8</b>	Uplink Activity LED

The power injector LED indications are shown in [Table 5-5](#).

**Table 5-5 Power Injector LED Indications**

Uplink Activity	Injector Status	Ethernet Activity	Description
-	-	Off	Wired LAN Ethernet link is not active
-	-	Green	Wired LAN Ethernet link is operational
-	-	Blinking Green	Transmitting and receiving packets over the wired LAN Ethernet link
-	-	Amber	Power injector internal memory error
Off	-	-	Link between power injector and bridge is not active
Green	-	-	Link between power injector and bridge is operational
Blinking Green	-	-	Transmitting and receiving Ethernet packets between the power injector and the bridge
Amber	-	-	Power injector internal memory error
-	Green	-	Bridge successfully passed Power On Self Test (POST) and loaded the IOS image
-	Blinking Green	-	Bridge power is active and the bridge is loading IOS image or POST operation has started

**DRAFT - CISCO CONFIDENTIAL****Table 5-5 Power Injector LED Indications (continued)**

Uplink Activity	Injector Status	Ethernet Activity	Description
-	Blinking Amber	-	Bridge has not been detected and bridge power is not active
Amber	Amber	Amber	Power injector internal memory error
Off	Amber	Off	Bridge is resetting the configuration to defaults; mode button has been depressed more than 2 seconds but less than 20 seconds
-	Red	-	Image recovery mode, downloading new image; mode button pressed more than 20 seconds
Red	Red	Red	Power injector internal memory error

## Checking Basic Configuration Settings

Mismatched basic settings are the most common causes of lost wireless connectivity. If the bridge does not associate with a remote bridge, check the following areas.

### SSID

To associate, all bridges must use the same SSID. The bridge installation mode SSID is *autoinstall* and the normal mode default SSID is *tsunami*. You should verify the SSID value shown on the Express Setup page is the same for all bridges. You should also verify the bridges are configured for the proper network role; only one bridge can be configured as the root bridge.

### Security Settings

Remote bridges attempting to authenticate with your bridge must support the same security options configured in the bridge, such as WEP, EAP or LEAP, MAC address authentication, Message Integrity Check (MIC), WEP key hashing, and 802.1X protocol versions.

If a remote bridge is unable to authenticate with your bridge, verify the security settings are same as your bridge settings. For additional information, refer to the *Cisco Aironet 1400 Series Bridge Software Configuration Guide*.

**DRAFT - CISCO CONFIDENTIAL**

# Antenna Alignment

If your bridges are unable to associate together, you should verify the basic configuration settings on all bridges before attempting to verify bridge antenna alignment (refer to “[Configuring the Bridge for the First Time](#)” section on page 4-1). If your basic configurations settings are correct, you can verify antenna alignment by using the the RSSI port. The RSSI port can be used even when the bridges are not associated.

**Note**

To meet regulatory restrictions, the external antenna bridge configuration and the external antenna must be professional installed.

The RSSI port outputs a DC voltage that is proportional to the received signal level. The RSSI voltage is available whenever a signal is present, regardless of the bridge mode (installation or normal), association status, or pre-configuration role setting. The RSSI voltage provides an instantaneous reading as you move the antenna. The RSSI port is a female BNC connector on the bridge housing. To obtain RSSI readings, you can use any convenient voltmeter connected to the RSSI port using a cable with a male BNC connector.

The RSSI voltage increases linearly with signal level as shown in [Table 6](#).

**Note**

A larger RSSI voltage reading indicates a stronger signal.

**Table 6** *RSSI Voltage Levels*

Nominal Signal Level (dBm)	RSSI Reading (volts)
-20 or greater	2.70
-30	2.31
-40	1.93
-50	1.54
-60	1.16
-70	0.77
-80	0.39
-90 or less	0.00

The voltage varies from 0 to 2.7 volts for signals between -90 and -20 dBm, respectively.

For additional alignment information, refer to the *Cisco Aironet 1400 Series Bridge Mounting Instructions* that shipped with your bridge.

## Resetting to the Default Configuration

If you forget the password that allows you to configure the bridge, you may need to completely reset the configuration. You can use the MODE button on the power injector or the web-browser interface.

## DRAFT - CISCO CONFIDENTIAL

**Note**

The following steps reset *all* configuration settings to factory defaults, including passwords, WEP keys, the IP address, and the SSID.

### Using the MODE Button

Follow these steps to delete the current configuration and return all bridge settings to factory defaults using the MODE button:

- Step 1** Disconnect the power jack on the power injector.
- Step 2** Press and hold the MODE button while you reconnect power to the power injector.
- Step 3** Hold the MODE button until the Status LED turns amber (approximately 3 seconds), and release the button.
- Step 4** After the bridge reboots, you must reconfigure the bridge by using the Web browser interface, the Telnet interface, or IOS commands.

**Note**

The bridge is configured with the factory default values including the IP address (set to receive an IP address using DHCP). To obtain the bridge's new IP address, refer to the [“Using the IP Setup Utility”](#) section on page 4-9.

### Using the Web Browser Interface

Follow the steps below to delete the current configuration and return all bridge settings to the factory defaults using the web browser interface.

- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).
- Step 2** Enter the bridge's IP address in the browser address line and press **Enter**. An Enter Network Password screen appears.
- Step 3** Enter your username in the User Name field.
- Step 4** Enter the bridge password in the Password field and press **Enter**. The Summary Status page appears.
- Step 5** Click **System Software** and the System Software screen appears.
- Step 6** Click **System Configuration** and the System Configuration screen appears.
- Step 7** Click the **Default** button.

**Note**

If the bridge is configured with a static IP address, the IP address does not change.

- Step 8** After the bridge reboots, you must reconfigure the bridge by using the Web browser interface, the Telnet interface, or IOS commands.

**DRAFT - CISCO CONFIDENTIAL**

# Reloading the Bridge Image

If your bridge has a firmware failure, you must reload the complete bridge image file using the Web browser interface or by pressing and holding the MODE button for around 30 seconds. You can use the browser interface if the bridge firmware is still fully operational and you want to upgrade the firmware image. However, you can use the MODE button when the bridge has a corrupt firmware image.

## Using the MODE button

You can use the MODE button on the bridge to reload the bridge image file from an active Trivial File Transfer Protocol (TFTP) server on your network or on a PC connected to the bridge Ethernet port.

**Note**

If your bridge experiences a firmware failure or a corrupt firmware image, indicated by three red LED indicators, you must reload the image from a connected TFTP server.

**Note**

This process resets *all* configuration settings to factory defaults, including passwords, WEP keys, the bridge IP address, and SSIDs.

Follow the steps below to reload the bridge image file:

- Step 1** The PC you intend to use must be configured with a static IP address in the range of 10.0.0.2 to 10.0.0.30.
- Step 2** Make sure the PC contains the bridge image file (*TBD*) in the TFTP server folder and the TFTP server is activated. For additional information, refer to the “[Obtaining the Bridge Image File](#)” and “[Obtaining the TFTP Server Software](#)” sections.
- Step 3** Connect the PC to the bridge using a Category 5 (CAT5) Ethernet cable.
- Step 4** Disconnect the power jack from the power injector.
- Step 5** Press and hold the MODE button while you reconnect power to the power injector.
- Step 6** Hold the MODE button until the status LED turns red (approximately 20 to 30 seconds), and release the MODE button.
- Step 7** Wait until the bridge reboots as indicated by all LEDs turning green followed by the Status LED blinking green.
- Step 8** After the bridge reboots, you must reconfigure the bridge by using the Web interface, the Telnet interface, or IOS commands.

**Note**

The bridge is configured with the factory default values including the IP address (set to receive an IP address using DHCP). To obtain the bridge’s new IP address, refer to the “[Using the IP Setup Utility](#)” section on page 4-9.

## DRAFT - CISCO CONFIDENTIAL

### Web Browser Interface

You can also use the Web browser interface to reload the bridge image file. The Web browser interface supports loading the image file using HTTP or TFTP interfaces.



---

**Note** Your bridge configuration is not changed when using the browser to reload the image file.

---

### Browser HTTP Interface

The HTTP interface enables you to browse to the bridge image file on your PC and download the image to the bridge. Follow the instructions below to use the HTTP interface:

- 
- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).
  - Step 2** Enter the bridge's IP address in the browser address line and press **Enter**. An Enter Network Password screen appears.
  - Step 3** Enter your username in the User Name field.
  - Step 4** Enter the bridge password in the Password field and press **Enter**. The Summary Status page appears.
  - Step 5** Click the **System Software** tab and then click **Software Upgrade**. The HTTP Upgrade screen appears.
  - Step 6** Click the **Browse** button to locate the image file on your PC.
  - Step 7** Click the **Upload** button.

For additional information, click the **Help** icon on the Software Upgrade screen.

---

### Browser TFTP Interface

The TFTP interface allows you to use a TFTP server on a network device to load the bridge image file. Follow the instructions below to use a TFTP server:

- 
- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).
  - Step 2** Enter the bridge's IP address in the browser address line and press **Enter**. An Enter Network Password screen appears.
  - Step 3** Enter your username in the User Name field.
  - Step 4** Enter the bridge password in the Password field and press **Enter**. The Summary Status page appears.
  - Step 5** Click the **System Software** tab and then click **Software Upgrade**. The HTTP Upgrade screen appears.
  - Step 6** Click the **TFTP Upgrade** tab.
  - Step 7** Enter the IP address for the TFTP server in the TFTP Server field.
  - Step 8** Enter the file name for the bridge image file in the Upload New System Image Tar File field. If the file is located in a subdirectory of the TFTP server root directory, include the relative path of the TFTP server root directory with the filename. If the file is located in the TFTP root directory, enter only the filename.
  - Step 9** Click the **Upload** button.

## DRAFT - CISCO CONFIDENTIAL

For additional information click the Help icon on the Software Upgrade screen.

---

### Obtaining the Bridge Image File

The bridge image file can be obtained from the Cisco.com software center using the following steps: IPSU is available on the Cisco web site. Follow these steps to obtain and install IPSU:

- 
- Step 1** Step 1 Use your web browser to go to the Cisco Software Center at the following URL:  
<http://www.cisco.com/public/sw-center/sw-wireless.shtml>
  - Step 2** Select **Option #1: Aironet Wireless Software Selector**.
  - Step 3** For the Product Type, select **Wireless Bridge** and click **Submit**.
  - Step 4** Select **1400 Series** for the model number and click **Submit**.
  - Step 5** Select **Current Release (Recommended)** and click **Submit**.
  - Step 6** Select the latest bridge image file (**TBD**).
  - Step 7** On the Encryption Authorization Form, enter the requested information, read the encryption information, and check the boxes that apply. Click **Submit**.
  - Step 8** Read and accept the terms and conditions of the Software License Agreement.
  - Step 9** Select the latest bridge image file again to download it.
  - Step 10** Save the file to a directory on your hard drive and then exit the Internet browser.
- 

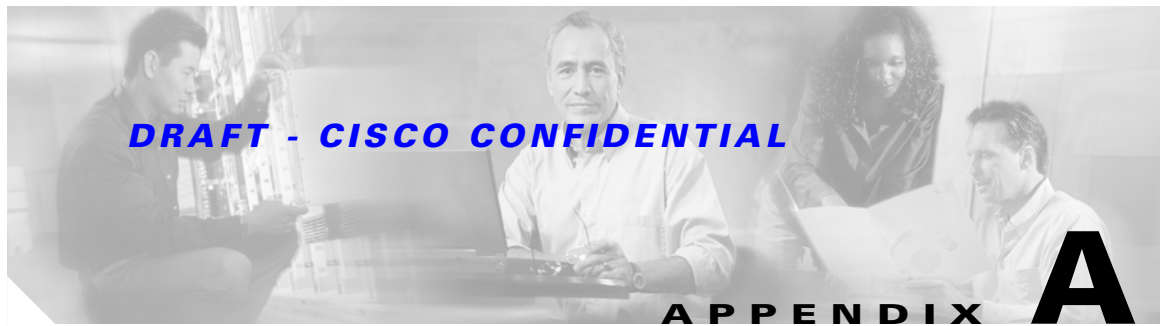
### Obtaining the TFTP Server Software

You can download TFTP server software from several web sites. Cisco recommends the shareware TFTP utility available at this URL:

<http://tftpd32.jounin.net>

Follow the instructions on the website for installing and using the utility.





## Translated Safety Warnings

---

This appendix provides translations of the safety warnings that appear in this publication. These translated warnings apply to other documents in which they appear in English. The following safety warnings appear in this appendix:

- [Installation Warning, page A-3](#)
- [Installation and Grounding Warning, page A-4](#)
- [Circuit Breaker Warning, page A-6](#)
- [Ground Conductor Warning, page A-7](#)
- [Installation Warning, page A-9](#)
- [Lightning Activity Warning, page A-10](#)
- [Explosive Device Proximity Warning, page A-11](#)
- [Bridge Antenna Exposure Limits -TBD, page A-11](#)

**DRAFT - CISCO CONFIDENTIAL****Warning Definition****Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix "Translated Safety Warnings.")

**Waarschuwing**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel "Translated Safety Warnings" (Vertalingen van veiligheidsvoorschriften) raadplegen.)

**Varoitus**

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)

**Attention**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité).

**Warnung**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewusst. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise).)

**Avvertenza**

Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza).

**Advarsel**

Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler].)

**Aviso**

Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança").

**DRAFT - CISCO CONFIDENTIAL**

- ¡Advertencia!** Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings.")
- Varning!** Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar].)

## Installation Warning

**Warning**

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

**Waarschuwing**

Deze apparatuur mag alleen worden geïnstalleerd, vervangen of hersteld door bevoegd geschoold personeel.

**Varoitus**

Tämän laitteen saa asentaa, vaihtaa tai huoltaa ainoastaan koulutettu ja laitteen tunteva henkilökunta.

**Attention**

Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.

**Warnung**

Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden.

**Figyelem!**

A berendezést csak szakképzett személyek helyezhetik üzembe, cserélhetik és tarthatják karban.

**Avvertenza**

Questo apparato può essere installato, sostituito o mantenuto unicamente da un personale competente.

**Advarsel**

Bare opplært og kvalifisert personell skal foreta installasjoner, utskiftninger eller service på dette utstyret.

**Aviso**

Apenas pessoal treinado e qualificado deve ser autorizado a instalar, substituir ou fazer a revisão deste equipamento.

**¡Advertencia!**

Solamente el personal calificado debe instalar, reemplazar o utilizar este equipo.

**Varning!**

Endast utbildad och kvalificerad personal bör få tillåtelse att installera, byta ut eller reparera denna utrustning.

**DRAFT - CISCO CONFIDENTIAL**

- Предупреждение** Установку, замену и обслуживание этого оборудования может осуществлять только специально обученный квалифицированный персонал.
- 警告** 只有经过培训且具有资格的人员才能进行此设备的安装、更换和维修。
- 警告** この装置の設置、交換、保守は、訓練を受けた相応の資格のある人が行ってください。

## Installation and Grounding Warning

**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, 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).

**Waarschuwing**

Zorg dat antenne niet in de buurt wordt geplaatst van langs het plafond lopende stroomkabels of andere voorzieningen voor licht of elektriciteit of op een plaats waar contact met dergelijke stroomvoorzieningen mogelijk is. Wees bij het installeren van de antenne voorzichtig dat u niet in contact komt met dergelijke stroomvoorzieningen aangezien dit kan leiden tot ernstig lichamelijk of dodelijk letsel. Voor het juist installeren en aarden van de antenne, dient u de nationale en plaatselijke verordeningen te raadplegen (bijv. in de VS NFPA 70, National Electrical Code, Artikel 810, in Canada: Canadian Electrical Code, Sectie 54).

**Varoitus**

Älä sijoita antennia lähelle voimajohtoja, muita sähkövalo- tai virtapiirejä tai paikkaa, jossa se voi joutua kosketuksiin sellaisten piirien kanssa. Kun asennat antennia, varo, ettet joutu kosketuksiin maintittujen piirien kanssa, sillä seurauksena voi olla vakava vamma tai kuolema. Tarkista antennin asennus- ja maadoitustiedot kansallisista ja paikallisista sähkösäännöksistä (esimerkiksi Yhdysvalloissa NFPA 70, National Electrical Code, Article 810 ja Kanadassa Canadian Electrical Code, Section 54).

**Attention**

Ne placez pas l'antenne à proximité d'une ligne aérienne ou d'autres circuits d'éclairage ou d'alimentation, ou dans un endroit où elle risque d'être en contact avec des circuits de ce type. Lors de son installation, assurez-vous bien qu'elle ne touche pas de tels circuits car cela risquerait d'entraîner des blessures graves, voire mortelles. Pour une installation et mise à la terre correctes de l'antenne, veuillez consulter les codes nationaux et locaux (par exemple, États-Unis : NFPA 70, National Electrical Code, Article 810 ; Canada : Code électrique canadien, Section 54).

**DRAFT - CISCO CONFIDENTIAL**

- Warnung** Platzieren Sie die Antenne nicht in der Nähe von Starkstrom-Freileitungen oder Schwach- bzw. Starkstromkreisen oder an Stellen, wo sie damit in Kontakt kommen könnte. Gehen Sie bei der Installation der Antenne besonders vorsichtig vor, damit Sie nicht in Kontakt mit derartigen Stromkreisen kommt, da dies zu schweren Verletzungen sogar mit Todesfolge führen kann. Installieren und erden Sie die Antenne sachgerecht unter Einhaltung der jeweils gültigen Sicherheitsvorschriften (zum Beispiel USA: NFPA 70, National Electrical Code, Artikel 810 oder Kanada: Canadian Electrical Code, Abschnitt 54).
- Figyelem!** Ne helyezze az antennát elektromos felsővezetékek és más elektromos világítási és tápellátási áramkörök közelébe, és semmilyen olyan környezetbe, ahol ilyen áramkörökkel érintkezhet. Az antenna felszerelésekor különösképpen ügyeljen arra, hogy ne kerüljön érintkezésbe ilyen áramkörökkel, mert az súlyos sérülést vagy halált okozhat. Az antenna helyes üzembe helyezésével és földelésével kapcsolatban az országos és helyi előírások tartalmazznak útmutatást (például az USA-ban: NFPA 70, National Electrical Code, Article 810, Kanadában: Canadian Electrical Code, Section 54).
- Avvertenza** Non sistemare l'antenna nelle vicinanze di circuiti elettrici generali o di altri circuiti di illuminazione o di alimentazione, o dove questa possa venire a contatto con tali circuiti. Durante l'installazione dell'antenna, prestare particolare attenzione a non entrare in contatto con tali circuiti, in quanto questo potrebbe provocare seri danni o morte. Per una corretta installazione e messa a terra dell'antenna, fare riferimento ai codici nazionali e locali (es. U.S.A.: NFPA 70, Codice Elettrico Nazionale, articolo 810, Canada: Codice Elettrico Canadese, sezione 54).
- Advarsel** Plasser ikke antennen nær de overliggende strømledningene eller andre lys- eller strømkretser, eller der den kan komme i kontakt med slike kretser. Ved installering av antennen må du være ytterst forsiktig slik at du ikke kommer i kontakt med slike kretser. Dette kan føre til alvorlig skade eller død. For riktig installasjon og jording av antennen, se statlige og lokale forskrifter (for eksempel i USA: NFPA 70, National Electrical Code, Article 810, og i Canada: Canadian Electrical Code, Section 54).
- Aviso** Não coloque a antena perto de linhas de alimentação, de outros circuitos ou onde possa entrar em contato com esses circuitos. Ao instalar a antena, tenha muito cuidado para não tocar nesses circuitos, visto que podem provocar ferimentos graves ou até a morte. Para obter informações sobre como instalar e aterrar corretamente a antena, consulte a legislação local e nacional (por ex., U.S.: NFPA 70, National Electrical Code, Artigo 810, Canadá: Canadian Electrical Code, Seção 54).
- ¡Advertencia!** No coloque la antena cerca de cables de tendido eléctrico u otros circuitos eléctricos, ni donde pueda entrar en contacto con los mismos. Al instalar la antena, extreme las precauciones para no entrar en contacto con dichos circuitos, ya que puede causar heridas graves e incluso la muerte. Para instalar la antena y conectarla a tierra correctamente, consulte los códigos nacionales y locales (p.ej., Estados Unidos: NFPA 70, National Electrical Code, Sección 810, Canadá: Canadian Electrical Code, Artículo 54).
- Varning!** Placera inte antennen nära överhängande kraftledningar, andra elljus- eller strömkretsar eller där den kan komma i kontakt med sådan kretsar. Vid installation av antennen måste du vara mycket försiktig så att du inte kommer i kontakt med sådana kretsar eftersom de kan orsaka allvarlig kroppsskada eller dödsfall. För riktig installation och jordning av antennen, hänvisas du till nationella och lokala koder (t.ex. USA: NFPA 70, National Electrical Code, Article 810, Kanada: Canadian Electrical Code, Section 54).

**DRAFT - CISCO CONFIDENTIAL**

<b>Предупреждение</b>	Не размещайте антенну поблизости от линий электропередачи, проводов освещения и других силовых линий, а также в местах, где антенна может касаться таких линий. При установке антенны будьте предельно внимательны, чтобы не коснуться таких линий — это может привести к серьезным травмам и даже к смертельному исходу. Сведения о правилах установки и заземлении антенны содержатся в национальных и региональных электротехнических правилах и нормах (например в США — NFPA 70, National Electrical Code, статья 810; в Канаде — Canadian Electrical Code, раздел 54).
<b>警告</b>	请勿将天线安放在过热的电线或其它电灯或电路附近，也不要将它安放在能与此类电路相接触的地方。安装天线时，要特别当心不要接触此类电路，因为它们会造成严重的伤害，甚至导致死亡。有关天线的正确安装和接地，请参阅国家和当地的规范（例如，美国：NFPA 70、美国国家电气规程 810 条款，加拿大：加拿大电气规程，第 54 部分）。
<b>警告</b>	送電線またはその他の電灯/電力回線に近い場所や、これらの回線に接触する可能性のある場所には、アンテナを設置しないでください。アンテナを設置するときは、死傷事故のおそれがあるので、これらの回線に絶対に接触しないよう十分に注意する必要があります。アンテナの適切な設置およびアース接続の手順については、一般規定および地域の規定を参照してください（たとえば、NFPA 70, National Electrical Code, Article 810 [米国]、Canadian Electrical Code, Section 54 [カナダ]）。

## Circuit Breaker Warning

**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than:**  
120Vac, 15A U.S. (240Vac, 10A International)

**Waarschuwing**

**Dit product is afhankelijk van de installatie van het gebouw voor beveiliging tegen kortsluiting (overstroom). Controleer of de beschermingsinrichting niet meer dan:**  
120Vac, 15A U.S. (240Vac, 10A International) is.

**Varoitus**

**Tämä tuote on riippuvainen rakennukseen asennetusta oikosulkusuojuuksesta (ylivirtasuojauksesta). Varmista, että suojalaitteen mitoitus ei ole yli:**  
120Vac, 15A U.S. (240Vac, 10A International)

**Attention**

**Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifiez que le courant nominal du dispositif de protection n'est pas supérieur à :**  
120Vac, 15A U.S. (240Vac, 10A International)

**Warnung**

**Dieses Produkt ist darauf angewiesen, dass im Gebäude ein Kurzschluss- bzw. Überstromschutz installiert ist. Stellen Sie sicher, dass der Nennwert der Schutzvorrichtung nicht mehr als:**  
120Vac, 15A U.S. (240Vac, 10A International) beträgt.

**Figyelem!**

**A termék védelmi rendszerének része az épület kábelezésébe épített rövidzárlat (túláram) elleni védelem is. Gondoskodjon róla, hogy a készüléket védő eszköz legfeljebb 120Vac, 15A U.S. (240Vac, 10A International) áramerősségre legyen méretezve.**

**DRAFT - CISCO CONFIDENTIAL**

<b>Avvertenza</b>	<b>Questo prodotto dipende dall'impianto dell'edificio per quanto riguarda la protezione contro cortocircuiti (sovracorrente). Assicurarsi che il dispositivo di protezione non abbia un rating superiore a: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>Advarsel</b>	<b>Dette produktet er avhengig av bygningens installasjoner av kortslutnings (overstrøm)-beskyttelse. Påse at verneenheten ikke er merket høyere enn: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>Aviso</b>	<b>Este produto depende das instalações existentes para proteção contra curto-circuito (sobrecarga). Assegure-se de que o fusível ou disjuntor não seja superior a: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>¡Advertencia!</b>	<b>Este equipo utiliza el sistema de protección contra cortocircuitos (o sobrecorrientes) del edificio. Asegúrese de que el dispositivo de protección no sea superior a: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>Varning!</b>	<b>Denna produkt är beroende av i byggnaden installerat kortslutningsskydd (överströmsskydd). Kontrollera att skyddsanordningen inte har högre märkvärde än: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>Предупреждение</b>	<b>Защита устройства от короткого замыкания (перегрузки) осуществляется с помощью оборудования, являющегося частью электропроводки здания. Убедитесь, что номинал защитного устройства не превышает: 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>警告</b>	<b>此产品的短路（过载电流）保护由建筑物的供电系统提供。确保短路保护设备的额定电流不大于： 120Vac, 15A U.S. (240Vac, 10A International)</b>
<b>警告</b>	<b>この製品は、設置する建物にショート（過電流）保護機構が備わっていることを前提に設計されています。保護装置の定格が以下の値を超えないことを確認してください。 120Vac, 15A U.S. (240Vac, 10A International)</b>

## Ground Conductor Warning

**Warning**

**This equipment must be grounded. 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.**

**Waarschuwing**

**Deze apparatuur dient geaard te zijn. De aardingsleiding mag nooit buiten werking worden gesteld en de apparatuur mag nooit bediend worden zonder dat er een op de juiste wijze geïnstalleerde aardingsleiding aanwezig is. Neem contact op met de bevoegde instantie voor elektrische inspecties of met een elektricien als u er niet zeker van bent dat er voor passende aarding gezorgd is.**

**DRAFT - CISCO CONFIDENTIAL**

<b>Varoitus</b>	Laitteiden on oltava maadoitettuja. Älä koskaan ohita maajohdinta tai käytä laitteita ilman oikein asennettua maajohdinta. Ota yhteys sähkötarkastusviranomaiseen tai sähköasentajaan, jos olet epävarma maadoituksen sopivuudesta.
<b>Attention</b>	Cet équipement doit être mis à la masse. Ne jamais rendre inopérant le conducteur de masse ni utiliser l'équipement sans un conducteur de masse adéquatement installé. En cas de doute sur la mise à la masse appropriée disponible, s'adresser à l'organisme responsable de la sécurité électrique ou à un électricien.
<b>Warnung</b>	Dieses Gerät muss geerdet sein. Auf keinen Fall den Erdungsleiter unwirksam machen oder das Gerät ohne einen sachgerecht installierten Erdungsleiter verwenden. Wenn Sie sich nicht sicher sind, ob eine sachgerechte Erdung vorhanden ist, wenden Sie sich an die zuständige Inspektionsbehörde oder einen Elektriker.
<b>Figyelem!</b>	A berendezés csak megfelelő védőföldeléssel működtethető. Ne iktassa ki a földelés csatlakozóját, és ne üzemeltesse a berendezést szabályosan felszerelt földelő vezeték nélkül! Ha nem biztos benne, hogy megfelelő földelés áll rendelkezésbe, forduljon a helyi elektromos hatóságokhoz vagy egy villanyszerelőhöz.
<b>Avvertenza</b>	Questa apparecchiatura deve essere dotata di messa a terra. Non escludere mai il conduttore di protezione né usare l'apparecchiatura in assenza di un conduttore di protezione installato in modo corretto. Se non si è certi della disponibilità di un adeguato collegamento di messa a terra, richiedere un controllo elettrico presso le autorità competenti o rivolgersi a un elettricista.
<b>Advarsel</b>	Dette utstyret må jordes. Omgå aldri jordingslederen og bruk aldri utstyret uten riktig montert jordingsleder. Ta kontakt med fagfolk innen elektrisk inspeksjon eller med en elektriker hvis du er usikker på om det finnes velegnet jordning.
<b>Aviso</b>	Este equipamento deve ser aterrado. Nunca anule o fio terra nem opere o equipamento sem um aterramento adequadamente instalado. Em caso de dúvida com relação ao sistema de aterramento disponível, entre em contato com os serviços locais de inspeção elétrica ou um electricista qualificado.
<b>¡Advertencia!</b>	Este equipo debe estar conectado a tierra. No inhabilite el conductor de tierra ni haga funcionar el equipo si no hay un conductor de tierra instalado correctamente. Póngase en contacto con la autoridad correspondiente de inspección eléctrica o con un electricista si no está seguro de que haya una conexión a tierra adecuada.
<b>Varning!</b>	Denna utrustning måste jordas. Koppla aldrig från jordledningen och använd aldrig utrustningen utan en på lämpligt sätt installerad jordledning. Om det föreligger osäkerhet huruvida lämplig jordning finns skall elektrisk besiktningsauktoritet eller elektriker kontaktas.
<b>Предупреждение</b>	Данное устройство должно быть заземлено. Никогда не отключайте провод заземления и не пользуйтесь оборудованием при отсутствии правильно подключенного провода заземления. За сведениями об имеющихся возможностях заземления обратитесь к соответствующим контролирующим организациям по энергоснабжению или к инженеру-электрику.



**DRAFT - CISCO CONFIDENTIAL**

- 警告** 此设备必须接地。切勿使接地导体失效，或者在没有正确安装接地导体的情况下操作该设备。如果您不能肯定接地导体是否正常工作，请咨询有关电路检测方面的权威人士或电工。
- 警告** この装置はアース接続する必要があります。アース導体を破損しないよう注意し、アース導体を正しく取り付けないまま装置を稼働させないでください。アース接続が適正であるかどうか分からない場合には、電気検査機関または電気技術者に相談してください。

## Installation Warning

**Warning****Read the installation instructions before connecting the system to the power source.****Waarschuwing****Raadpleeg de installatie-instructies voordat u het systeem op de voedingsbron aansluit.****Varoitus****Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.****Attention****Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.****Warnung****Vor dem Anschließen des Systems an die Stromquelle die Installationsanweisungen lesen.****Figyelem!****Mielőtt áramforráshoz csatlakoztatná a rendszert, olvassa el az üzembe helyezési útmutatót!****Avvertenza****Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.****Advarsel****Les installasjonsinstruksjonene før systemet kobles til strømkilden.****Aviso****Leia as instruções de instalação antes de ligar o sistema à fonte de energia.****¡Advertencia!****Lea las instrucciones de instalación antes de conectar el sistema a la red de alimentación.****Varning!****Läs installationsanvisningarna innan du kopplar systemet till strömförsörjningsenheten.****Предупреждение****Перед подключением устройства к источнику электропитания ознакомьтесь с данной инструкцией по установке.****警告****在将系统与电源连接之前，请仔细阅读安装说明。****警告****必ず設置手順を読んでから、システムを電源に接続してください。**

**DRAFT - CISCO CONFIDENTIAL****Lightning Activity Warning****Warning****Do not work on the system or connect or disconnect cables during periods of lightning activity.****Waarschuwing****Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.****Varoitus****Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.****Attention****Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.****Warnung****Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.****Figyelem!****Villámlás közben ne dolgozzon a rendszeren, valamint ne csatlakoztasson és ne húzzon ki kábeleket!****Avvertenza****Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.****Advarsel****Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.****Aviso****Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).****¡Advertencia!****No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.****Varning!****Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.****Предупреждение****Не следует работать с устройством, а также подключать или отключать кабели во время грозы.****警告****请勿在发生雷电时操作系统，也不要在此期间连接或断开电缆。****警告****雷が発生しているときは、システムに手を加えたり、ケーブルの接続や取り外しを行わないでください。**

**DRAFT - CISCO CONFIDENTIAL****Explosive Device Proximity Warning****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.

**Waarschuwing**

Gebruik dit draadloos netwerkkapparaat alleen in de buurt van onbeschermden ontstekers of in een omgeving met explosieven indien het apparaat speciaal is aangepast om aan de eisen voor een dergelijk gebruik te voldoen.

**Varoitus**

Älä käytä johdotonta verkkolaitetta suojaamattomien räjäytysnallien läheisyydessä tai räjäytysalueella, jos laitetta ei ole erityisesti muunnettu sopivaksi sellaiseen käyttöön.

**Attention**

Ne jamais utiliser un équipement de réseau sans fil à proximité d'un détonateur non blindé ou dans un lieu présentant des risques d'explosion, sauf si l'équipement a été modifié à cet effet.

**Warnung**

Benutzen Sie Ihr drahtloses Netzwerkgerät nicht in der Nähe ungeschützter Sprengkapseln oder anderer explosiver Stoffe, es sei denn, Ihr Gerät wurde eigens für diesen Gebrauch modifiziert und bestimmt.

**Avvertenza**

Non utilizzare la periferica di rete senza fili in prossimità di un detonatore non protetto o di esplosivi a meno che la periferica non sia stata modificata a tale proposito.

**Advarsel**

Ikke bruk den trådløse nettverksenheten nært inntil uisolerte fenghetter eller i et eksplosivt miljø med mindre enheten er modifisert slik at den tåler slik bruk.

**Aviso**

Não opere o dispositivo de rede sem fios perto de cápsulas explosivas não protegidas ou num ambiente explosivo, a não ser que o dispositivo tenha sido modificado para se qualificar especialmente para essa utilização.

**¡Advertencia!**

No utilizar un aparato de la red sin cable cerca de un detonador que no esté protegido ni tampoco en un entorno explosivo a menos que el aparato haya sido modificado con ese fin.

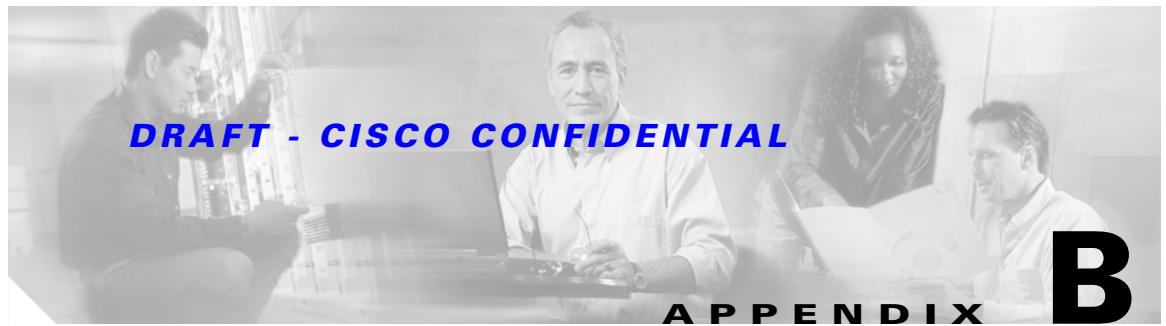
**Warning!**

Använd inte den trådlösa nätverksenheten i närheten av oskyddade tändhatten eller i en explosiv miljö om inte enheten modifierats för att kunna användas i sådana sammanhang.

**Bridge Antenna Exposure Limits -TBD****Warning**

In order to comply with radio frequency (RF) exposure limits, the antennas for this product should be positioned no less than 6.56 ft (2 m) from your body or nearby persons.

***DRAFT - CISCO CONFIDENTIAL***



## Declarations of Conformity and Regulatory Information

---

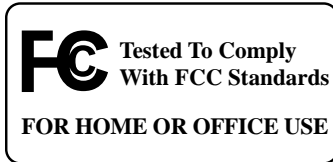
This appendix provides declarations of conformity and regulatory information for the Cisco Aironet 1400 Series Wireless Bridge.

This appendix contains the following sections:

- [Manufacturers Federal Communication Commission Declaration of Conformity Statement, page B-2](#)
- [Department of Communications—Canada, page B-3](#)
- [Declaration of Conformity for RF Exposure, page B-4](#)

**DRAFT - CISCO CONFIDENTIAL**

# Manufacturers Federal Communication Commission Declaration of Conformity Statement



**Models:** AIR-BR1410A-A-K9  
AIR-BR-1410-A-A-K9-N

**FCC Certification number:** LDK 102047  
LDK 102047P

**Manufacturer:** Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

**Caution**


---

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using integrated antennas or those listed in [Table B-1](#). Any changes or modification to the product not expressly approved by Cisco could void the user's authority to operate this device.

---

**Caution**


---

To meet regulatory restrictions, the bridge with the antenna connector and the external antenna must be installed by a professional installer.

---

**DRAFT - CISCO CONFIDENTIAL****Table B-1 Access Point 2.4-GHz Antennas**

<b>Cisco Part Number</b>	<b>Model</b>	<b>Gain</b>
AIR-ANT58G9VOA-NAironet	Vertically polarized omnidirectional	9 dBi
AIR-ANT58G10SSA-NAironet	Sector	9.5 dBi
AIR-ANT58G28SDA-NAironet	Dish	28 dBi

# Department of Communications—Canada

## Canadian Compliance Statement

This Class B Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Class B Limits of Industry Canada. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

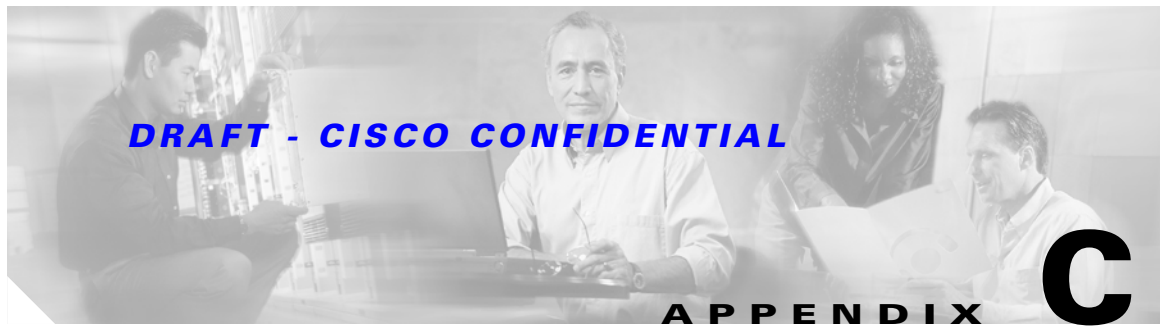
Cisco's 54-Mbps, 5.8-GHz bridges are certified to the requirements of RSS-210 issue 5, RSP 100, and RSS 102 for 5-GHz spread spectrum devices.

***DRAFT - CISCO CONFIDENTIAL*****Declaration of Conformity for RF Exposure**

This bridge product has been found to be compliant to the requirements set forth in CFR 47 Section 1.1307 addressing RF Exposure from radio frequency devices as defined in Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields. For antennas, AIR-ANT58G9VOA-NAironet, AIR-ANT58G10SSA-NAironet, and AIR-ANT58G28SDA-NAironet, the antennas should be positioned more than 6.8 feet (2 meters) from your body or nearby persons.

This transmitter may not be co-located or operating in conjunction with other transmitters or antennas separated by less than 2m .





## Channels and Antenna Settings

---

This appendix lists the IEEE 802.11a (5.8-GHz band) channels and the maximum power levels supported by the Americas regulatory domain.

The following topics are covered in this appendix:

- [Channels, page C-2](#)
- [Maximum Power Levels, page C-2](#)

**DRAFT - CISCO CONFIDENTIAL**

# Channels

## IEEE 802.11a (5.8-GHz Band)

The channel identifiers, channel center frequencies and regulatory domain of each 20-MHz-wide channel are shown in [Table C-1](#).

**Table C-1 Channels for IEEE 802.11a (5.8-GHz Band)**

Channel Identifier	Center Frequency (MHz)	Regulatory Domains			
		Americas (-A)			
149	5745	X			
153	5765	X			
157	5785	X			
161	5805	X			

This product is for outdoor use with regard to the channel identifiers indicated in [Table C-1](#).

# Maximum Power Levels

## 5.8-GHz Band

An improper combination of power level and antenna configurations can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. [Table C-2](#) indicates the maximum power levels and antenna gains allowed.

**Table C-2 Maximum Power Levels and Antenna Gains**

Regulatory Domains	Maximum Power Settings				
	Orientation	9 dBi Omnidirectional Antenna	9.5 dBi Sector Antenna	22.5 dBi Integrated Antenna	28 dBi Dish Antenna
Americas (-A)	P2P <sup>1</sup>	24 dBm	24 dBm	24 dBm	22 dBm
	P2MP <sup>2</sup>	24 dBm	24 dBm	12 <sup>3</sup> dBm <sup>4</sup>	na

1. Point-to-Point
2. Point-to-Multipoint
3. A maximum of 13 dBm is allowed, but that setting is not supported by the bridge.
4. On point-to-multipoint links, the remote bridges communicating with the central bridge are allowed to use a maximum power setting of 24 dBm. The central bridge is limited to a maximum power setting of 12 dBm.



- 802.11** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 1- and 2-megabit-per-second (Mbps) wireless LANs operating in the 2.4-GHz band.
- 802.11a** The IEEE standard that specifies carrier sense media access control and physical layer specifications for wireless LANs operating in the 5-GHz frequency band.

---

## A

- Ad Hoc Network** A wireless network composed of stations without Access Points.
- Antenna Gain** The gain of an antenna is a measure of the antenna's ability to direct or focus radio energy over a region of space. High gain antennas have a more focused radiation pattern in a specific direction.
- Associated** A station is configured properly to allow it to wirelessly communicate with an Access Point.

---

## B

- Beacon** A wireless LAN packet that signals the availability and presence of the wireless device. Beacon packets are sent by access points and base stations; however, client radio cards send beacons when operating in computer to computer (Ad Hoc) mode.
- BOOTP** Boot Protocol. A protocol used for the static assignment of IP addresses to devices on the network.
- Bridge** A wireless LAN transceiver that is used to interconnect two or more wired Ethernet networks.
- Broadcast Packet** A single data message (packet) sent to all addresses on the same subnet.

---

## C

- Cell** The area of radio range or coverage in which the wireless devices can communicate with the base station. The size of the cell depends upon the speed of the transmission, the type of antenna used, and the physical environment, as well as other factors.
- CSMA** Carrier sense multiple access. A wireless LAN media access method specified by the IEEE 802.11 specification.

**DRAFT - CISCO CONFIDENTIAL**

---

**D**

<b>Data Rates</b>	The range of data transmission rates supported by a device. Data rates are measured in megabits per second (Mbps).
<b>dBi</b>	A ratio of decibels to an isotropic antenna that is commonly used to measure antenna gain. The greater the dBi value, the higher the gain, and the more acute the angle of coverage.
<b>dBm</b>	A power measurement described in decibels per milliwatt. 0 dBm is defined as 1 mw at 1 kHz of frequency at 600 ohms of impedance.
<b>DHCP</b>	Dynamic host configuration protocol. A protocol available with many operating systems that automatically issues IP addresses within a specified range to devices on the network. The device retains the assigned address for a specific administrator-defined period.
<b>Dipole</b>	A type of low-gain (2.2-dBi) antenna consisting of two (often internal) elements.
<b>Domain Name</b>	The text name that refers to a grouping of networks or network resources based on organization-type or geography; for example: name.com—commercial; name.edu—educational; name.gov—government; ISPname.net—network provider (such as an ISP); name.ar—Argentina; name.au—Australia; and so on.
<b>DNS</b>	Domain Name System server. A server that translates text names into IP addresses. The server maintains a database of host alphanumeric names and their corresponding IP addresses.
<b>DSSS</b>	Direct sequence spread spectrum. A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band.

---

**E**

<b>EAP</b>	Extensible Authentication Protocol. An optional IEEE 802.1x security feature ideal for organizations with a large user base and access to an EAP-enabled Remote Authentication Dial-In User Service (RADIUS) server.
<b>Ethernet</b>	The most widely used wired local area network. Ethernet uses carrier sense multiple access (CSMA) to allow computers to share a network and operates at 10, 100, or 1000 Mbps, depending on the physical layer used.

---

**F**

<b>File Server</b>	A repository for files so that a local area network can share files, mail, and programs.
<b>Firmware</b>	Software that is programmed on a memory chip.

**DRAFT - CISCO CONFIDENTIAL**

---

**G**

- Gateway** A device that connects two otherwise incompatible networks together.
- GHz** Gigahertz. One billion cycles per second. A unit of measure for frequency.

---

**I**

- IEEE** Institute of Electrical and Electronic Engineers. A professional society serving electrical engineers through its publications, conferences, and standards development activities. The body responsible for the Ethernet 802.3 and wireless LAN 802.11 specifications.
- Infrastructure** The wired Ethernet network.
- IP Address** The Internet Protocol (IP) address of a station.
- IP Subnet Mask** The number used to identify the IP subnetwork, indicating whether the IP address can be recognized on the LAN or if it must be reached through a gateway. This number is expressed in a form similar to an IP address; for example: 255.255.255.0.
- Isotropic** An antenna that radiates its signal 360 degrees both vertically and horizontally in a perfect sphere.

---

**M**

- MAC** Media Access Control address. A unique 48-bit number used in Ethernet data packets to identify an Ethernet device, such as an access point or your client adapter.
- Modulation** Any of several techniques for combining user information with a transmitter's carrier signal.
- Multipath** The echoes created as a radio signal bounces off of physical objects.
- Multicast Packet** A single data message (packet) sent to multiple addresses.

---

**N**

- Non-root Bridge** A wireless LAN transceiver connected to a remote Ethernet network and communicates only with another wireless LAN transceiver connected to the main Ethernet network.

---

**O**

- Omni-directional** This typically refers to a primarily circular antenna radiation pattern.
- Orthogonal Frequency Division Multiplex (OFDM)** A modulation technique used by IEEE 802.11a-compliant wireless LANs for transmission at 6, 9, 12, 18, 24, 36, 48, and 54 Mbps.

**DRAFT - CISCO CONFIDENTIAL**

---

**P**

- Packet** A basic message unit for communication across a network. A packet usually includes routing information, data, and sometimes error detection information.
- Power Injector** A device that supplies DC power to another device over Ethernet communication lines.

---

**R**

- Range** A linear measure of the distance that a transmitter can send a signal.
- Receiver Sensitivity** A measurement of the weakest signal a receiver can receive and still correctly translate it into data.
- RF** Radio frequency. A generic term for radio-based technology.
- Roaming** A feature of some Access Points that allows users to move through a facility while maintaining an unbroken connection to the LAN.
- Root Bridge** A wireless LAN transceiver connected to the main Ethernet network and communicates with other wireless LAN transceivers connected to remote Ethernet networks.

---

**S**

- Spread Spectrum** A radio transmission technology that spreads the user information over a much wider bandwidth than otherwise required in order to gain benefits such as improved interference tolerance and unlicensed operation.
- SSID** Service Set Identifier (also referred to as Radio Network Name). A unique identifier used to identify a radio network and which stations must use to be able to communicate with each other or to an access point. The SSID can be any alphanumeric entry up to a maximum of 32 characters.

**DRAFT - CISCO CONFIDENTIAL**

---

**T**

**Transmit Power** The power level of radio transmission.

---

**U**

**UNII** Unlicensed National Information Infrastructure—regulations for UNII devices operating in the 5.15 to 5.35 GHz and 5.725 to 5.825 GHz frequency bands.

**UNII-1** Regulations for UNII devices operating in the 5.15 to 5.25 GHz frequency band.

**UNII-2** Regulations for UNII devices operating in the 5.25 to 5.35 GHz frequency band.

**UNII-3** Regulations for UNII devices operating in the 5.725 to 5.825 GHz frequency band.

**Unicast Packet** A single data message (packet) sent to a specific IP address.

---

**W**

**WEP** Wired Equivalent Privacy. An optional security mechanism defined within the 802.11 standard designed to make the link integrity of wireless devices equal to that of a cable.

**Workstation** A computing device with an installed client adapter.

***DRAFT - CISCO CONFIDENTIAL***



---

## **A**

access point  
  image [5-10](#)  
antenna  
  connectors [1-8](#)  
audience [vii](#)

---

## **B**

basic settings  
  checking [5-7](#)

---

## **C**

caution [viii](#)  
Cisco TAC [5-1](#)  
connector [1-3](#)  
connectors [1-7, 1-8](#)  
conventions, document [viii](#)  
conventions of document [?? to ix, ?? to A-3](#)

---

## **D**

data rates [1-8, 2-5](#)  
declarations of conformity [B-1](#)  
default configuration  
  resetting to defaults [5-8](#)  
document  
  conventions [?? to ix, ?? to A-3](#)  
documentation  
  conventions [viii](#)  
  related publications [ix](#)

---

## **E**

EIRP, maximum [C-2 to ??](#)  
environmental conditions [2-5](#)

---

## **F**

FCC Declaration of Conformity [B-2](#)  
FCC Safety Compliance [2-3](#)  
frequencies [C-2](#)  
frequency range [1-7](#)

---

## **I**

indicators [1-4, 5-2](#)  
inline power [1-2](#)  
input power [1-7](#)  
installation guidelines [2-3](#)  
IP address, finding and setting [4-10](#)  
IPSU [4-9](#)

---

## **M**

MAC [4-10, 4-11](#)  
Mode button [5-10](#)

---

## **N**

network configurations [1-5](#)

---

## **O**

obtaining

**DRAFT - CISCO CONFIDENTIAL**

documentation [ix](#)  
operating temperature [1-7](#)

---

**P**

package contents [2-6](#)  
password reset [5-8](#)  
power  
    inline [1-2](#)  
    input [1-7](#)  
power level, maximum [C-2](#)

---

**R**

range [1-8](#)  
regulatory [B-1](#)  
    domains [C-2](#)  
related publications [ix](#)  
reloading access point image [5-10](#)  
RF exposure [B-4](#)

---

**S**

safety warnings, translated [A-1](#)  
site survey [2-5](#)  
size [1-6](#)  
specifications [1-6](#)  
SSID  
    troubleshooting [5-7](#)

---

**T**

TAC [5-1](#)  
Telnet [4-12](#)  
temperature  
    operating [1-7](#)  
TFTP server [5-10](#)  
troubleshooting [5-1](#)

---

**U**

unpacking [2-5](#)

---

**V**

voltage range [1-7](#)

---

**W**

warning  
    defined [viii to ix, 2-2 to ??, A-2 to A-3](#)  
warnings [2-2, A-1](#)  
weight [1-7](#)