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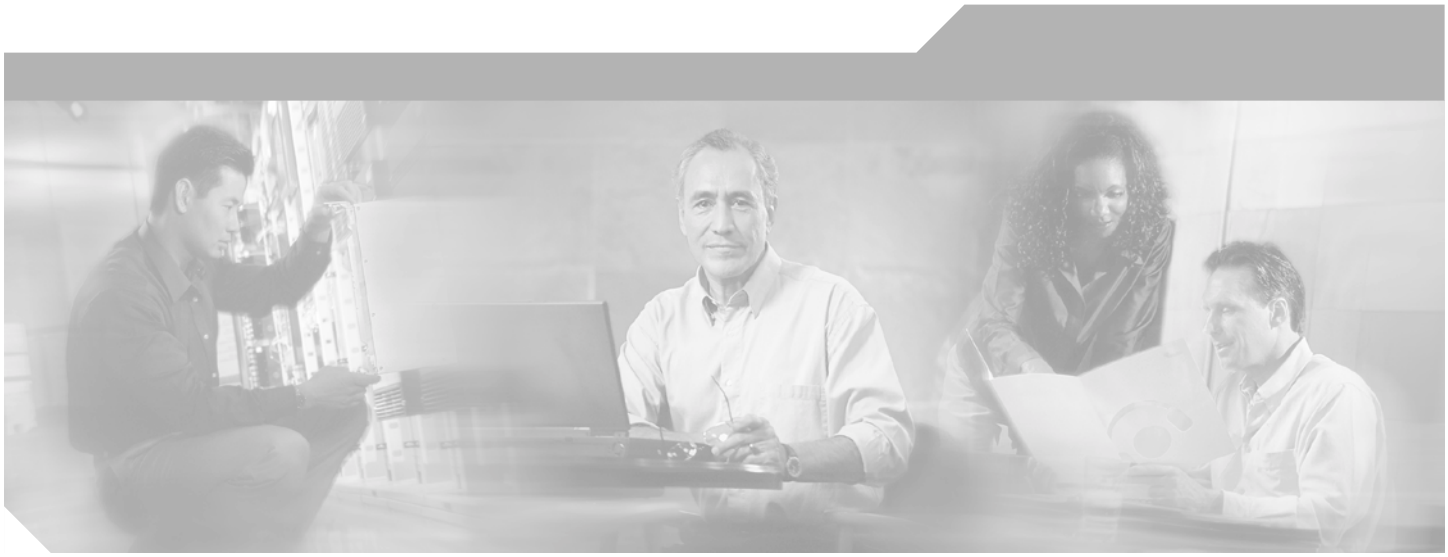

Cisco Aironet 1100 Series Access Point Hardware Installation Guide

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Cisco Aironet 1100 Series Access Point Hardware Installation Guide

Preface

Audience

This guide is for the networking professional who installs and manages the Cisco Aironet 1100 Series Access Point, hereafter referred to as the *access point*. To use this guide, you should have experience working with the Cisco IOS software and be familiar with the concepts and terminology of wireless local area networks.

Purpose

This guide provides the information you need to install and initially configure your access point, including procedures for using the IOS commands that have been created or changed for use with the access point. It does not provide detailed information about these commands. For detailed information about these commands, refer to the *Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges* for this release. For information about the standard IOS Release 12.2 commands, refer to the IOS documentation set available from the Cisco.com home page at **Service and Support > Technical Documents**. On the Cisco Product Documentation home page, select **Release 12.2** from the Cisco IOS Software drop-down menu.

This guide also includes an overview of the access point web-based interface (APWI), which contains all the functionality of the command-line interface (CLI). This guide does not provide field-level descriptions of the APWI windows nor does it provide the procedures for configuring the access point from the APWI. For all APWI window descriptions and procedures, refer to the access point online help, which is available from the Help buttons on the APWI pages.

Organization

This guide is organized into these chapters:

Chapter 1, “Overview,” lists the software and hardware features of the access point and describes the access point’s role in your network.

Chapter 2, “Installing the Access Point,” describes how to connect Ethernet and power cables and provides an installation summary, safety warnings, and general guidelines.

Chapter 3, “Configuring the Access Point for the First Time,” describes how to configure basic settings on a new access point.

Chapter 4, "Using the Web-Browser Interface," describes how to use the web-browser interface to configure the access point.

Chapter 5, "Using the Command-Line Interface," describes how to use the command-line interface (CLI) to configure the access point.

Chapter 6, "Mounting Instructions," describes how to mount the access point on a desktop, wall, or ceiling.

Chapter 7, "2.4 GHz Radio Upgrade," provides upgrade instructions for changing the 2.4 GHz radio.

Chapter 8, "Troubleshooting," provides troubleshooting procedures for basic problems with the access point.

Appendix A, "Translated Safety Warnings," provides translations of the safety warnings that appear in this publication.

Appendix B, "Declarations of Conformity and Regulatory Information," provides declarations of conformity and regulatory information for the access point.

Appendix C, "Access Point Specifications," lists technical specifications for the access point.

Appendix D, "Channels and Antenna Settings," lists the access point radio channels and the maximum power levels supported by the world's regulatory domains.

Conventions

This publication uses these conventions to convey instructions and information:

Command descriptions use these conventions:

- Commands and keywords are in boldface text.
- Arguments for which you supply values are in italic.
- Square brackets ([ ]) mean optional elements.
- Braces ({ }) group required choices, and vertical bars (|) separate the alternative elements.
- Braces and vertical bars within square brackets ([{ | }]) mean a required choice within an optional element.

Interactive examples use these conventions:

- Terminal sessions and system displays are in `screen` font.
- Information you enter is in **`boldface screen`** font.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and timesavers use these conventions and symbols:

Tip Means the following will help you solve a problem. The tips information might not be troubleshooting or even an action, but could be useful information.

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 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).)**

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 fisicos. 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").**

¡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].)**

Related Publications

These documents provide complete information about the access point:

- *Release Notes for 1100 Series Access Points*
- *Cisco Aironet 1100 Series Access Point Command Reference*

Click this link to browse to the Cisco Aironet documentation home page:

http://www.cisco.com/univercd/cc/td/doc/product/wireless/index.htm

To browse to the 1100 series access point documentation, select **Aironet 1100 Series Wireless LAN Products** > **Cisco Aironet 1100 Series Access Points**.

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

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We appreciate your comments.

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

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

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.

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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

- 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:

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- 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

CHAPTER 1

Overview

Cisco Aironet 1100 Series Access Point provides a secure, affordable, and easy-to-use wireless LAN solution that combines mobility and flexibility with the enterprise-class features required by networking professionals. With a management system based on Cisco IOS software, the 1100 series is a Wi-Fi certified, wireless LAN transceiver. The 1100 series access point uses a single mini-PCI radio (IEEE 802.11b-compliant or IEEE 802.11g-compliant) that can be upgraded to future radio technologies.

The access point serves as the connection point between wireless and wired networks or as the center point of a stand-alone wireless network. In large installations, wireless users within radio range of an access point can roam throughout a facility while maintaining seamless, uninterrupted access to the network.

You can configure and monitor the access point using the command-line interface (CLI), the browser-based management system, or Simple Network Management Protocol (SNMP).

This chapter provides information on the following topics:

Hardware Features

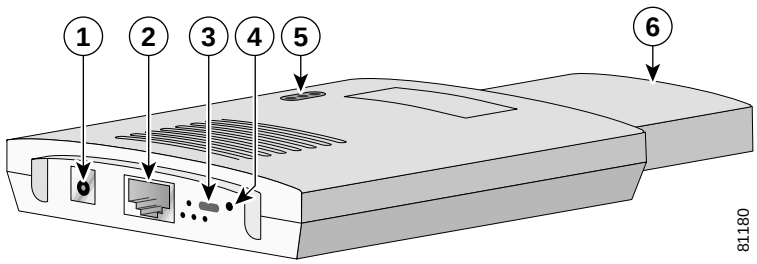
This section describes access point features. Refer to Appendix C, "Access Point Specifications," for a list of access point specifications.

Key hardware features of the 1100 series access point include:

- Single Radio Operation, page 1-2
- Ethernet Port, page 1-2
- LEDs, page 1-3
- Power Sources, page 1-3
- UL 2043 Certification, page 1-4
- Anti-Theft Features, page 1-4

Figure 1-1 shows the location of some of the hardware features of the access point.

Figure 1-1 Access Point Layout and Connectors



1	48-VDC power port	**4**	Mode button
2	Ethernet port (RJ-45)	**5**	Status LEDs
3	Cable lock slot	**6**	Antenna

Single Radio Operation

The access point contains a 2.4-GHz radio in a mini-PCI slot and two 2.2-dBi dipole integrated antennas. You can perform a field upgrade to the mini-PCI radio and antennas to support new radio technologies, such as the 2.4-GHz IEEE 802.11g-compliant radio.

Ethernet Port

The auto-sensing Ethernet port accepts an RJ-45 connector, linking the access point to your 10BASE-T or 100BASE-T Ethernet LAN. The access point can receive power through the Ethernet cable from a power injector, switch, or power patch panel. The Ethernet MAC address is printed on the label on the back of the access point.

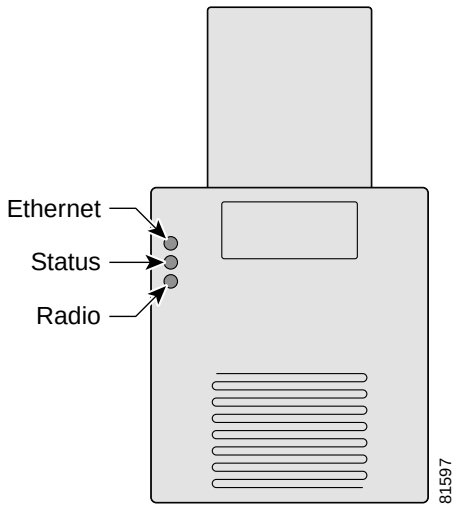
LEDs

The three LEDs on the top of the access point report Ethernet activity, association status, and radio activity.

- The Ethernet LED signals Ethernet traffic on the wired LAN, or Ethernet infrastructure. This LED is normally green when an Ethernet cable is connected, and blinks green when a packet is received or transmitted over the Ethernet infrastructure. The LED is off when the Ethernet cable is not connected.
- The status LED signals operational status. Steady green indicates that the access point is associated with at least one wireless client. Blinking green indicates that the access point is operating normally but is not associated with any wireless devices.
- The radio LED signals wireless traffic over the radio interface. The light is normally off, but it blinks green whenever a packet is received or transmitted over the access point radio.

Figure 1-2 shows the three status LEDs.

Figure 1-2 Access Point LEDs



Power Sources

The access point draws up to 4.9W of DC power and can receive power from an external power module or through inline power using the Ethernet cable. Using inline power, you do not need to run a separate power cord to the access point. The access point supports the following power sources:

- Power supply (input 100–240 VAC, 50–60 Hz, output 48 VDC, 0.2A minimum)
- Inline power from:
  - Cisco Aironet Power Injector for 1100 and 1200 series access points
  - A switch capable of providing inline power, such as the Cisco Catalyst 3500XL, 3550, 4000, or 6500
  - An inline power patch panel, such as the Cisco Catalyst Inline Power Patch Panel

UL 2043 Certification

The access point is encased in a durable plastic enclosure having adequate fire resistance and low smoke-producing characteristics suitable for operation in a building's environmental air space, such as above suspended ceilings, in accordance with Section 300-22(c) of the NEC, and with Sections 2-128, 12-010(3) and 12-100 of the *Canadian Electrical Code*, Part 1, C22.1.

Caution Cisco Aironet 1100 series power injectors and the universal power supplies are not tested to UL 2043 and should not be placed in a building’s air-handling spaces, such as above suspended ceilings.

Anti-Theft Features

There are two methods of securing the access point to help prevent theft:

- Security cable keyhole—You can use the security cable slot to secure the access point using a standard security cable, such as those used on laptop computers.
- Security hasp—When you mount the access point on a wall or ceiling using the mounting bracket and the security hasp, you can lock the access point to the bracket with a padlock. Compatible padlocks are Master Lock models 120T and 121T or equivalent.

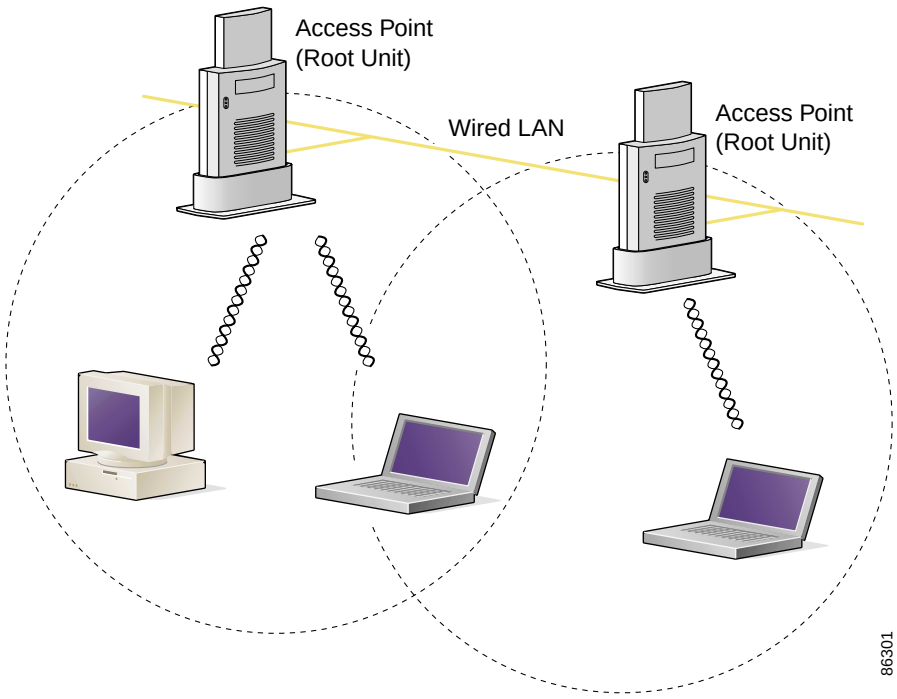
Network Configuration Examples

This section describes the access point's role in three common wireless network configurations. The access point's default configuration is as a root unit connected to a wired LAN or as the central unit in an all-wireless network. The repeater role requires a specific configuration.

Root Unit on a Wired LAN

An access point connected directly to a wired LAN provides a connection point for wireless users. If more than one access point is connected to the LAN, users can roam from one area of a facility to another without losing their connection to the network. As users move out of range of one access point, they automatically connect to the network (associate) through another access point. The roaming process is seamless and transparent to the user. Figure 1-3 shows access points acting as root units on a wired LAN.

Figure 1-3 Access Points as Root Units on a Wired LAN

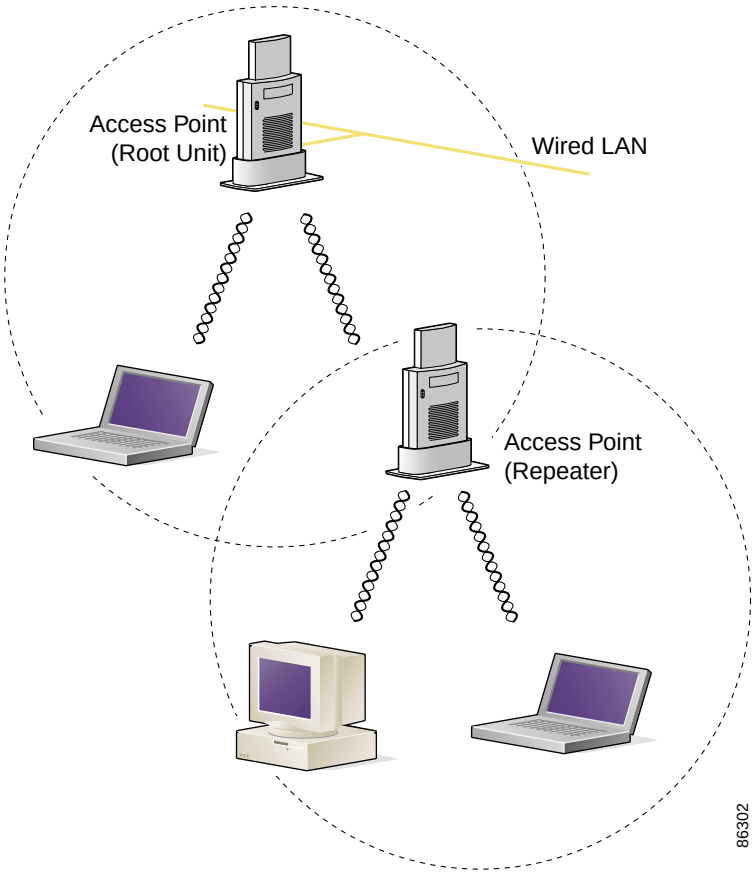


Repeater Unit that Extends Wireless Range

An access point can be configured as a stand-alone repeater to extend the range of your infrastructure or to overcome an obstacle that blocks radio communication. The repeater forwards traffic between wireless users and the wired LAN by sending packets to either another repeater or to an access point connected to the wired LAN. The data is sent through the route that provides the best performance for the client. Figure 1-4 shows an access point acting as a repeater. Consult the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for instructions on setting up an access point as a repeater.

Note Non-Cisco client devices might have difficulty communicating with repeater access points.

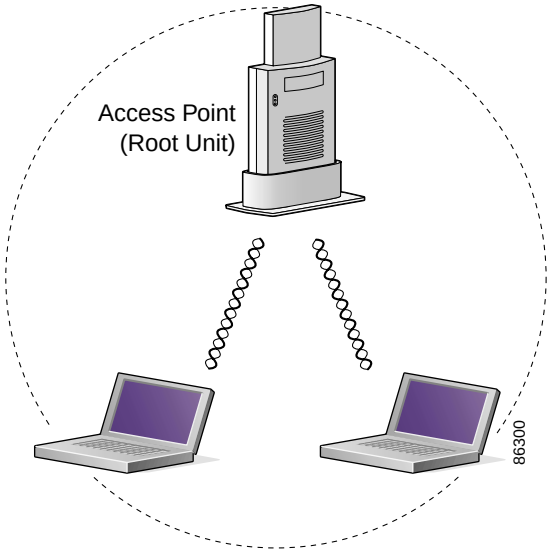
Figure 1-4 Access Point as Repeater



Central Unit in an All-Wireless Network

In an all-wireless network, an access point acts as a stand-alone root unit. The access point is not attached to a wired LAN; it functions as a hub linking all stations together. The access point serves as the focal point for communications, increasing the communication range of wireless users. Figure 1-5 shows an access point in an all-wireless network.

Figure 1-5 Access Point as Central Unit in All-Wireless Network



CHAPTER 2

Installing the Access Point

This chapter describes the setup of the access point and includes the following sections:

Safety Information

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

FCC Safety Compliance Statement

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

General Safety Guidelines

- Do not touch or move antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio so that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- The use of wireless devices in hazardous locations is limited to the constraints posed by the local codes, the national codes, and the safety directors of such environments.

Warnings

Translated versions of the following safety warnings are provided in Appendix A, “Translated Safety Warnings.”

Warning **In order to comply with FCC radio frequency (RF) exposure limits, dipole antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.**

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

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

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

Unpacking the Access Point

Follow these steps to unpack the access point:

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.

Package Contents

Each access point package contains the following items:

- Access point power pack
- Wall or ceiling mounting bracket
- Security hasp adapter
- Cubical partition mounting bracket assembly
- Horizontal surface mounting holster
- Mounting hardware kit
- Product registration card

Basic Installation Guidelines

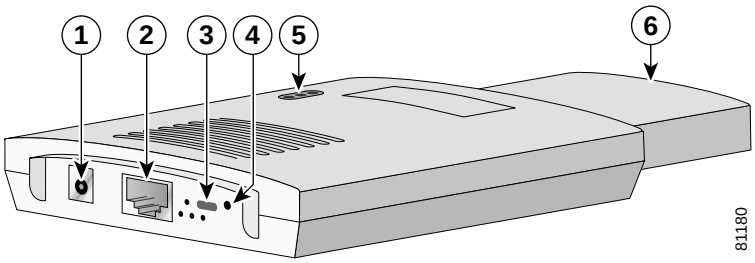
Because the access point is a radio device, it is susceptible to common causes of interference that can reduce throughput and range. Follow these basic guidelines to ensure the best possible performance:

- Install the access point in an area where large steel structures such as shelving units, bookcases, and filing cabinets do not block the radio signals to and from the access point.
- Install the access point away from microwave ovens. Microwave ovens operate on the same frequency as the access point and can cause signal interference.

Before Beginning the Installation

Before you begin the installation process, please refer to Figure 2-1 to familiarize yourself with the access point's layout, features, and connectors.

Figure 2-1 Access Point Layout and Connectors



1	48-VDC power port	**4**	Mode button
2	Ethernet port (RJ-45)	**5**	Status LEDs
3	Cable lock slot	**6**	Antenna

Installation Summary

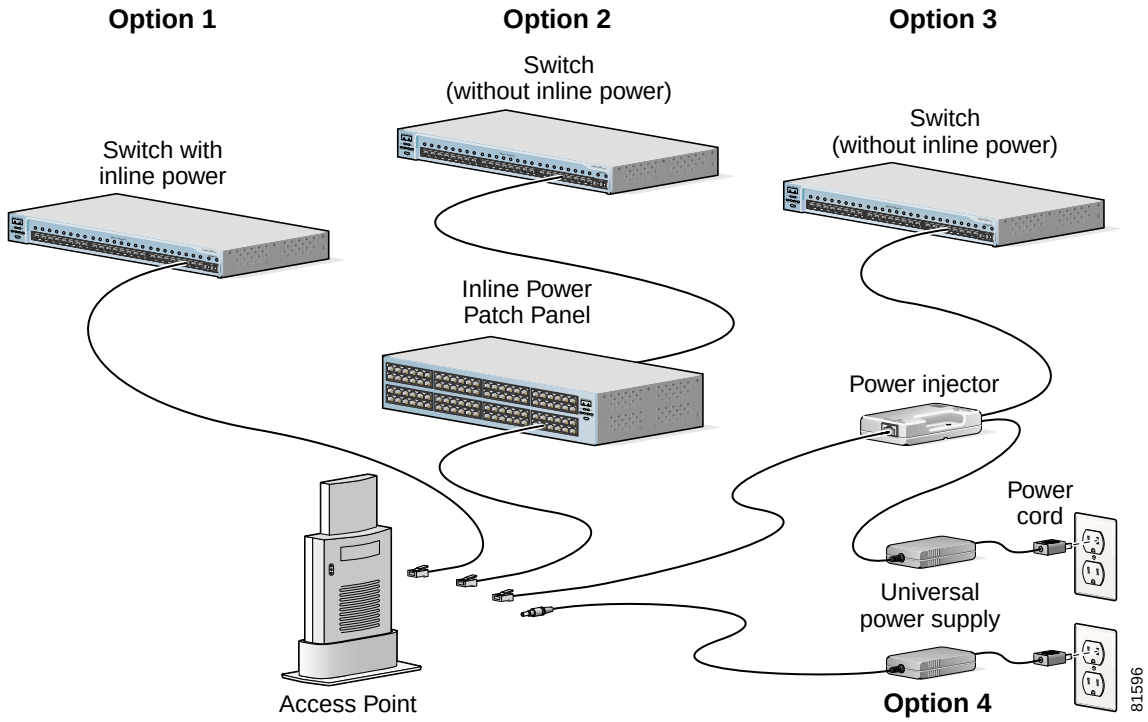
During the installation of the access point, you need to perform the following operations:

- Connect Ethernet and power cables (refer to the "Connecting the Ethernet and Power Cables" section on page 2-5).
- Configure basic settings (refer to Chapter 3, "Configuring the Access Point for the First Time").
- Configure security and other access point options.
- Use the mounting brackets or docking cradle to locate the access point on a convenient flat horizontal or vertical surface, such as a desktop, book shelf, file cabinet, cubicle wall, room wall, or the room ceiling. For additional information, refer to Chapter 6, "Mounting Instructions."

Connecting the Ethernet and Power Cables

The access point receives power through the Ethernet cable or an external power module. Figure 2-2 shows the power options for the access point.

Figure 2-2 Access Point Power Options



The access point power options are listed below:

- A switch with inline power, such as a Cisco Catalyst 3500XL, 3550, 4000, or 6500 switch
- An inline power patch panel, such as a Cisco Catalyst Inline Power Patch Panel
- A power injector
- A power module (Universal power supply)

Note If you use in-line power from a switch or patch panel, do not connect the power module to the access point. Using two power sources on the access point might cause the switch or patch panel to shut down the port to which the access point is connected.

Connecting to an Ethernet Network with an Inline Power Source

Follow these steps to connect the access point to the Ethernet LAN when you have an inline power source:

Step 1 Connect the Ethernet cable to the RJ-45 Ethernet connector labeled *Ethernet* on the access point.

Step 2 Connect the other end of the Ethernet cable to one of the following:

- A switch with inline power, such as a Cisco Catalyst 3500XL, 3550, 4000, or 6500 switch.
- An inline power switch panel, such as a Cisco Catalyst Inline Power Patch Panel.
- The end of a Cisco Aironet power injector labeled *To AP/Bridge*. Connect the other end labeled *To Network* to the 10/100 Ethernet LAN.

Caution The Cisco Aironet Power Injector for the 1100 and 1200 series is designed for use with 1100 series or 1200 series access points only. Using the power injector with other Ethernet-ready devices can damage the equipment.

Caution The Cisco Aironet Power Injector for the 1100 and 1200 series is not tested to UL 2043 and should not be placed in a building's environmental air space, such as above suspended ceilings.

Note If you use a power supply or power injector to power the access point, you must use the power supply included with your access point and the Cisco Aironet Power Injector for the 1100 and 1200 series access points.

Connecting to an Ethernet Network with Local Power

Follow these steps to connect the access point to an Ethernet LAN when you are using a local power source:

Step 1 Connect the Ethernet cable to the RJ-45 Ethernet connector labeled *Ethernet* on the access point.

Step 2 Plug the other end of the Ethernet cable into an unpowered Ethernet port on your network.

Step 3 Connect the power module’s output connector to the 48-VDC power port labeled *48VDC* on the access point.

Step 4 Plug the other end of the power module into an approved 100- to 240-VAC outlet.

Powering Up the Access Point

When power is applied to the access point, it begins a routine power-up sequence that you can monitor by observing the three LEDs on top of the access point. After you observe all three LEDs turning green to indicate the starting of the IOS operating system, the Status LED blinks green signifying that IOS is operational. When in an operational status, the Ethernet LED is steady green when no traffic is being passed and dark during periods when traffic is being passed. The sequence takes about 1 minute to complete. Refer to Chapter 8, "Troubleshooting," for LED descriptions.

When the sequence is complete, you are ready to obtain the access point's IP address and perform an initial configuration. Refer to Chapter 3, "Configuring the Access Point for the First Time," for instructions on assigning basic settings to the access point.

CHAPTER 3

Configuring the Access Point for the First Time

This chapter describes how to configure basic settings on your access point for the first time. The contents of this chapter are similar to the instructions in the quick start guide that shipped with your access point. You can configure all the settings described in this chapter using the CLI, but it might be simplest to browse to the access point'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

Before you install the access point, make sure you are using a computer connected to the same network as the access point, 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 access point (such as 172.17.255.115)
  - If the access point 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 access point IP address, the MAC address from the label on the bottom of the access point (such as 00164625854c)

Resetting the Access Point to Default Settings

If you need to start over during the initial setup process, follow these steps to reset the access point to factory default settings using the access point MODE button:

Step 1 Disconnect power (the power jack for external power or the Ethernet cable for in-line power) from the access point.

Step 2 Press and hold the MODE button while you reconnect power to the access point.

Step 3 Hold the MODE button until the Status LED turns amber (approximately 1 to 2 seconds), and release the button. All access point settings return to factory defaults.

You can also use the web-browser interface to reset the access point 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 access point'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 access point 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 access point is configured with a static IP address, the IP address will not be changed.

Obtaining and Assigning an IP Address

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

- Use default address 10.0.0.1 when you connect to the access point locally. For detailed instructions, see the "Connecting to the Access Point Locally" section on page 3-3.
- 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 access point's Media Access Control (MAC) address. Your network administrator will query the DHCP server using the MAC address to identify the IP address. The access point's MAC address is on label attached to the bottom of the access point.
  - Use the Cisco IP Setup Utility (IPSU) to identify the assigned address. You can also use IPSU to assign an IP address to the access point 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 3-8).

Connecting to the Access Point Locally

If you need to configure the access point locally (without connecting the access point to a wired LAN), you can connect a PC to its 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 access point; you can use either a straight-through cable or a crossover cable.

If the access point 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 access point provides up to twenty IP addresses between 10.0.0.11 and 10.0.0.30 to the following devices:

- An Ethernet-capable PC connected to its Ethernet port
- Wireless client devices configured to use either no SSID or *tsunami* as the SSID, and with all security settings disabled

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

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

Follow these steps to connect to the access point 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 10.0.0.2 to 10.0.0.10. Connect your PC to the access point using a Category 5 Ethernet cable. You can use either a crossover cable or a straight-through cable.

Step 2 Power up the access point.

Step 3 Follow the steps in the "Assigning Basic Settings" section on page 3-4. If you make a mistake and need to start over, follow the steps in the "Resetting the Access Point to Default Settings" section on page 3-2.

Step 4 After configuring the access point, remove the Ethernet cable from your PC and connect the access point to your wired LAN.

Note When you connect your PC to the access point 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 access point's IP address, you can browse to the access point'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 access point'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 3-1 shows the Summary Status page.

Figure 3-1 Summary Status Page

Step 5 Click **Express Setup**. The Express Setup screen appears. Figure 3-2 shows the Express Setup page.

Figure 3-2 Express Setup Page

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

Note If the access point's IP address changes while you are configuring the access point using the web-browser interface or a Telnet session over the wired LAN, you lose your connection to the access point. If you lose your connection, reconnect to the access point using its new IP address. Follow the steps in the "Resetting the Access Point to Default Settings" section on page 3-2 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.
- **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 client devices use to associate with the access point.
- **Broadcast SSID in Beacon**—Use this setting to allow devices that do not specify an SSID to associate with the access point.
  - **Yes**—This is the default setting; it allows devices that do not specify an SSID to associate with the access point.
  - **No**—Devices must specify an SSID to associate with the access point. With No selected, the SSID used by the client devices must match exactly the access point's SSID.
- **Role in Radio Network**—Click on the button that describes the role of the access point on your network. Select **Access Point (Root)** if your access point is connected to the wired LAN. Select **Repeater (Non-Root)** if it is not connected to the wired LAN.
- **Optimize Radio Network for**—Use this setting to select either preconfigured settings for the access point radio or customized settings for the access point radio.
  - **Throughput**—Maximizes the data volume handled by the access point but might reduce its range.
  - **Range**—Maximizes the access point's range but might reduce throughput.
  - **Custom**—The access point uses settings you enter on the Network Interfaces: Radio-802.11b Settings page. Clicking **Custom** takes you to the Network Interfaces: Radio-802.11b Settings page.
- **Aironet Extensions**—Enable this setting if there are only Cisco Aironet devices on your wireless LAN.

- **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).

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

Your access point is now running but probably requires additional configuring to conform to your network's operational and security requirements. Consult the chapters in this manual for the information you need to complete the configuration.

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

Default Settings on the Express Setup Page

Table 3-1 lists the default settings for the settings on the Express Setup page.

Table 3-1 Default Settings on the Express Setup Page

Setting	Default
System Name	ap
Configuration Server Protocol	DHCP
IP Address	Assigned by DHCP by default; if DHCP is disabled, the default setting is 10.0.0.1
IP Subnet Mask	Assigned by DHCP by default; if DHCP is disabled, the default setting is 255.255.255.224
Default Gateway	Assigned by DHCP by default; if DHCP is disabled, the default setting is 0.0.0.0
Radio Service Set ID (SSID)	tsunami
Broadcast SSID in Beacon	Yes[1]
Role in Radio Network	Access point (root)
Optimize Radio Network for	Throughput
Aironet Extensions	Enable
SNMP Community	defaultCommunity

1. When you assign multiple SSIDs, this setting no longer appears.

Protecting Your Wireless LAN

After you assign basic settings to your access point, you need to configure security settings to prevent unauthorized access to your network. Because it is a radio device, the access point can communicate beyond the physical boundaries of your building. Refer to the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for information on how to configure some combination of these security features to protect you network from intruders:

- Unique SSIDs that are not broadcast in the access point beacon
- WEP and additional WEP features, such as TKIP and broadcast key rotation
- Dynamic WEP and client authentication

Using the IP Setup Utility

IPSU enables you to find the access point's IP address when it has been assigned by a DHCP server. You can also use IPSU to set the access point'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.

Tip Another simple way to find the access point's IP address is to look on the Status screen in the Aironet Client Utility on a client device associated to the access point.

The sections below explain how to install the utility, how to use it to find the access point'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 Use your Internet browser to access the Cisco Software Center at the following URL:

http://www.cisco.com/public/sw-center/sw-wireless.shtml

Step 2 Click **Option 2: Aironet Wireless Software Display Tables**.

Step 3 Locate the access point firmware and utilities section and click **Cisco Aironet 1100 Series**.

Step 4 Click **IPSUvxxxxxx.exe**. The *vxxxxxx* identifies the software package version number.

Step 5 On the Encryption Authorization Form, enter the requested information, read the encryption information, and check the boxes that apply.

Step 6 Click **Submit**.

Step 7 Read and accept the terms and conditions of the Software License Agreement.

Step 8 Download and save the file to a temporary directory on your hard drive and then exit the Internet browser.

Step 9 Double-click **IPSUvxxxxxx.exe** in the temporary directory to expand the file.

Step 10 Double-click **Setup.exe** and follow the steps provided by the installation wizard to install IPSU.

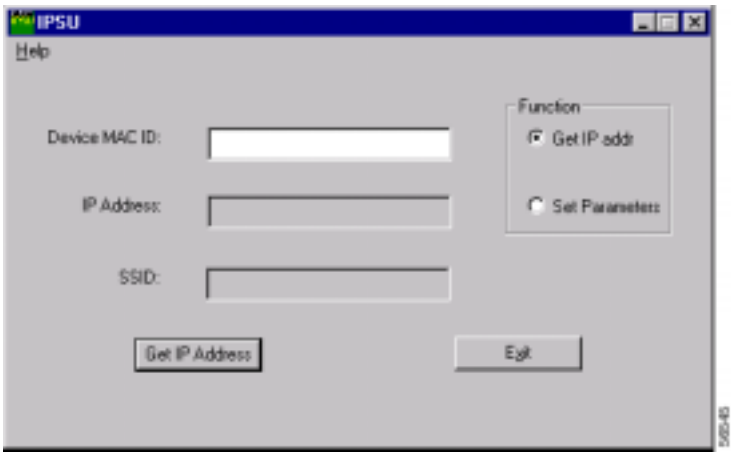
The IPSU icon appears on your computer desktop.

Using IPSU to Find the Access Point's IP Address

If your access point 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 access point MAC address, you must run IPSU from a computer on the same subnet as the access point. Follow these steps to find the access point's IP address:

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

Figure 3-3 IPSU Get IP Address Screen



Step 2 When the utility window opens, make sure the *Get IP addr* radio button in the Function box is selected.

Step 3 Enter the access point's MAC address in the Device MAC ID field. The access point's MAC address is printed on the label on the bottom of the unit. It should contain six pairs of hexadecimal digits. Your access point'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 access point'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 access point did not receive a DHCP-assigned IP address. To change the access point IP address from the default value using IPSU, refer to the "Using IPSU to Set the Access Point's IP Address and SSID" section on page 3-10.

Using IPSU to Set the Access Point's IP Address and SSID

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

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

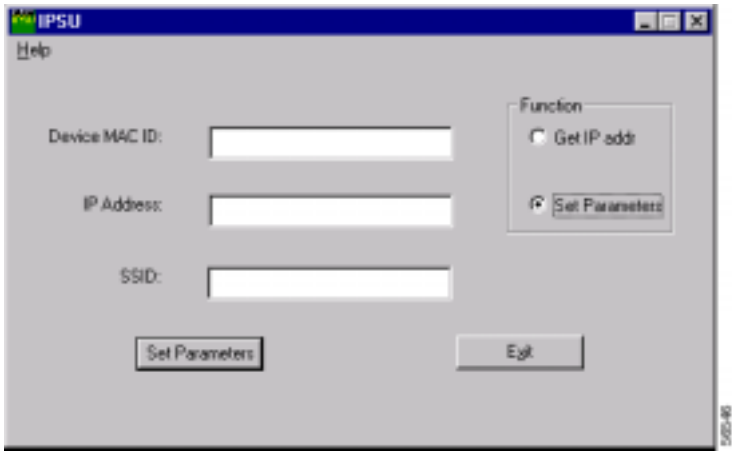
Note IPSU can change the access point's IP address and SSID only from their default settings. After the IP address and SSID have been changed, IPSU cannot change them again.

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

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 3-4).

Figure 3-4 IPSU Set Parameters Screen



Step 3 Enter the access point's MAC address in the Device MAC ID field. The access point's MAC address is printed on the label on the bottom of the unit. It should contain six pairs of hexadecimal digits. Your access point'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 access point in the IP Address field.

Step 5 Enter the SSID you want to assign to the access point 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 access point's IP address and SSID settings.

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

Assigning an IP Address Using the CLI

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

When you assign an IP address to the access point 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 access point's BVI:

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

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 access point's IP address.

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

CHAPTER 4

Using the Web-Browser Interface

This chapter describes the web-browser interface that you can use to configure the access point. It contains these sections:

The web-browser interface contains management pages that you use to change access point settings, upgrade firmware, and monitor and configure other wireless devices on the network.

Note The access point web-browser interface is fully compatible with Microsoft Internet Explorer (version 5.x or later) or Netscape Navigator (version 4.x).

Using the Web-Browser Interface for the First Time

Use the access point's IP address to browse to the management system. See the "Obtaining and Assigning an IP Address" section on page 3-3 for instructions on assigning an IP address to the access point.

Follow these steps to begin using the web-browser interface:

Step 1 Start the browser.

Step 2 Enter the access point's IP address in the browser **Location** field (Netscape Communicator) or **Address** field (Internet Explorer) and press **Enter**. The Summary Status page appears.

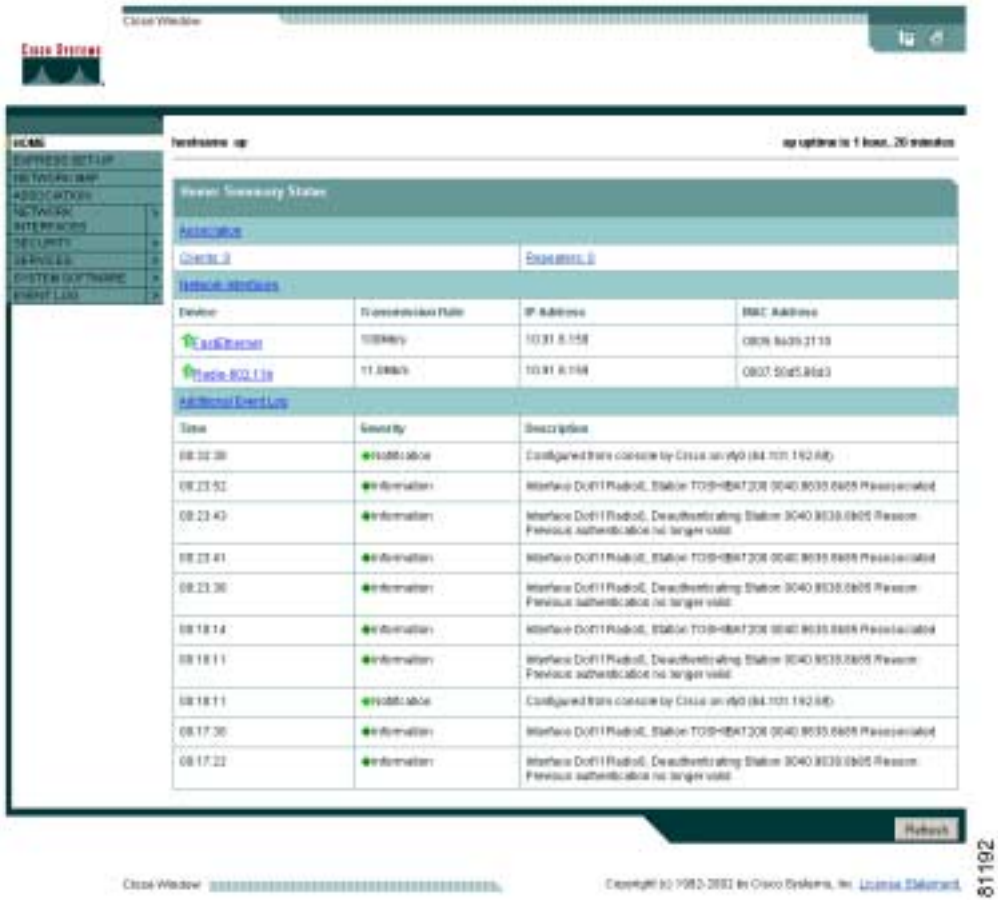
Using the Management Pages in the Web-Browser Interface

The system management pages use consistent techniques to present and save configuration information. A navigation bar is on the left side of the page, and configuration action buttons appear at the bottom. You use the navigation bar to browse to other management pages, and you use the configuration action buttons to save or cancel changes to the configuration.

Note Changes are applied only when you click **Apply**. It's important to remember that clicking your browser's **Back** button returns you to the previous page without saving any changes you have made. Clicking **Cancel** cancels any changes you made on the page and keeps you on that page.

Figure 4-1 shows the web-browser interface home page.

Figure 4-1 Web-Browser Interface Home Page



Using Action Buttons

Table 4-1 lists the page links and buttons that appear on most management pages.

Table 4-1 Common Buttons on Management Pages

Button/Link	Description
Navigation Links	
Home	Displays access point status page with information on the number of radio devices associated to the access point, the status of the Ethernet and radio interfaces, and a list of recent access point activity.
Express Setup	Displays the Express Setup page that includes basic settings such as system name, IP address, and SSID.
Network Map	Displays a list of infrastructure devices on your wireless LAN.
Association	Displays a list of all devices on your wireless LAN, listing their system names, network roles, and parent-client relationships.

Table 4-1 Common Buttons on Management Pages (continued)

Button/Link	Description
Network Interfaces	Displays status and statistics for the Ethernet and radio interfaces and provides links to configuration pages for each interface.
Security	Displays a summary of security settings and provides links to security configuration pages.
Services	Displays status for several access point features and links to configuration pages for Telnet/SSH, CDP, Domain Name Server, Filters, Proxy Mobile IP, QoS, SNMP, SNTP, and VLANs.
System Software	Displays the version number of the firmware that the access point is running and provides links to configuration pages for upgrading and managing firmware.
Event Log	Displays the access point event log and provides links to configuration pages where you can select events to be included in traps, set event severity levels, and set notification methods.
Configuration Action Buttons	
Apply	Saves changes made on the page and remains on the page.
Refresh	Updates status information or statistics displayed on a page.
Cancel	Discards changes to the page and remains on the page.
Back	Discards any changes made to the page and returns to the previous page.

Character Restrictions in Entry Fields

Because the 1100 series access point uses Cisco IOS software, there are certain characters that you cannot use in the entry fields on the web-browser interface. Table 4-2 lists the prohibited characters and the fields in which you cannot use them.

Table 4-2 Prohibited Characters for Web-Browser Interface Entry Fields

Entry Field Type	Prohibited Characters
Password entry fields	**?** **“** **$** **[** **+**
All other entry fields	**?** **“** **$** **[** **+** You also cannot use these three characters as the first character in an entry field: **!** **#** **;**

Using Online Help

Click the help icon at the top of any page in the web-browser interface to display online help. Figure 4-2 shows the print and help icons.

Figure 4-2 Print and Help Icons

When a help page appears in a new browser window, use the Select a topic drop-down menu to display the help index or instructions for common configuration tasks, such as configuring VLANs.

CHAPTER 5

Using the Command-Line Interface

This chapter describes the IOS command-line interface (CLI) that you can use to configure your access point. It contains these sections:

IOS Command Modes

The Cisco IOS user interface is divided into many different modes. The commands available to you depend on which mode you are currently in. Enter a question mark (?) at the system prompt to obtain a list of commands available for each command mode.

When you start a session on the access point, you begin in user mode, often called *user EXEC mode*. Only a limited subset of the commands are available in user EXEC mode. For example, most of the user EXEC commands are one-time commands, such as **show** commands, which show the current configuration status, and **clear** commands, which clear counters or interfaces. The user EXEC commands are not saved when the access point reboots.

To have access to all commands, you must enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From this mode, you must enter privileged EXEC mode before you can enter the global configuration mode.

Using the configuration modes (global, interface, and line), you can make changes to the running configuration. If you save the configuration, these commands are stored and used when the access point reboots. To access the various configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and line configuration mode.

Table 5-1 describes the main command modes, how to access each one, the prompt you see in that mode, and how to exit the mode. The examples in the table use the host name *ap*.

Table 5-1 Command Mode Summary

Mode	Access Method	Prompt	Exit Method	About This Mode
User EXEC	Begin a session with your access point.	`ap>`	Enter **logout** or **quit**.	Use this mode to • Change terminal settings • Perform basic tests • Display system information.
Privileged EXEC	While in user EXEC mode, enter the **enable** command.	`ap#`	Enter **disable** to exit.	Use this mode to verify commands. Use a password to protect access to this mode.
Global configuration	While in privileged EXEC mode, enter the **configure** command.	`ap(config)#`	To exit to privileged EXEC mode, enter **exit** or **end**, or press **Ctrl-Z**.	Use this mode to configure parameters that apply to the entire access point.
Interface configuration	While in global configuration mode, enter the **interface** command (with a specific interface).	`ap(config-if)#`	To exit to global configuration mode, enter **exit**. To return to privileged EXEC mode, press **Ctrl-Z** or enter **end**.	Use this mode to configure parameters for the Ethernet interfaces.

Getting Help

You can enter a question mark (?) at the system prompt to display a list of commands available for each command mode. You can also obtain a list of associated keywords and arguments for any command, as shown in Table 5-2.

Table 5-2 Help Summary

Command	Purpose
help	Obtain a brief description of the help system in any command mode.

*abbreviated-command-entry***?**	Obtain a list of commands that begin with a particular character string.
	For example:
	`ap# di?`
	`dir  disable disconnect`

abbreviated-command-entry<**Tab**>	Complete a partial command name.
	For example:
	`ap# sh conf<tab>`
	`ap# show configuration`

?	List all commands available for a particular command mode. For example: `ap> ?`
command **?**	List the associated keywords for a command. For example: `ap> show ?`

command keyword **?**	List the associated arguments for a keyword.
	For example:
	`ap(config)# cdp holdtime ?`
	`  <10-255>  Length of time (in sec) that receiver must keep this packet`

Abbreviating Commands

You have to enter only enough characters for the access point to recognize the command as unique. This example shows how to enter the **show configuration** privileged EXEC command:

```
ap# show conf
```

Using no and default Forms of Commands

Most configuration commands also have a **no** form. In general, use the **no** form to disable a feature or function or reverse the action of a command. For example, the **no shutdown** interface configuration command reverses the shutdown of an interface. Use the command without the keyword **no** to re-enable a disabled feature or to enable a feature that is disabled by default.

Configuration commands can also have a **default** form. The **default** form of a command returns the command setting to its default. Most commands are disabled by default, so the **default** form is the same as the **no** form. However, some commands are enabled by default and have variables set to certain default values. In these cases, the **default** command enables the command and sets variables to their default values.

Understanding CLI Messages

Table 5-3 lists some error messages that you might encounter while using the CLI to configure your access point.

Table 5-3 Common CLI Error Messages

Error Message	Meaning	How to Get Help
`% Ambiguous command: "show con"`	You did not enter enough characters for your access point to recognize the command.	Re-enter the command followed by a question mark (?) with a space between the command and the question mark. The possible keywords that you can enter with the command are displayed.
`% Incomplete command.`	You did not enter all the keywords or values required by this command.	Re-enter the command followed by a question mark (?) with a space between the command and the question mark. The possible keywords that you can enter with the command are displayed.
`% Invalid input detected at '^' marker.`	You entered the command incorrectly. The caret (^) marks the point of the error.	Enter a question mark (?) to display all the commands that are available in this command mode. The possible keywords that you can enter with the command are displayed.

Using Command History

The IOS provides a history or record of commands that you have entered. This feature is particularly useful for recalling long or complex commands or entries, including access lists. You can customize the command history feature to suit your needs as described in these sections:

- Changing the Command History Buffer Size, page 5-5
- Recalling Commands, page 5-5
- Disabling the Command History Feature, page 5-5

Changing the Command History Buffer Size

By default, the access point records ten command lines in its history buffer. Beginning in privileged EXEC mode, enter this command to change the number of command lines that the access point records during the current terminal session:

```
ap# terminal history [size number-of-lines]
```

The range is from 0 to 256.

Beginning in line configuration mode, enter this command to configure the number of command lines the access point records for all sessions on a particular line:

```
ap(config-line)# history [size number-of-lines]
```

The range is from 0 to 256.

Recalling Commands

To recall commands from the history buffer, perform one of the actions listed in Table 5-4:

Table 5-4 Recalling Commands

Action[1]	Result
Press **Ctrl-P** or the up arrow key.	Recall commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Press **Ctrl-N** or the down arrow key.	Return to more recent commands in the history buffer after recalling commands with **Ctrl-P** or the up arrow key. Repeat the key sequence to recall successively more recent commands.
show history	While in privileged EXEC mode, list the last several commands that you just entered. The number of commands that are displayed is determined by the setting of the **terminal history** global configuration command and **history** line configuration command.

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

Disabling the Command History Feature

The command history feature is automatically enabled.

To disable the feature during the current terminal session, enter the **terminal no history** privileged EXEC command.

To disable command history for the line, enter the **no history** line configuration command.

Using Editing Features

This section describes the editing features that can help you manipulate the command line. It contains these sections:

Enabling and Disabling Editing Features

Although enhanced editing mode is automatically enabled, you can disable it.

To re-enable the enhanced editing mode for the current terminal session, enter this command in privileged EXEC mode:

```
ap# terminal editing
```

To reconfigure a specific line to have enhanced editing mode, enter this command in line configuration mode:

```
ap(config-line)# editing
```

To globally disable enhanced editing mode, enter this command in line configuration mode:

```
ap(config-line)# no editing
```

Editing Commands through Keystrokes

Table 5-5 shows the keystrokes that you need to edit command lines.

Table 5-5 Editing Commands through Keystrokes

Capability	Keystroke[1]	Purpose
Move around the command line to make changes or corrections.	**Ctrl-B** or the left arrow key	Move the cursor back one character.
	Ctrl-F or the right arrow key	Move the cursor forward one character.
	Ctrl-A	Move the cursor to the beginning of the command line.
	Ctrl-E	Move the cursor to the end of the command line.
	Esc B	Move the cursor back one word.
	Esc F	Move the cursor forward one word.
	Ctrl-T	Transpose the character to the left of the cursor with the character located at the cursor.
Recall commands from the buffer and paste them in the command line. The access point provides a buffer with the last ten items that you deleted.	**Ctrl-Y**	Recall the most recent entry in the buffer.
	Esc Y	Recall the next buffer entry. The buffer contains only the last 10 items that you have deleted or cut. If you press **Esc Y** more than ten times, you cycle to the first buffer entry.

Table 5-5 Editing Commands through Keystrokes (continued)

Capability	Keystroke[1]	Purpose
Delete entries if you make a mistake or change your mind.	**Delete** or **Backspace**	Erase the character to the left of the cursor.
	Ctrl-D	Delete the character at the cursor.
	Ctrl-K	Delete all characters from the cursor to the end of the command line.
	Ctrl-U or **Ctrl-X**	Delete all characters from the cursor to the beginning of the command line.
	Ctrl-W	Delete the word to the left of the cursor.
	Esc D	Delete from the cursor to the end of the word.
Capitalize or lowercase words or capitalize a set of letters.	**Esc C**	Capitalize at the cursor.
	Esc L	Change the word at the cursor to lowercase.
	Esc U	Capitalize letters from the cursor to the end of the word.
Designate a particular keystroke as an executable command, perhaps as a shortcut.	**Ctrl-V** or **Esc Q**	
Scroll down a line or screen on displays that are longer than the terminal screen can display. **Note** The `More` prompt appears for output that has more lines than can be displayed on the terminal screen, including **show** command output. You can use the **Return** and **Space** bar keystrokes whenever you see the `More` prompt.	**Return**	Scroll down one line.
	Space	Scroll down one screen.
Redisplay the current command line if the access point suddenly sends a message to your screen.	**Ctrl-L** or **Ctrl-R**	Redisplay the current command line.

1. The arrow keys function only on ANSI-compatible terminals such as VT100s.

Editing Command Lines that Wrap

You can use a wraparound feature for commands that extend beyond a single line on the screen. When the cursor reaches the right margin, the command line shifts ten spaces to the left. You cannot see the first ten characters of the line, but you can scroll back and check the syntax at the beginning of the command.

To scroll back to the beginning of the command entry, press **Ctrl-B** or the left arrow key repeatedly. You can also press **Ctrl-A** to immediately move to the beginning of the line.

Note The arrow keys function only on ANSI-compatible terminals such as VT100s.

In this example, the **access-list** global configuration command entry extends beyond one line. When the cursor first reaches the end of the line, the line is shifted ten spaces to the left and redisplayed. The dollar sign ($) shows that the line has been scrolled to the left. Each time the cursor reaches the end of the line, the line is again shifted ten spaces to the left.

```
ap(config)# access-list 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1
ap(config)# $ 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1.20 255.25
ap(config)# $t tcp 131.108.2.5 255.255.255.0 131.108.1.20 255.255.255.0 eq
ap(config)# $108.2.5 255.255.255.0 131.108.1.20 255.255.255.0 eq 45
```

After you complete the entry, press **Ctrl-A** to check the complete syntax before pressing the **Return** key to execute the command. The dollar sign ($) appears at the end of the line to show that the line has been scrolled to the right:

```
ap(config)# access-list 101 permit tcp 131.108.2.5 255.255.255.0 131.108.1$
```

The software assumes you have a terminal screen that is 80 columns wide. If you have a width other than that, use the **terminal width** privileged EXEC command to set the width of your terminal.

Use line wrapping with the command history feature to recall and modify previous complex command entries. For information about recalling previous command entries, see the "Editing Commands through Keystrokes" section on page 5-6.

Searching and Filtering Output of show and more Commands

You can search and filter the output for **show** and **more** commands. This is useful when you need to sort through large amounts of output or if you want to exclude output that you do not need to see.

To use this functionality, enter a **show** or **more** command followed by the *pipe* character (|), one of the keywords **begin**, **include**, or **exclude**, and an expression that you want to search for or filter out:

command | {**begin** | **include** | **exclude**} *regular-expression*

Expressions are case sensitive. For example, if you enter **| exclude output**, the lines that contain *output* are not displayed, but the lines that contain *Output* are displayed.

This example shows how to include in the output display only lines where the expression *protocol* appears:

```
ap# show interfaces | include protocol
Vlan1 is up, line protocol is up
Vlan10 is up, line protocol is down
GigabitEthernet0/1 is up, line protocol is down
GigabitEthernet0/2 is up, line protocol is up
```

Accessing the CLI

You can open the access point's CLI using Telnet or Secure Shell (SSH).

Opening the CLI with Telnet

Follow these steps to open the CLI with Telnet. 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 access point's IP address.

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

Step 4 At the username and password prompts, enter your administrator username and password. The default username is **Cisco**, and the default password is **Cisco**. The default enable password is also **Cisco**. Usernames and passwords are case-sensitive.

Opening the CLI with Secure Shell

Secure Shell Protocol is a protocol that provides a secure, remote connection to networking devices set up to use it. Secure Shell (SSH) is a software package that provides secure login sessions by encrypting the entire session. SSH features strong cryptographic authentication, strong encryption, and integrity protection. For detailed information on SSH, visit the homepage of SSH Communications Security, Ltd. at this URL:

http://www.ssh.com/

SSH provides more security for remote connections than Telnet by providing strong encryption when a device is authenticated. See the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for detailed instructions on setting up the access point for SSH access.

CHAPTER 6

Mounting Instructions

This appendix contains mounting instructions for the access point and contains the following topics:

Overview

The mounting brackets and hardware shipped with your access point enables you to mount it on any of the following surfaces:

- Horizontal or vertical flat surfaces, such as walls or ceilings
- Suspended ceilings
- Cubical partition walls
- Desktop or other suitable horizontal surface

The 1100 series access point provides adequate fire resistance and low smoke-producing characteristics suitable for operation in a building's environmental air space, such as above suspended ceilings, in accordance with Section 300-22(C) of the National Electrical Code (NEC) and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, C22.1.

Caution Cisco Aironet 1100 Series Power Injectors and the universal power supplies are not tested to UL 2043 and should not be placed in a building’s air-handling spaces, such as above suspended ceilings.

Security features for each of these mounting methods are also provided. You can use a Kensington lock (Notebook Microstar, model number 64068), which you must provide, to make the access point more secure when you mount it using any of the mounting options.

You can use the security hasp adapter provided by Cisco to secure the access point with a padlock when you use the wall or ceiling mounting bracket. The security hasp adapter provides maximum physical security for your access point.

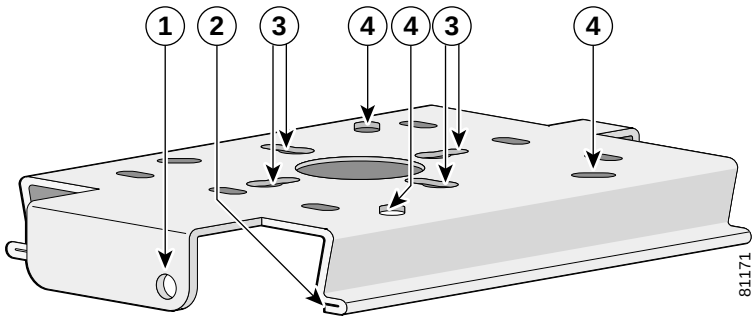
A mounting hardware kit is provided that contains the hardware and fasteners necessary to mount the access point. Refer to Table 6-1 to identify the materials you need to mount your access point, then go to the section containing the specific mounting procedure.

Table 6-1 Mounting Material

Mounting Method	Materials Required	In Kit
Horizontal or vertical surface	Wall or ceiling mounting bracket Security hasp adapter Four #8 x 1 in. (25.4 mm) screws Four wall anchors 3/16 in. (4.7 mm) or 3/32 in. (2.3 mm) drill bit Drill	Yes Yes Yes Yes No No
Suspended ceiling	Wall or ceiling mounting bracket Security hasp adapter Two caddy fasteners with studs Two plastic spacers Two 1/4–20 Keps nuts Standard screwdriver Appropriate wrench or pliers	Yes Yes Yes Yes Yes No No
Office cubical wall partition	Cubical partition mounting bracket assembly	Yes
Desktop	Desktop holster	Yes

The wall or ceiling mounting bracket also serves as a template for transferring the location of the bracket's mounting holes to the mounting surface. Refer to Figure 6-1 to locate the various mounting holes for the method you intend to use.

Figure 6-1 Mounting Bracket



1	Security hasp	**3**	Suspended ceiling mount holes
2	Access point mounting rail	**4**	Wall mount holes

Mounting on a Horizontal or Vertical Surface

Follow these steps to mount the access point on a horizontal or vertical surface, such as a ceiling or wall.

Step 1 Use the wall or ceiling mounting bracket as a template to mark the locations of the mounting holes.

- You can use any of the 10 holes around the periphery (three of which are identified in the illustration) of the bracket to mount it using the supplied #8 fasteners.

Step 2 Drill one of the following sized holes at the locations you marked:

- 3/16 in. (4.7 mm) if you are using wall anchors
- 3/32 in. (2.3 mm) if you are not using wall anchors

Step 3 Install the anchors into the wall if you are using them. Otherwise, go to Step 4.

Step 4 Secure the mounting bracket to the surface using the #8 fasteners.

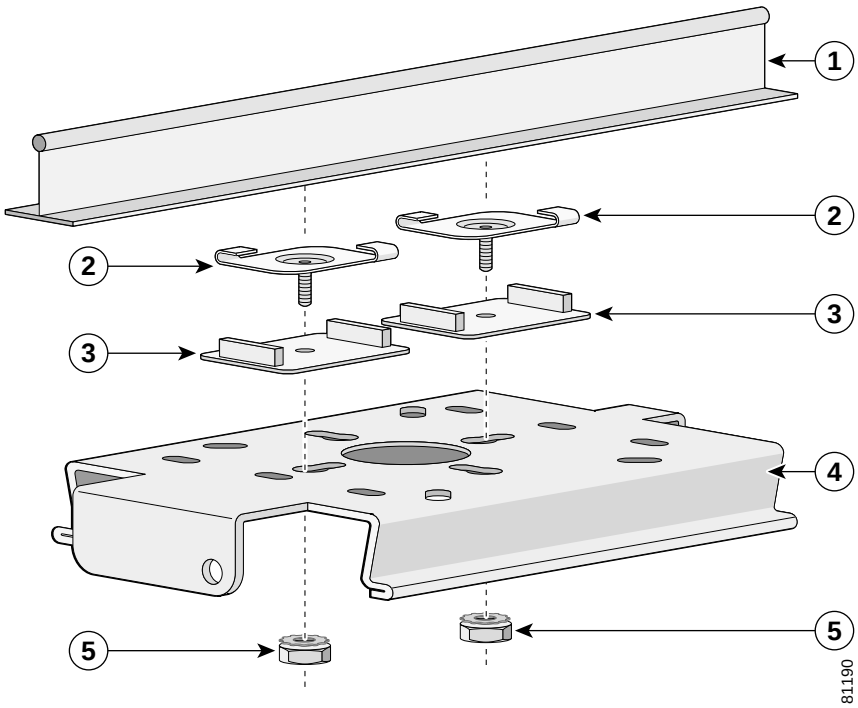
Note On a vertical surface, be sure to mount the bracket with its security hasp facing down.

Step 5 Line up the mounting slots on the access point with the mounting rail on the mounting bracket and slide down the mounting rails until it clicks into place.

Mounting on a Suspended Ceiling

Follow these steps to mount your access point on a suspended ceiling. It may be helpful to refer to Figure 6-2 before beginning the process.

Figure 6-2 Suspended Ceiling Mounting Bracket Parts



1	Suspended ceiling T-rail	**4**	Wall or ceiling mounting bracket
2	Caddy fastener	**5**	Keps nut
3	Plastic spacer		

Step 1 Determine the location at which to mount the access point.

Step 2 Attach two caddy fasteners to the ceiling's T-rail.

Step 3 Use the wall or ceiling mounting bracket to adjust the distance between the caddy fasteners so that they align with the holes in the bracket.

- The distance between the caddy fastener studs is 2.5 in (6.35 cm).

Step 4 Use a standard screwdriver to tighten the caddy fastener studs in place on the T-rail. Do not overtighten.

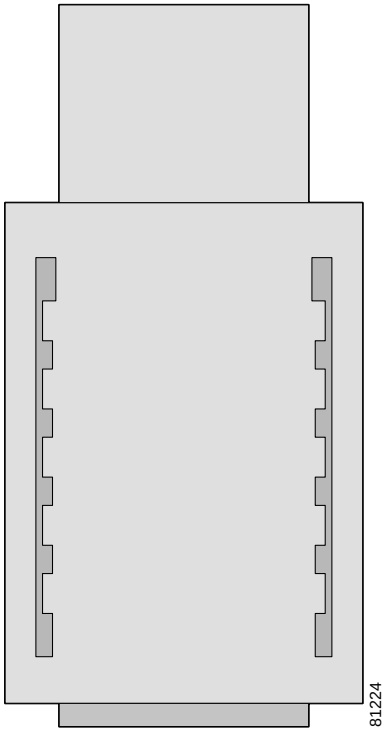
Step 5 Install a plastic spacer on each caddy fastener stud. The spacer's legs should contact the ceiling grid T-rail.

Step 6 Attach the wall or ceiling mounting bracket to the caddy fastener studs and start a Keps nut on each stud.

Step 7 Use a wrench or pliers to tighten the Keps nuts. Do not overtighten.

Step 8 Line up the mounting slots on the access point with the mounting rail on the wall or ceiling mounting bracket and slide it down the mounting rails until it clicks into place. See Figure 6-3.

Figure 6-3 Access Point Mounting Slots



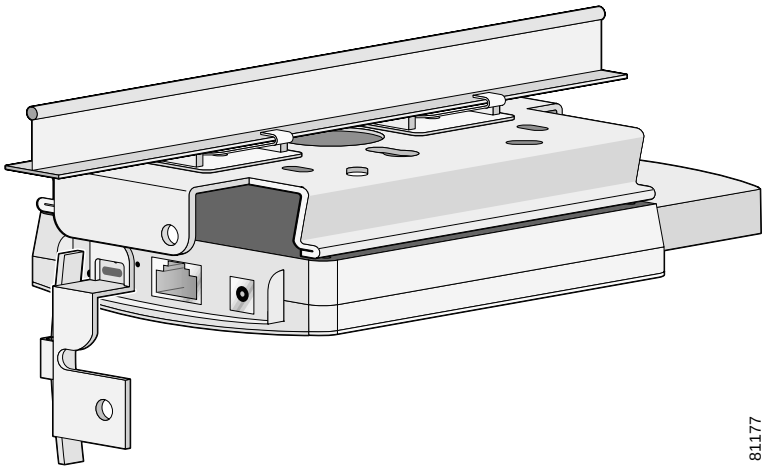
Using the Security Hasp Adapter

The security hasp on the wall or ceiling mounting bracket and the security hasp adapter locks the access point to the bracket to make it more secure. After you have installed the access point on the detachable mounting bracket, follow these steps to secure it with a padlock (Master Lock model 120T, 121T or equivalent).

Step 1 Connect the Ethernet cable and power jack.

Step 2 Insert the T-shaped tab on the security hasp adapter into the Kensington lock slot on the access point. See Figure 6-4.

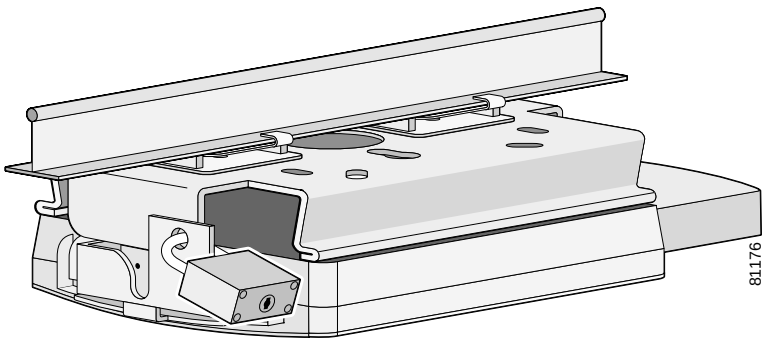
Figure 6-4 Security Hasp Adapter



Step 3 Rotate the adapter to engage it with the security hasp. The hole in the adapter should be aligned with the hole in the security hasp.

Step 4 Secure the adapter to the security hasp with a padlock. Your installation will look similar to Figure 6-5.

Figure 6-5 Security Hasp with Padlock



Mounting on a Cubical Wall Partition

Follow these steps to mount the access point on a cubical wall partition.

Step 1 Select the place on the partition where you want to mount the access point.

Step 2 Determine the width of the partition you are going to mount the access point on.

Step 3 Assemble the cubical partition mounting bracket by sliding the two pieces together. You can use either the short or long part of the bracket to obtain the proper fit to the partition wall.

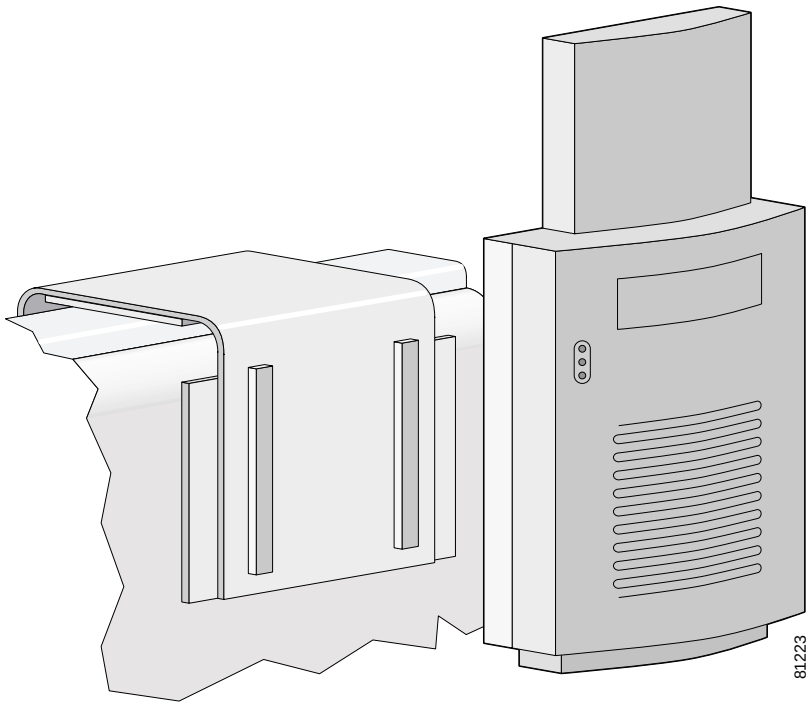
- The bracket is adjustable from 2.125 in. (5.39 cm) to 4.25 in. (10.79 cm).

Step 4 Connect the Ethernet and power cables.

Step 5 Line up the mounting slots on the access point with the mounting rails on the cubical partition mounting bracket and slide it down the rails until it clicks into place.

Step 6 Position the mounting bracket over the partition wall and adjust it to fit. See Figure 6-6.

Figure 6-6 Cubicle Wall Bracket



Using the Desktop Holster

Follow these steps to mount the access point on a desktop or other horizontal surface using the supplied desktop holster.

Step 1 Select a suitable location to place the holster.

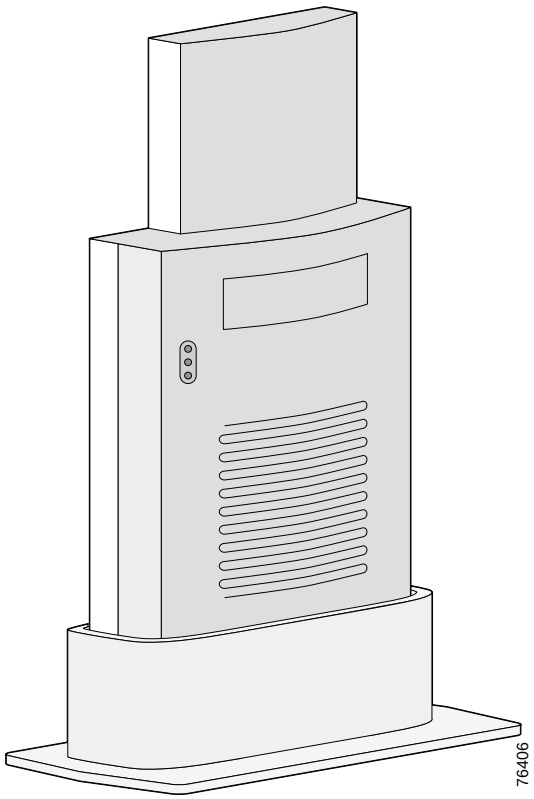
Step 2 Connect the Ethernet and power cables.

- If you are going to secure the access point with a Kensington lock, attach it now.

Step 3 Position the holster so that its back side is facing you.

Step 4 Insert the access point into the holster while guiding the cables so that they do not interfere with the sides of the holster. You will hear a click when the access point locks into place. See Figure 6-7.

Figure 6-7 Desktop Holster



Using the Cable Lock Feature

When you mount the access point using the cubical partition mount or desktop holster, you can secure the access point with your own security cable. Follow these steps to install the security cable.

Note Cisco recommends using a Kensington Notebook Microstar (model number 64068) to secure your access point.

Step 1 Loop the security cable around a nearby immovable object.

Step 2 Insert the key into the lock.

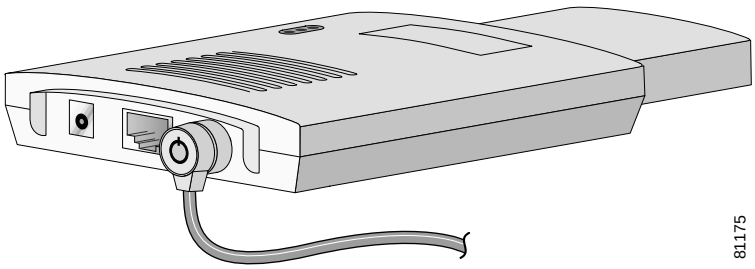
Step 3 Insert the lock into the security slot on the access point.

Step 4 Rotate the key right or left to secure the lock to the access point.

Step 5 Remove the key.

A properly secured lock and cable look similar to Figure 6-8.

Figure 6-8 Kensington Lock



CHAPTER 7

2.4 GHz Radio Upgrade

This chapter provides upgrade instructions for the 2.4-GHz (IEEE 802.11b-compliant or IEEE 802.11g-compliant) radio card and includes the following sections:

Upgrade Overview

This section provides instructions for upgrading the access point 2.4-GHz radio. The following operations summarize the upgrade procedure:

1. Remove all cables and power connections from the access point.
2. Follow standard electrostatic discharge (ESD) procedures.
3. Place the access point on an ESD-protected work surface.
4. Remove the access point's back cover.
5. Remove the existing 2.4-GHz radio card.
6. Install the new 2.4-GHz radio card.
7. Replace the access point's back cover.
8. Install the new compliance labels.

Caution ESD can damage the Cisco Aironet radio and the internal components of the access point. It is recommended that the 2.4-GHz radio upgrade procedures be performed by an ESD-trained service technician at an ESD-protected workstation.

Note After you install the new radio, all configurable radio settings will be at default values. Refer to the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for complete instructions on configuring the new radio.

Unpacking the Radio

Each 2.4-GHz (IEEE 802.11G) radio is shipped with the following items:

- Quick start guide
- A product registration card
- A T-10 tamper-resistant Torx L-wrench (not used on 1100 series access points)
- Two 1100 series access point labels
- A 1200 series access point 2.4-GHz radio compliance label (not used on 1100 series access points)

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

Removing the Back Cover

To remove the access point's back cover, follow these steps:

Step 1 Remove all cables and power connections from the access point.

Step 2 Remove all static-generating items from the work area, such as plastic material, styrofoam cups, and other similar items.

Step 3 Place the access point and the new 2.4-GHz radio (in its antistatic bag) on an antistatic work surface.

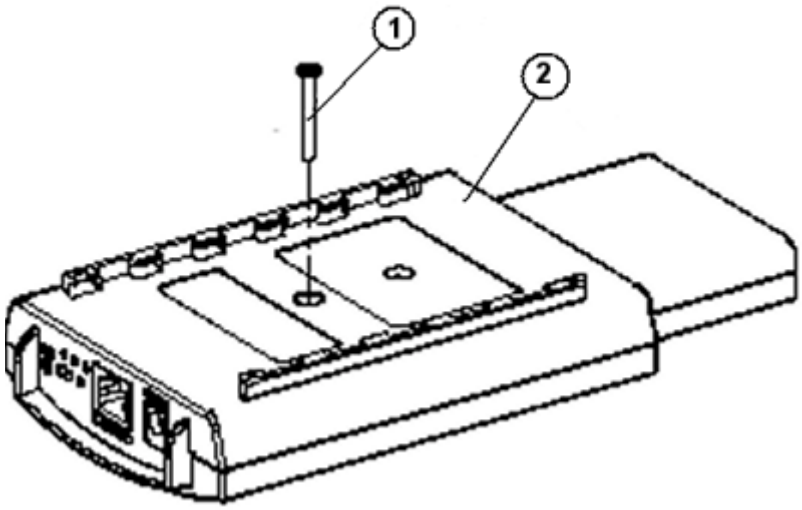
Step 4 Discharge any static buildup on your body by touching a grounded surface (antistatic work surface) before proceeding.

Step 5 Position the access point so that the back cover is facing up.

Caution The internal access point components and the 2.4-GHz radio can be damaged by ESD from improper handling.

Step 6 Remove the back cover retaining screw using a philips screwdriver (see Figure 7-1).

Figure 7-1 Access Point Back Cover Screw



1	Back cover screw	**2**	Back cover

Step 7 Hold the front cover with one hand and with the other hand gently slide the back cover towards the connector end of the unit.

Step 8 Gently lift the connector end of the back cover and remove the cover.

Go to the "Removing a 2.4-GHz Radio" section.

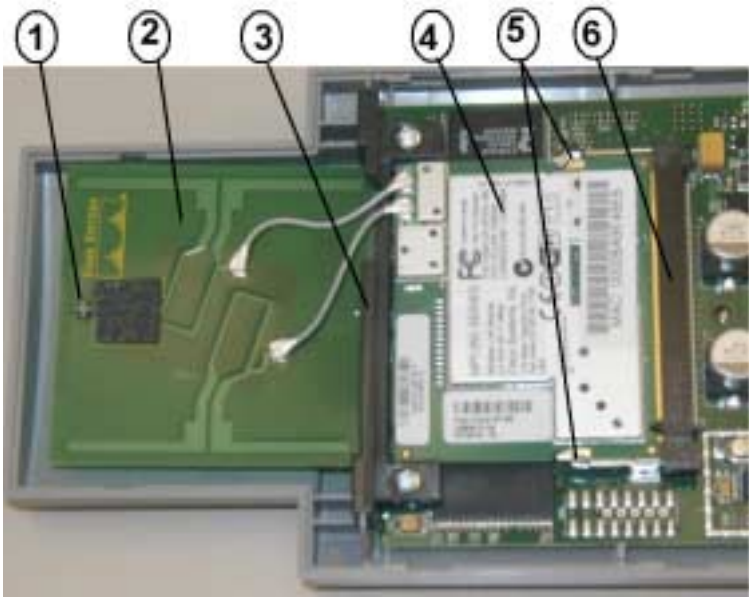
Removing a 2.4-GHz Radio

To remove a 2.4-GHz radio card from your access point, follow these steps:

Caution The internal access point components and the 2.4-GHz radio can be damaged by ESD from improper handling.

Step 1 Gently lift the top of the antenna card until it clears the plus shaped (+) support post (see Figure 7-2).

Figure 7-2 Radio Card and Antenna Card



1	Support post	**4**	Radio Card
2	Antenna card	**5**	Card-retaining clips
3	Support bracket	**6**	Mini-PCI connector

Step 2 Gently pull the antenna card to remove it from the notch in the support bracket. Do not disconnect the antenna wire connectors.

Step 3 Push the card-retaining clips (on each side of card) away from the radio card (see Figure 7-2). When released, the radio card springs up. Do not disconnect the antenna wires.

Step 4 Remove the 2.4-GHz radio card from the mini-PCI connector by performing the following operations:

a. Grasp the radio card only on the edges, being careful not to touch components on the board or the gold connector pins.

b. Remove the 2.4-GHz card from the mini-PCI connector.

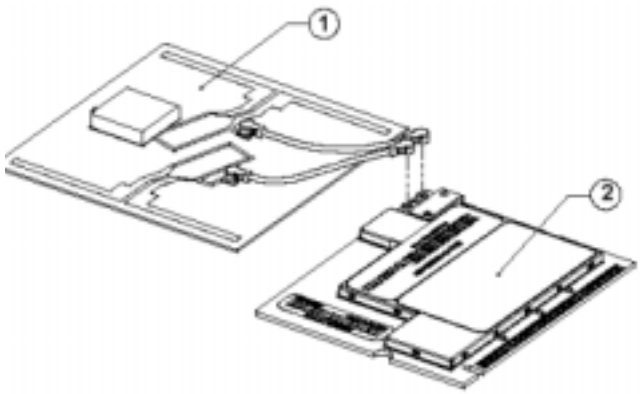
Step 5 Place the radio card and antenna card on the ESD-protected work surface.

Step 6 Use your fingers to carefully remove the antenna wire connectors from the 2.4-GHz radio card. Do not remove the antenna wire connectors from the antenna board.

Caution The antenna connectors can be damaged by using a pair of long-nose pliers during the removal process.

Caution To avoid damaging the antenna wire assemblies, handle them by their connectors.

Figure 7-3 Antenna Wires



1	Antenna card	**2**	Radio card

Step 7 Place the removed 2.4-GHz radio card into an anti-static bag. The antenna card will be connected to your new radio card.

Go to the "Installing a 2.4-GHz Radio" section.

Installing a 2.4-GHz Radio

To install a new 2.4-GHz radio card into the access point, follow these steps:

Caution The internal access point components and the 2.4-GHz radio can be damaged by ESD from improper handling.

Step 1 Carefully remove the new Cisco Aironet 2.4-GHz radio card from its anti-static bag.

Step 2 Grasp the radio card only on the edges, being careful not to touch components on the board or the gold connector pins.

Step 3 Place the radio card on the anti-static work surface next to the antenna card.

Step 4 Use your fingers to carefully connect the antenna wire connectors to the connectors on the 2.4-GHz radio card (see Figure 7-3).

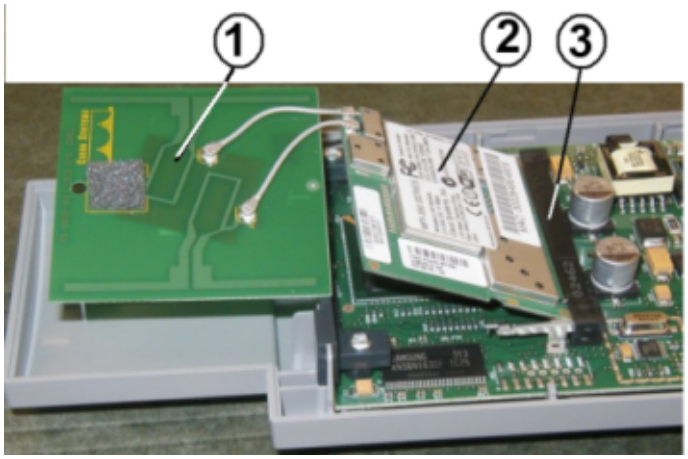
Caution The antenna connectors can be damaged by using a pair of long-nose pliers.

Caution To avoid damaging the antenna wire assemblies, handle them by their connectors.

Step 5 Insert the radio card into the access point's mini-PCI connector by following these steps:

a. Tilt the radio card at approximately 20° to 30° so that its gold pins are aligned with the mini-PCI connector (see Figure 7-4).

Figure 7-4 Inserting Radio Card in Mini-PCI Connector



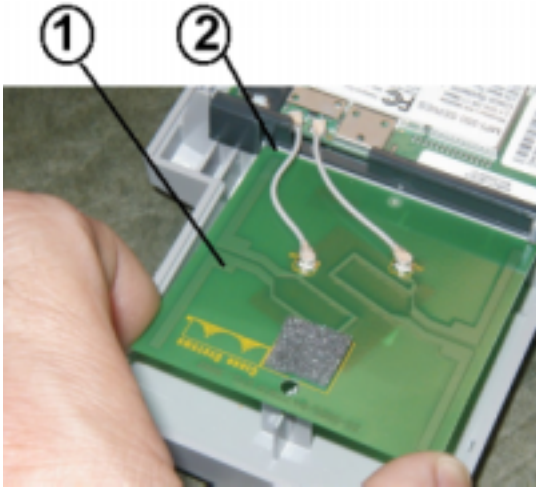
1	Antenna card	**3**	Mini-PCI connector
2	Radio card		

b. Push the radio card into the mini-PCI connector until it clicks into place.

Step 6 Hold the top of the antenna card and carefully push the radio card down (towards the access point's motherboard) until the card-retaining clips lock into the notches on the side of the radio card (you will hear a click).

Step 7 Insert the antenna card into the notch in the support bracket and gently push until it is seated (see Figure 7-5).

Figure 7-5 Inserting Antenna Card



1	Antenna card	**2**	Support bracket notch

Step 8 Align the hole on the top of the antenna board with the support post and gently push down until the board is fully seated on the support post.

Step 9 Carefully position the antenna wires so that the metal connectors do not touch each other.

Caution Damage to the radio could occur if the antenna connectors are touching when power is applied. If they are touching, carefully rotate them in opposite directions until they are separated.

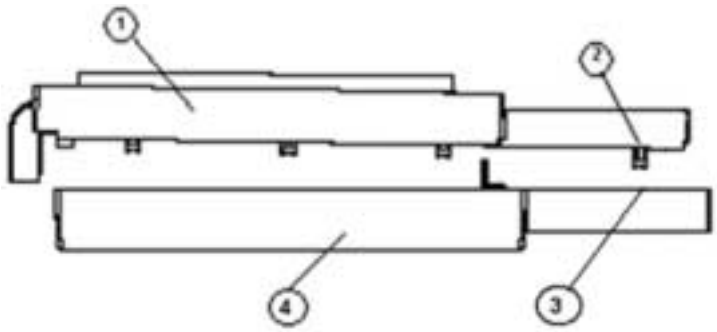
Go to the Replacing the Back Cover, page 7-8 section.

Replacing the Back Cover

To replace the back cover on the access point, follow these steps:

Step 1 While holding the back cover near the connector end, carefully place the antenna end's latches into the detents on the antenna end of the front cover (refer to Figure 7-6).

Figure 7-6 Positioning the Back Cover Latches



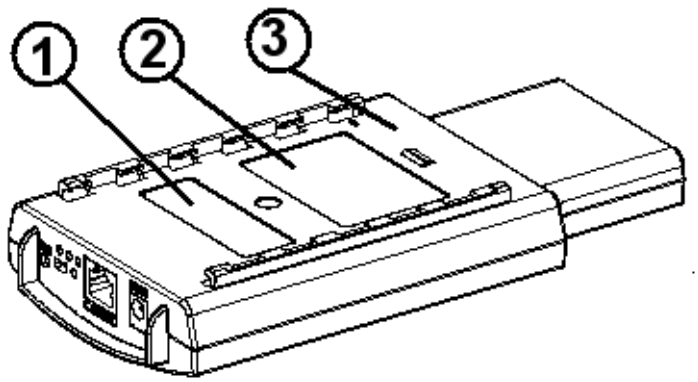
1	Back cover	**3**	Detent
2	Latch	**4**	Front cover

Step 2 Release the back cover and with one finger gently push the connector end of the back cover towards the antenna end. The back cover drops into place and slides forward until it is fully seated.

Step 3 Use a philips screwdriver to hand tighten the cover's retaining screw.

Step 4 Remove the backing paper from each 1100 series access point compliance label and carefully place the label over the existing label (see Figure 7-7).

Figure 7-7 Location of Compliance Labels



1	2.4-GHz radio label	**2**	Product compliance label
3	Back cover		

The radio card installation is now complete. To configure the new radio with your new wireless network settings, refer to the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points*.

CHAPTER 8

Troubleshooting

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

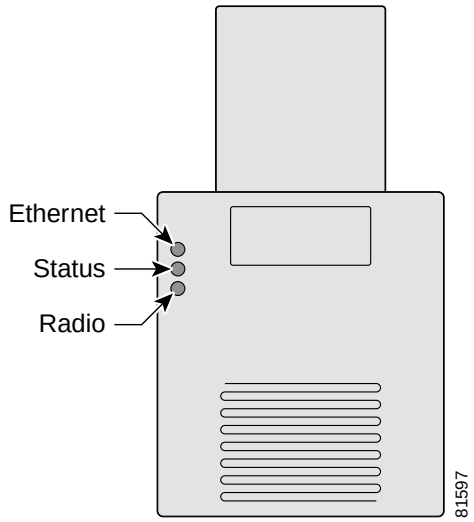
http://www.cisco.com/tac

Sections in this chapter include:

Checking the Top Panel LEDs

If your access point is not communicating, check the three LEDs on the top panel. You can use them to quickly assess the unit's status. Figure 8-1 shows the LEDs.

Figure 8-1 Access Points



The LEDs signals have the following meanings (for additional details refer to Table 8-1):

- The Ethernet LED signals traffic on the wired LAN, or Ethernet infrastructure. This LED is normally green when an Ethernet cable is connected, and blinks green when a packet is received or transmitted over the Ethernet infrastructure. The LED is off when the Ethernet cable is not connected.
- The status LED signals operational status. Steady green indicates that the access point is associated with at least one wireless client. Blinking green indicates that the access point is operating normally but is not associated with any wireless devices.
- The radio LED 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 access point's radio.

Table 8-1 Top Panel LED Signals

Message type	Ethernet LED	Status LED	Radio LED	Meaning
Boot loader status	Green	–	Green	DRAM memory test.
	–	Amber	Red	Board initialization test
	–	Blinking green	Blinking green	Flash memory test.
	Amber	Green	–	Ethernet initialization test.
	Green	Green	Green	Starting IOS.
Association status	–	Green	–	At least one wireless client device is associated with the unit.
	–	Blinking green	–	No client devices are associated; check the unit's SSID and WEP settings.
Operating status	–	Green	Blinking green	Transmitting/receiving radio packets.
	Green	–	–	Ethernet link is operational.
	Blinking green	–	–	Transmitting/receiving Ethernet packets.
Boot Loader Errors	Red	–	Red	DRAM memory test failure.
	–	Red	Red	File system failure.
	Red	Red	–	Ethernet failure during image recovery.
	Amber	Green	Amber	Boot environment error.
	Red	Green	Red	No IOS image file.
	Amber	Amber	Amber	Boot failure.
Operation Errors	–	Green	Blinking amber	Maximum retries or buffer full occurred on the radio.
	Blinking amber	–	–	Transmit/receive Ethernet errors.
	–	Blinking amber	–	General warning.
Configuration Reset	–	Amber	–	Resetting the configuration options to factory defaults.
Failure	Red	Red	Red	Firmware failure; try disconnecting and reconnecting unit power.
Firmware Upgrade	–	Red	–	Loading new firmware image.

Checking Basic Settings

Mismatched basic settings are the most common causes of lost connectivity with wireless clients. If the access point does not communicate with client devices, check the following areas.

SSID

Wireless clients attempting to associate with the access point must use the same SSID as the access point. If a client device's SSID does not match the SSID of an access point in radio range, the client device will not associate. The access point default SSID is *tsunami*.

WEP Keys

The WEP key you use to transmit data must be set up exactly the same on your access point and any wireless devices with which it associates. For example, if you set WEP Key 3 on your client adapter to 0987654321 and select it as the transmit key, you must also set WEP Key 3 on the access point to exactly the same value. The access point does not need to use Key 3 as its transmit key, however.

Refer to *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for instructions on setting the access point's WEP keys.

Security Settings

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

If a wireless client is unable to authenticate with your access point, contact the system administrator for proper security settings in the client adapter and for the client adapter driver and firmware versions that are compatible with the access point settings.

Note The access point MAC address that appears on the Status page in the Aironet Client Utility (ACU) is the MAC address for the access point radio. The MAC address for the access point Ethernet port is printed on the label on the back of the access point.

Resetting to the Default Configuration

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

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 access point settings to the factory defaults using the MODE button:

Step 1 Disconnect power (the power jack for external power or the Ethernet cable for in-line power) from the access point.

Step 2 Press and hold the MODE button while you reconnect power to the access point.

Step 3 Hold the MODE button until the Status LED turns amber (approximately 2 to 3 seconds), and release the button.

Step 4 After the access point reboots, you must reconfigure the access point by using the Web browser interface, the Telnet interface, or IOS commands.

Note The access point is configured with the factory default values including the IP address (set to receive an IP address using DHCP).

Using the Web Browser Interface

Follow the steps below to delete the current configuration and return all access point 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 access point'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 access point 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 access point is configured with a static IP address, the IP address does not change.

Step 8 After the access point reboots, you must reconfigure the access point by using the Web browser interface, the Telnet interface, or IOS commands.

Reloading the Access Point Image

If your access point has a firmware failure, you must reload the complete access point image file using the Web browser interface or by pressing and holding the MODE button for about 20 to 30 seconds. You can use the browser interface if the access point firmware is still fully operational and you want to upgrade the firmware image. However, you can use the MODE button when the access point has a corrupt firmware image.

Using the MODE button

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

Note If your access point experiences a firmware failure or a corrupt firmware image, indicated by three red LEDs, 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 access point IP address, and SSIDs.

Follow the steps below to reload the access point 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 access point image file (*c1100-k9w7-tar.default*) in the TFTP server folder and the TFTP server is activated. For additional information, refer to the "Obtaining the Access Point Image File" and "Obtaining the TFTP Server Software" sections.

Step 3 Connect the PC to the access point using a Category 5 (CAT5) Ethernet cable.

Step 4 Disconnect power (the power jack for external power or the Ethernet cable for in-line power) from the access point.

Step 5 Press and hold the MODE button while you reconnect power to the access point.

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 access point reboots as indicated by all LEDs turning green followed by the Status LED blinking green.

Step 8 After the access point reboots, you must reconfigure the access point by using the Web interface, the Telnet interface, or IOS commands.

Web Browser Interface

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

Note Your access point 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 access point image file on your PC and download the image to the access point. 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 access point'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 access point 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 access point 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 access point'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 access point 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 access point 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.

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

Obtaining the Access Point Image File

The access point image file can be obtained from the Cisco.com software center using the following steps:

Step 1 Use your Internet browser to access the Cisco Software Center at the following URL:

http://www.cisco.com/public/sw-center/sw-wireless.shtml

Step 2 Click **Option 2: Aironet Wireless Software Display Tables**.

Step 3 Find the access point firmware and utilities section and click **Cisco Aironet 1100 Series**.

Step 4 Click **c1100-k9w7-tar.122-13.JA.tar**.

Step 5 On the Encryption Authorization Form, enter the requested information, read the encryption information, and check the boxes that apply.

Step 6 Click **Submit**.

Step 7 Read and accept the terms and conditions of the Software License Agreement.

Step 8 Select the image file again to download it.

Step 9 Download the access point image file to a directory on your PC hard drive.

Obtaining the TFTP Server Software

You can download TFTP server software from several websites. 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.

APPENDIX A

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:

Dipole Antenna Installation Warning

Warning	In order to comply with FCC radio frequency (RF) exposure limits, dipole antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.
Waarschuwing	Om te voldoen aan de FCC radiofrequentie (RF) blootstellingslimieten dienen dipoolantennes zich minstens 20 cm of meer van de lichamen van alle personen bevinden.
Varoitus	FCC:n antamien radiotaajuuksille altistumista koskevien rajoitusten mukaan dipoliantennien on sijaittava vähintään 20 cm:n päässä kaikista henkilöistä.
Attention	Pour se conformer aux limites d'exposition à la fréquence radio préconisées par la FCC (Federal Communications Commission), les antennes dipôles doivent se situer à un minimum de 20 cm de toute personne.
Warnung	Um die in den FCC-Richtlinien festgelegten Expositionshöchstgrenzen für Radiofrequenzen (RF) nicht zu überschreiten, sollten Dipolantennen mindestens 20 cm (7,9 Zoll) vom Körper aller Person entfernt aufgestellt werden.
Avvertenza	Per conformarsi ai limiti FCC di esposizione a radiofrequenza (RF), le antenne a dipolo devono stare ad una distanza minima di 20 cm dal corpo di ogni persona.
Advarsel	I henhold til eksponeringsgrensene for radiofrekvenser (RF), skal dipole antenner befinne seg på en avstand av minst 20 cm eller mer fra mennesker.
Aviso	Para estar de acordo com as normas FCC de limites de exposição para freqüência de rádio (RF), as antenas dipolo devem estar distantes no mínimo 20 cm (7,9 pol) do corpo de qualquer pessoa.
¡Advertencia!	Para cumplir con los límites de exposición de radio frecuencia (RF) de la Comisión Federal de Comunicaciones (FCC) es preciso ubicar las antenas dipolo a un mínimo de 20 cm (7,9 pulgadas) o más del cuerpo de las personas.
Varning!	För att följa FCC-exponeringsgränserna för radiofrekvens (RF), bör dipolsantenner placeras på minst 20 cm avstånd från alla människor.

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 netwerkapparaat alleen in de buurt van onbeschermde 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.oen.

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.

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

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.
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.

Installation Warning

Warning	Read the installation instructions before you connect the system to its power source.
Waarschuwing	Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.
Varoitus	Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.
Attention	Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.
Warnung	Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.
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 sua fonte de energia.
¡Advertencia!	Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.
Varning!	Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

Circuit Breaker (15A) Warning

Warning	This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).
Waarschuwing	Dit produkt is afhankelijk van de installatie van het gebouw voor kortsluit- (overstroom)beveiliging. Controleer of er een zekering of stroomverbreker van niet meer dan 120 Volt wisselstroom, 15 A voor de V.S. (240 Volt wisselstroom, 10 A internationaal) gebruikt wordt op de fasegeleiders (alle geleiders die stroom voeren).
Varoitus	Tämä tuote on riippuvainen rakennukseen asennetusta oikosulkusuojauksesta (ylivirtasuojauksesta). Varmista, että vaihevirtajohtimissa (kaikissa virroitetuissa johtimissa) käytetään Yhdysvalloissa alle 120 voltin, 15 ampeerin ja monissa muissa maissa 240 voltin, 10 ampeerin sulaketta tai suojakytkintä.
Attention	Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).

Warnung **Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird.**

Avvertenza **Questo prodotto dipende dall'installazione dell'edificio per quanto riguarda la protezione contro cortocircuiti (sovracorrente). Verificare che un fusibile o interruttore automatico, non superiore a 120 VCA, 15 A U.S. (240 VCA, 10 A internazionale) sia stato usato nei fili di fase (tutti i conduttori portatori di corrente).**

Advarsel **Dette produktet er avhengig av bygningens installasjoner av kortslutningsbeskyttelse (overstrøm). Kontroller at det brukes en sikring eller strømbryter som ikke er større enn 120 VAC, 15 A (USA) (240 VAC, 10 A internasjonalt) på faselederne (alle strømførende ledere).**

Aviso **Este produto depende das instalações existentes para protecção contra curto-circuito (sobrecarga). Assegure-se de que um fusível ou disjuntor não superior a 240 VAC, 10A é utilizado nos condutores de fase (todos os condutores de transporte de corrente).**

¡Advertencia! **Este equipo utiliza el sistema de protección contra cortocircuitos (o sobrecorrientes) deló propio edificio. Asegurarse de que se utiliza un fusible o interruptor automático de no más de 240 voltios en corriente alterna (VAC), 10 amperios del estándar internacional (120 VAC, 15 amperios del estándar USA) en los hilos de fase (todos aquéllos portadores de corriente).**

Varning! **Denna produkt är beroende av i byggnaden installerat kortslutningsskydd (överströmsskydd). Kontrollera att säkring eller överspänningsskydd används på fasledarna (samtliga strömförande ledare) för internationellt bruk max. 240 V växelström, 10 A (i USA max. 120 V växelström, 15 A).**

APPENDIX B

Declarations of Conformity and Regulatory Information

This appendix provides declarations of conformity and regulatory information for the Cisco Aironet 1100 Series Access Points.

This appendix contains the following sections:

Manufacturers Federal Communication Commission Declaration of Conformity Statement

Tested To Comply With FCC Standards

FOR HOME OR OFFICE USE

Models:	AIR-AP1120B-A-K9 or AIR-AP1121G-A-K9
FCC Certification number:	LDK 102042 (AIR-MPI350) or LDK102048 (AIR-MP21G-A-K9)
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. Any changes or modification to said product not expressly approved by Cisco could void the user's authority to operate this device.

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 numerique de la classe B respecte les exigences du Reglement sur le material broilleur 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.

The device is certified to the requirements of RSS-210 for 2.4-GHz spread spectrum devices. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

European Community, Switzerland, Norway, Iceland, and Liechtenstein

Declaration of Conformity with Regard to the R&TTE Directive 1999/5/EC

English:	This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Deutsch:	Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprecheneden Vorgaben der Richtlinie 1999/5/EU.
Dansk:	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Directiv 1999/5/EF.
Español:	Este equipo cumple con los requisitos esenciales asi como con otras disposiciones de la Directive 1999/5/EC.
Έλληνας:	Αυτός ο εξοπλισμός συμμορφώνεται με τις ουσιώδεις απαιτήσεις και τις λοιπές διατάξεις της Οδηγίας 1999/5/ΕΚ.
Français:	Cet appareil est conforme aux exigencies essentialles et aux autres dispositions pertinantes de la Directive 1999/5/EC.
Íslenska:	Þessi búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipunar 1999/5/ESB.

Italiano:	Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 1999/5/EC.
Nederlands:	Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijn 1999/5/EC.
Norsk:	Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-directiv 1999/5/EC.
Português:	Este equipamento satisfaz os requisitos essenciais e outras provisões da Directiva 1999/5/EC.
Suomalainen:	Tämä laite täyttää direktiivin 1999/5/EY oleelliset vaatimukset ja on siinä asetettujen muidenkin ehtojen mukainen.
Svenska:	Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 1999/5/EC.

This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The Declaration of Conformity related to this product can be found at the following URL:

http://www.ciscofax.com

For the 1100 series access point, the following standards were applied:

- Radio: EN 300.328-1, EN 300.328-2
- EMC: EN 301 489-1, EN 301 489-17
- Safety: EN 60950

The following CE mark is affixed to the 1100 series equipment:

The above CE mark is required as of April 8, 2000 but might change in the future.

Note This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Cisco Corporate Compliance.

Note Combinations of power levels and antennas resulting in a radiated power level of above 100 mW eirp are considered as not compliant with the above mentioned directive and are not allowed for use within the European community and countries that have adopted the European R&TTE directive 1999/5/EC and/or the CEPT recommendation Rec 70.03. For more details on legal combinations of power levels and antennas, contact Cisco Corporate Compliance.

Declaration of Conformity for RF Exposure

The radio module has been evaluated under FCC Bulletin OET 65C and found compliant to the requirements as set forth in CFR 47 Sections 2.1091, 2.1093, and 15.247 (b) (4) addressing RF Exposure from radio frequency devices. The access point should be installed more than 20 cm from your body or nearby persons.

Guidelines for Operating Cisco Aironet Access Points and Bridges in Japan

This section provides guidelines for avoiding interference when operating Cisco Aironet access points and bridges in Japan. These guidelines are provided in both Japanese and English.

Japanese Translation

この機器の使用周波数帯では、電子レンジ等の産業・科学・医療用機器のほか工場の製造ライン等で使用されている移動体識別用の構内無線局（免許を要する無線局）及び特定小電力無線局（免許を要しない無線局）が運用されています。

1　この機器を使用する前に、近くで移動体識別用の構内無線局及び特定小電力無線局が運用されていないことを確認して下さい。

2　万一、この機器から移動体識別用の構内無線局に対して電波干渉の事例が発生した場合には、速やかに使用周波数を変更するか又は電波の発射を停止した上、下記連絡先にご連絡頂き、混信回避のための処置等(例えば、パーティションの設置など)についてご相談して下さい。

3　その他、この機器から移動体識別用の特定小電力無線局に対して電波干渉の事例が発生した場合など何かお困りのことが起きたときは、次の連絡先へお問い合わせ下さい。

連絡先：03-5549-6500

43768

English Translation

This equipment operates in the same frequency bandwidth as industrial, scientific, and medical devices such as microwave ovens and mobile object identification (RF-ID) systems (licensed premises radio stations and unlicensed specified low-power radio stations) used in factory production lines.

1. Before using this equipment, make sure that no premises radio stations or specified low-power radio stations of RF-ID are used in the vicinity.
2. If this equipment causes RF interference to a premises radio station of RF-ID, promptly change the frequency or stop using the device; contact the number below and ask for recommendations on avoiding radio interference, such as setting partitions.

3. If this equipment causes RF interference to a specified low-power radio station of RF-ID, contact the number below.

   Contact Number: 03-5549-6500

APPENDIX C

Access Point Specifications

This appendix provides technical specifications for the Cisco Aironet 1100 Series Access Point. Table C-1 lists the technical specifications for the access point.

Table C-1 Access Point Specifications

Category	Specifications
Physical	
Size	4.1 in. W x 1.5 in. D x 8.1 in. H 10.4 cm W x 3.8 cm D x 20.6 cm H
Status Indicators	Three indicators on the top panel: • Ethernet traffic • Status • Radio traffic
Connectors	End panel (left to right): RJ-45 connector for 10/100 BASE-T Ethernet connections; power connector (for plug-in AC power module).
Input Voltage	48 VDC nominal. Operational up to 60 VDC. Voltage higher than 60 VDC can damage the unit.
Input Current	With IEEE 802.11b-compliant radio: 150 mA With IEEE 802.11g-compliant radio: TBD mA (typical)
Operating Temperature	32 to 104°F (0 to 40°C) for the access point 32 to 104°F (0 to 40°C) for the power injector
Storage Temperature	–40 to 185°F (–40 to 85°C) for access point
Weight	10.5 oz (297g) with 2.4-GHz radio

Table C-1 Access Point Specifications (continued)

Category	Specifications
Radio	**2.4-GHz Radio**
Power Output	With IEEE 802.11b-compliant radio: 100, 50, 30, 20, 5, or 1 mW (at 1, 2, 5.5, and 11Mbps) With IEEE 802.11g-compliant radio: 100, 50, 30, 20, 5, or 1 mW (at 1, 2, 5.5 and 11 Mbps) 30, 20, 10, 5, or 1 mW (at 6, 9, 12, 18, 24, 48, and 54 Mbps) (Depending on the regulatory domain in which the access point is installed)
Frequency	2.400 to 2.497 GHz (Depending on the regulatory domain in which the access point is installed)
Range	Indoor: IEEE 802.11b-compliant radio: 150 ft (45 m) at 11 Mbps 400 ft (122 m) at 1 Mbps IEEE 802.11g-compliant radio: TBD at 36 Mbps TBD at 54 Mbps Outdoor: IEEE 802.11b-compliant radio: 800 ft (244 m) at 11 Mbps 2000 ft (610 m) at 1 Mbps IEEE 802.11g-compliant radio: TBD at 36 Mbps TBD at 54 Mbps
Modulation	Direct Sequence Spread Spectrum (DSSS)
Data rates	IEEE 802.11b-compliant radio: 1, 2, 5.5, and 11 Mbps IEEE 802.11g-compliant radio: 1, 2, 5.5, and 11 Mbps 6, 9, 12, 18, 24, 36, 48, and 54 Mbps
Antenna	A diversity system with two integrated 2.2 dBi dipole antennas.

Table C-1 Access Point Specifications (continued)

Category	Specifications
Compliance	The 1100 series access point provides adequate fire resistance and low smoke-producing characteristics suitable for operation in a building's environmental air space, such as above suspended ceilings, in accordance with Section 300-22(C) of the National Electrical Code (NEC) and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, C22.1. **Caution** Cisco Aironet 1100 series power injectors and the universal power supplies are not tested to UL 2043 and should not be placed in a building's air-handling spaces, such as above suspended ceilings.
Safety	Designed to meet: • UL 1950 • CSA 22.2 No. 950-95 • IEC 60950 • EN 60950
Radio Approvals	IEEE 802.11b-compliant radio: FCC Part 15.247 Japan ARIB-STD-33B EN 300.328 IEEE 802.11g-compliant radio: FCC Parts 15.247, 15.205, 15.209 Canada RSS-210 Japan ARIB-STD-33B Japan ARIB-STD-66 Europe EN-300.328
EMI and Susceptibility	FCC Part 15.107 and 15.109 Class B ICES-003 Class B (Canada) AS/NZS 3548 Class B VCCI Class B EN 301.489-1 EN 301.489-17
RF Exposure	OET-65C RSS-102 ANSI C95.1

APPENDIX D

Channels and Antenna Settings

This appendix lists the IEEE 802.11b (2.4-GHz) and IEEE 802.11g (2.4-GHz) channels and the maximum power levels supported by the world's regulatory domains.

The following topics are covered in this appendix:

Channels

IEEE 802.11b (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11b 22-MHz-wide channel are shown in Table D-1.

Table D-1 Channels for IEEE 802.11b

Channel Identifier	Center Frequency (MHz)	Regulatory Domains			
		Americas (-A)	EMEA (-E)	Japan (-J)	Israel (-I)
1	2412	X	X	X	–
2	2417	X	X	X	–
3	2422	X	X	X	–
4	2427	X	X	X	–
5	2432	X	X	X	X
6	2437	X	X	X	X
7	2442	X	X	X	X
8	2447	X	X	X	X
9	2452	X	X	X	–
10	2457	X	X	X	–
11	2462	X	X	X	–
12	2467	–	X	X	–
13	2472	–	X	X	–
14	2484	–	–	X	–

Note Mexico is included in the Americas (-A) regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11g 22-MHz-wide channel are shown in Table D-2.

Table D-2 Channels for IEEE 802.11g

Channel Identifier	Center Frequency (MHz)	Regulatory Domains							
		Americas (-A)		EMEA (-E)		Israel (-I)		Japan (-J)	
		CCK	OFDM	CCK	OFDM	CCK	OFDM	CCK	OFDM
1	2412	X	X	X	X	–	–	X	X
2	2417	X	X	X	X	–	–	X	X
3	2422	X	X	X	X	–	–	X	X
4	2427	X	X	X	X	–	–	X	X
5	2432	X	X	X	X	X	X	X	X
6	2437	X	X	X	X	X	X	X	X
7	2442	X	X	X	X	X	X	X	X
8	2447	X	X	X	X	X	X	X	X
9	2452	X	X	X	X	–	–	X	X
10	2457	X	X	X	X	–	–	X	X
11	2462	X	X	X	X	–	–	X	X
12	2467	–	–	X	X	–	–	X	X
13	2472	–	–	X	X	–	–	X	X
14	2484	–	–	–	–	–	–	X	–

Maximum Power Levels

IEEE 802.11b (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table D-3 indicates the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11b regulatory domain.

Table D-3 Maximum Power Levels Per Antenna Gain for IEEE 802.11b

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)
Americas (-A) (4 watts EIRP maximum)	2.2	100
EMEA (-E) (100 mW EIRP maximum)	2.2	50
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30
Israel (-I) (100 mW EIRP maximum)	2.2	50

IEEE 802.11g (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table D-4 indicates the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11g regulatory domain.

Table D-4 Maximum Power Levels Per Antenna Gain for IEEE 802.11g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK	OFDM
Americas (-A) (4 watts EIRP maximum)	2.2	100	30
EMEA (-E) (100 mW EIRP maximum)	2.2	50	30
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30	30
Israel (-I) (100 mW EIRP maximum)	2.2	50	30

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.

802.11b The IEEE standard that specifies carrier sense media access control and physical layer specifications for 5.5- and 11-Mbps wireless LANs operating in the 2.4-GHz frequency band.

A

access point A wireless LAN data transceiver that uses radio waves to connect a wired network with wireless stations.

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.

BPSK A modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 1 Mbps.

broadcast packet A single data message (packet) sent to all addresses on the same subnet.

C

CCK Complementary code keying. A modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 5.5 and 11 Mbps.

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.

client A radio device that uses the services of an Access Point to communicate wirelessly with other devices on a local area network.

CSMA Carrier sense multiple access. A wireless LAN media access method specified by the IEEE 802.11 specification.

D

data rates The range of data transmission rates supported by a device. Data rates are measured in megabits per second (Mbps).

dBi 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.

DHCP 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.

dipole A type of low-gain (2.2-dBi) antenna consisting of two (often internal) elements.

domain name 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.

DNS 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.

DSSS Direct sequence spread spectrum. A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band.

E

EAP 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.

Ethernet 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

file server A repository for files so that a local area network can share files, mail, and programs.

firmware Software that is programmed on a memory chip.

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 in a spherical pattern.

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.

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.

P

packet A basic message unit for communication across a network. A packet usually includes routing information, data, and sometimes error detection information.

Q

Quadruple Phase Shift Keying A modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 2 Mbps.

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.

RP-TNC A connector type unique to Cisco Aironet radios and antennas. Part 15.203 of the FCC rules covering spread spectrum devices limits the types of antennas that may be used with transmission equipment. In compliance with this rule, Cisco Aironet, like all other wireless LAN providers, equips its radios and antennas with a unique connector to prevent attachment of non-approved antennas to radios.

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.

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 IEEE 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.

T

U

V

W