

Cisco Aironet Wireless LAN Client Adapters Installation and Configuration Guide for Mac OS

340 and 350 Series

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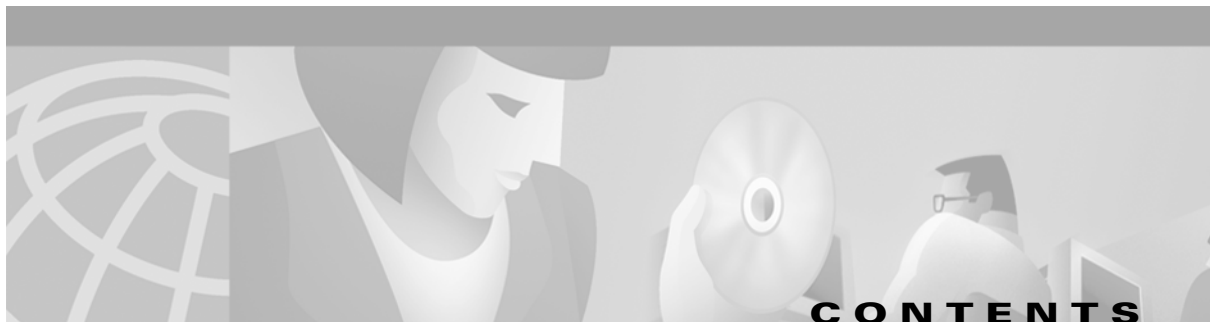
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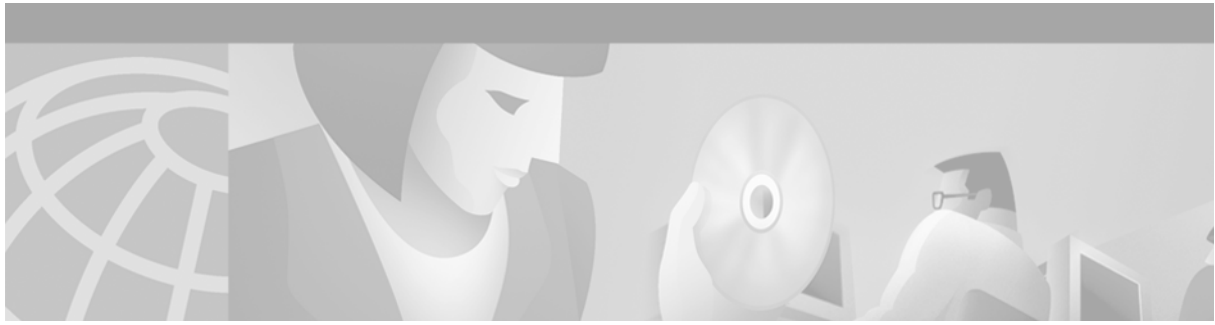
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Preface

The preface provides an overview of the *Cisco Aironet Wireless LAN Client Adapters Installation and Configuration Guide for Mac OS*, references related publications, and explains how to obtain other documentation and technical assistance.

The following topics are covered in this section:

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Audience

This publication is for the person responsible for installing and maintaining a Cisco Aironet Wireless LAN Adapter, also referred to as a *client adapter*. The installer should be familiar with computing devices and with network terms and concepts.

Purpose

This publication describes the client adapters, explains how to install the adapters and the client utilities (which enable you to configure and view the status of the adapter), and offers troubleshooting information.

Organization

This publication is organized into the following chapters:

- [Chapter 1, “Overview,”](#) provides an introduction to the client adapters and describes network configurations.
- [Chapter 2, “Preparing for Installation,”](#) provides information that you need to know before installing a client adapter, such as safety information and system requirements.
- [Chapter 3, “Installing the Driver, Client Utility, and Client Adapter,”](#) provides instructions for inserting a client adapter, installing the driver and the client utility, configuring your client adapter with basic settings, and how to verify your configuration settings.
- [Chapter 4, “Security Features,”](#) provides an overview of the WEP and LEAP security features as well as explains how use the client utility to enable WEP and LEAP for your client adapter.
- [Chapter 5, “Advanced Configuration on Mac OS 9.x,”](#) provides an overview of the client utility and describes how to open and use the utility on the Mac OS 9.x operating system.
- [Chapter 6, “Advanced Configuration on Mac OS X,”](#) provides an overview of the client utility and describes how to open and use the utility on the Mac OS X operating system.
- [Chapter 7, “Performing Diagnostics,”](#) explains how to use the client utility to perform user-level diagnostics.
- [Chapter 8, “Routine Procedures,”](#) explains how to determine the version of firmware, driver, and client utility; explains how to update the firmware, driver, and client utility; explains how to uninstall the driver and client utility; and explains how to remove the client adapter.
- [Chapter 9, “Troubleshooting,”](#) provides information on diagnosing and correcting common problems, defines error messages, and explains how to access online help.
- [Appendix A, “Technical Specifications,”](#) lists the physical, radio, power, and regulatory specifications for the client adapters.
- [Appendix B, “Translated Safety Warnings,”](#) provides translations of the client adapters’ safety warnings in nine languages.
- [Appendix C, “Declarations of Conformity and Regulatory Information,”](#) provides conformity and regulatory information for the client adapters.
- [Appendix D, “Channels and Antenna Settings,”](#) lists the channels, maximum power levels, and antenna gains supported by the world’s regulatory domains.

- [Appendix E, “Positioning Wireless Devices,”](#) provides guidelines for positioning equipment in a wireless network and describes how to run the site survey tool.

Conventions

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

- Commands and keywords are in **boldface**.
- Variables are in *italics*.
- Notes, cautions, and warnings use the following conventions and symbols:



Note

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



Caution

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



Warning

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

Waarschuwing

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

Varoitus

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

- Attention** Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité).
- Warnung** Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise).)
- Avvertenza** Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza).
- Advarsel** Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler].)
- Aviso** Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança").

- ¡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

For more information about Cisco Aironet Wireless LAN Adapters and related products, refer to the following publications:

- *Quick Start Guide: Cisco Aironet Wireless LAN Client Adapters*
- *Release Notes for Cisco Aironet Wireless LAN Client Adapters*
- *Release Notes for Cisco Aironet Client Utility and Driver, Version 2.1 for Mac OS 9.x and Mac OS X*
- *Cisco Aironet Access Point Software Configuration Guide*

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

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

<http://www.cisco.com>

Translated documentation is available at the following URL:

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

Documentation CD-ROM

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

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:
http://www.cisco.com/cgi-bin/order/order_root.pl
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click the **Fax** or **Email** option under the “Leave Feedback” at the bottom of the Cisco Documentation home page.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

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

We appreciate your comments.

Obtaining Technical Assistance

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

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

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

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

<http://www.cisco.com>

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 through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

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

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires 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 the following URL to register:

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

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

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

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; 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 will automatically open a case.

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

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

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



Overview

This chapter describes the Cisco Aironet Wireless LAN Adapters, also referred to as *client adapters*, and illustrates their role in a wireless network.

The following topics are covered in this section:

- [Introduction to the Client Adapters, page 1-2](#)
- [Parts of the Client Adapter, page 1-3](#)
- [Network Configurations Using the Client Adapter, page 1-4](#)
- [Introduction to the Client Utility, page 1-7](#)
- [Client Utility Basics for Mac OS 9.x, page 1-7](#)
- [Client Utility Basics for Mac OS X, page 1-10](#)

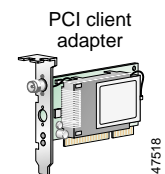
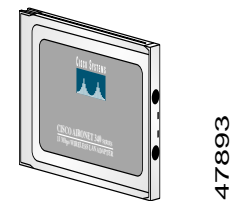
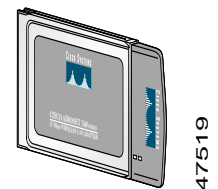
Introduction to the Client Adapters

The Cisco Aironet Wireless LAN Adapters, also referred to as *client adapters*, are radio modules that provide transparent wireless data communications between fixed, portable, or mobile devices and other wireless devices or a wired network infrastructure. The client adapters are fully compatible when used in devices supporting Plug-and-Play (PnP) technology.

The primary function of the client adapters is to transfer data packets transparently through the wireless infrastructure. The adapters operate similarly to a standard network product except that the cable is replaced with a radio connection. No special wireless networking functions are required, and all existing applications that operate over a network will operate using the adapters.

This document covers three types of client adapters:

- **PC card client adapter** (also referred to as a *PC card*)—A PCMCIA card radio module that can be inserted into any device equipped with an *external* Type II or Type III PC card slot. Host devices can include laptops, notebook computers, personal digital assistants, and hand-held or portable devices.
- **LM card client adapter** (also referred to as an *LM card*)—A PCMCIA card radio module that can be inserted into any device equipped with an *internal* Type II or Type III PC card slot. Host devices usually include hand-held or portable devices.
- **PCI client adapter**—A client adapter card radio module that can be inserted into any device equipped with an empty PCI expansion slot, such as a desktop computer.



Refer to the [“Radio Antenna” section on page 1-3](#) for antenna differences between these adapters.

Introduction to the Client Adapter Software Components

The software components of the client adapter consists of a driver, firmware, and a client utility. These components work together to allow the client adapter to work properly in your workstation. Typically, the driver and client utility are designed for use with a specific operating system or a group of similar operating systems, while the firmware is designed specifically for the client adapter’s hardware and radio. The firmware controls the radio operations.

The client adapter firmware provides the interface between the radio and the driver. The driver provides the interface between the client adapter firmware and the workstation’s operating system. The client adapter is installed as a network communications adapter on the workstation’s operating system.

The client utility interfaces to the operating system to allow you to configure, test, and monitor the operations of the client adapter on the wireless LAN. The client utility also allows you to load new firmware into the client adapter.

Terminology

Throughout this document, the following terms are used:

- **client adapter**—Refers to all three types of adapters
- **PC card, LM card, or PCI client adapter**—Refers to only a specific adapter
- **workstation (or station)**—Refers to a computing device with an installed client adapter

Parts of the Client Adapter

The client adapter is composed of three major parts: a radio, a radio antenna, and two LEDs.

Radio

The client adapter contains a direct-sequence spread spectrum (DSSS) radio that operates in the 2.4-GHz license-free Industrial Scientific Medical (ISM) band. The radio transmits data over a half-duplex radio channel operating at up to 11 Mbps.

DSSS technology causes radio signals to be transmitted over a wide frequency range, using multiple frequencies simultaneously. The benefit of this technology is its ability to protect the data transmission from interference. For example, if a particular frequency encounters noise or interference or both, enough redundancy is built into the signal on other frequencies that the client adapter is usually still successful in its transmission.

Radio Antenna

The type of antenna used depends on your client adapter:

- PC cards have an integrated, permanently attached diversity antenna. The benefit of the diversity antenna system is improved coverage. The system works by allowing the card to switch and sample between its two antenna ports in order to select the optimum port for receiving data packets. As a result, the card has a better chance of maintaining the radio frequency (RF) connection in areas of interference. The antenna is housed within the section of the card that hangs out of the PC card slot when the card is installed.
- LM cards are shipped without an antenna; however, an antenna can be connected through the card's external connector. If a snap-on antenna is used, it should be operated in diversity mode. Otherwise, the antenna mode used should correspond to the antenna port to which the antenna is connected.
- PCI client adapters are shipped with a 2-dBi dipole antenna that attaches to the adapter's antenna connector. However, other types of antennas may be used. PCI client adapters can be operated through the right antenna port only.

**Note**

For information on setting the client adapter's antenna mode, refer to [Chapter 5, "Advanced Configuration on Mac OS 9.x"](#) or to [Chapter 6, "Advanced Configuration on Mac OS X."](#)

**Note**

External antennas used in combination with a power setting resulting in a radiated power level above 100 mW equivalent isotropic radiated power (EIRP) are not allowed for use within the European community and other countries that have adopted the European R&TTE directive or the CEPT recommendation Rec 70.03 or both. For more details on legal combinations of power levels and antennas in those countries, contact Cisco Corporate Compliance. See also the [“Declaration of Conformity with Regard to the R&TTE Directive 1999/5/EC”](#) section on page C-4.

LEDs

The client adapter has two LEDs that glow or blink to indicate the status of the adapter or to convey error messages. Refer to Chapter 9 for an interpretation of the LED codes.

Network Configurations Using the Client Adapter

The client adapter can be used in a variety of network configurations. In some configurations, access points provide connections to your network or act as repeaters to increase wireless communication range. The maximum communication range is based on how you configure your wireless network.

This section describes and illustrates the following common network configurations:

- Ad hoc wireless local area network (LAN)
- Wireless infrastructure with workstations accessing a wired LAN

**Note**

For examples of more complex network configurations involving client adapters and access points, refer to the *Cisco Aironet Access Point Hardware Installation Guide*.

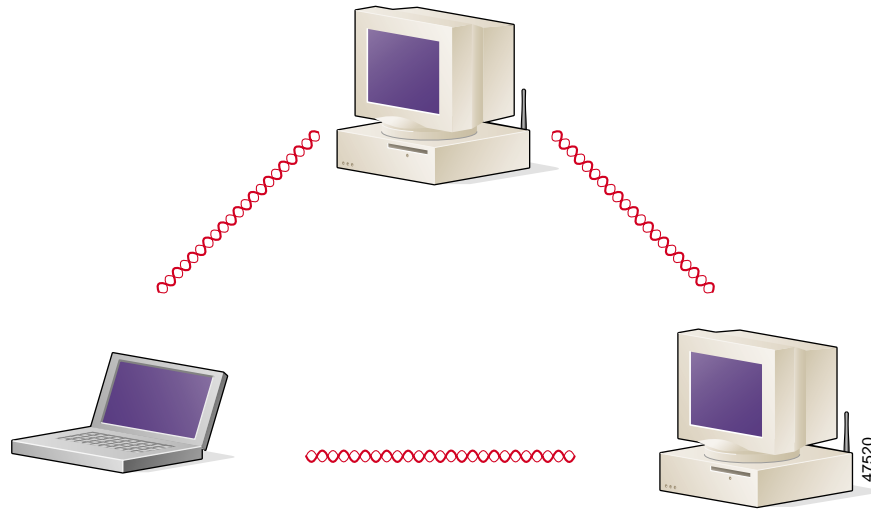
**Note**

For information on setting the client adapter’s network mode, refer to Chapter 5 for the Mac OS 9.x operating system or to Chapter 6 for the Mac OS X operating system.

Ad Hoc Wireless LAN

An ad hoc (or peer-to-peer) wireless LAN (see [Figure 1-1](#)) is the simplest wireless LAN configuration. In a wireless LAN using an ad hoc network configuration, all devices equipped with a client adapter can be linked together and communicate directly with each other.

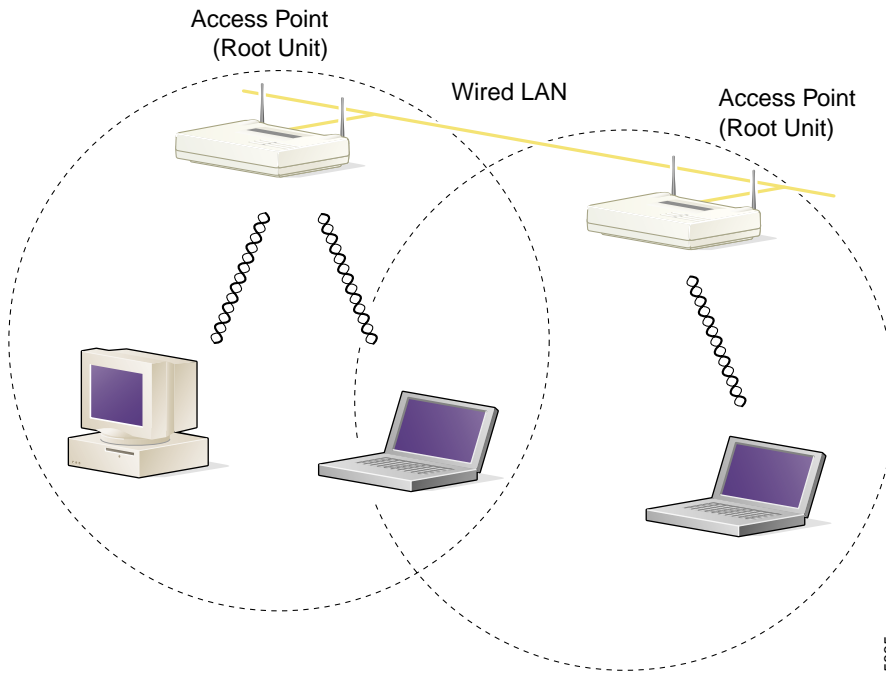
Figure 1-1 Ad Hoc Wireless LAN



Wireless Infrastructure with Workstations Accessing a Wired LAN

A microcellular network can be created by placing two or more access points on a LAN. [Figure 1-2](#) shows a microcellular network with workstations accessing a wired LAN through several access points. This configuration is useful with portable or mobile stations because it allows them to be directly connected to the wired network even while moving from one microcell domain to another. This process is transparent, and the connection to the file server or host is maintained without disruption. The mobile station stays connected to an access point as long as it can. However, once the transfer of data packets needs to be retried or beacons are missed, the station automatically searches for and associates to another access point. This process is referred to as *seamless roaming*.

Figure 1-2 *Wireless Infrastructure with Workstations Accessing a Wired LAN*



Introduction to the Client Utility

The client utility allows you to load new firmware, enable security features, configure your client adapter, and perform user-level diagnostics. The latest client utility software package for both the Mac OS 9.x and the Mac OS X operating systems is available from Cisco's web site.

**Note**

The latest Macintosh software package on CCO contains the driver and client utility for both the Mac OS 9.x and the Mac OS X operating systems.

To obtain the latest driver and client utility from the Cisco Web site, follow these 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** In the client adapters section, click on the link for the Macintosh operating system.
- Step 3** Click on the latest software file (*MACOSInstallv2x.sit*) that supports both Mac OS X (version 10.1.x) and Mac OS 9.x operating systems. The *2x* identifies the software package version number.
- Step 4** Read and accept the terms and conditions of the Software License Agreement.
- Step 5** Select the Cisco server from which you wish to download the file.
- Step 6** Save the file to your hard drive then exit the web browser.

For installation instructions, refer to [Chapter 3, "Installing the Driver, Client Utility, and Client Adapter."](#)

Client Utility Basics for Mac OS 9.x

The client utility on Mac OS 9.x supports several screens used for specific functions.

Opening the Client Utility for Mac OS 9.x

To open the client utility on a Mac OS 9.x operating system, follow the steps below:

- Step 1** Double-click the Macintosh hard disk icon on the desktop.
- Step 2** Double-click the **Cisco pcm3x0 Folder** icon. If you selected a location other than the default (the Cisco pcm3x0 Folder) during the installation process, select the folder in which the utility was installed.
- Step 3** Double-click the **pcm3x0PPC** icon. The computer searches for the client adapter. After the adapter is found, the Basic Properties screen appears.

Switching between Screens

The client utility allows more than one screen (or window) to be open at a time. The Windows menu (see [Figure 1-3](#)) displays a list of the open screens.

Figure 1-3 Windows Menu



The screen marked with a diamond indicates the active screen. You can change which screen is active by clicking on another screen in the Windows menu.



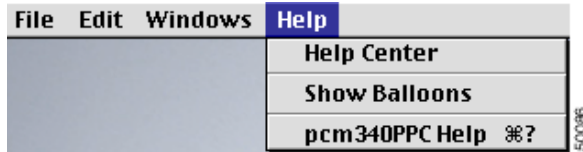
Note

The Basic Properties screen and the Edit Properties screen cannot be open at the same time.

Getting Help

To access information about the pcm3x0PPC client utility, select **pcm3x0PPC Help** from the Help pull-down menu (see [Figure 1-4](#)), or click **Help** on the bottom of the client utility screens.

Figure 1-4 Help Pull-Down Menu



The Cisco PCM3x0 Wireless LAN Adapter screen (see [Figure 1-5](#)) appears.

Figure 1-5 Cisco PCM3x0 Wireless LAN Adapter Screen



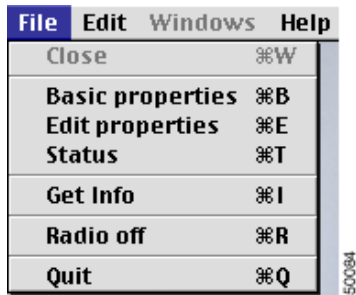
From the Cisco PCM3x0 Wireless LAN Adapter screen, you can access additional information.

- To search for a specific word or phrase, enter the word in the Search box at the top of the screen and click **Search**.
- To access information on a specific topic, click the desired topic in the middle of the screen.

Exiting the Client Utility

To exit the pcm3x0PPC client utility, select **Quit** from the File pull-down menu (see [Figure 1-6](#)).

Figure 1-6 File Pull-Down Menu



Buttons on the Client Utility Screens

The buttons on the bottom of the client utility screens are used to perform specific functions. [Table 1-1](#) describes the most common buttons.

Table 1-1 Client Utility Buttons on Mac OS 9.x

Button	Description
Cancel	Exits the application without saving any changes
OK	Saves any changes and exits the application
Apply	Saves any changes but does not exit the application
Pause	Freezes the information on the Statistics screens and prevents it from being updated
Continue	Allows the information on the Statistics screens to be updated after the Pause button is selected
Clear Stats	Temporarily clears any values on the Statistics screens and resets them to 0
Start	Initiates a RF Link test
Stop	Stops an RF Link test that is running
Defaults	Sets the parameters for a screen to their default values
Help	Provides information on the screen and its parameters

Client Utility Basics for Mac OS X

The client utility on Mac OS X supports three main screens, the basic and advanced parameter screens and the troubleshooting screen.

Opening the Client Utility

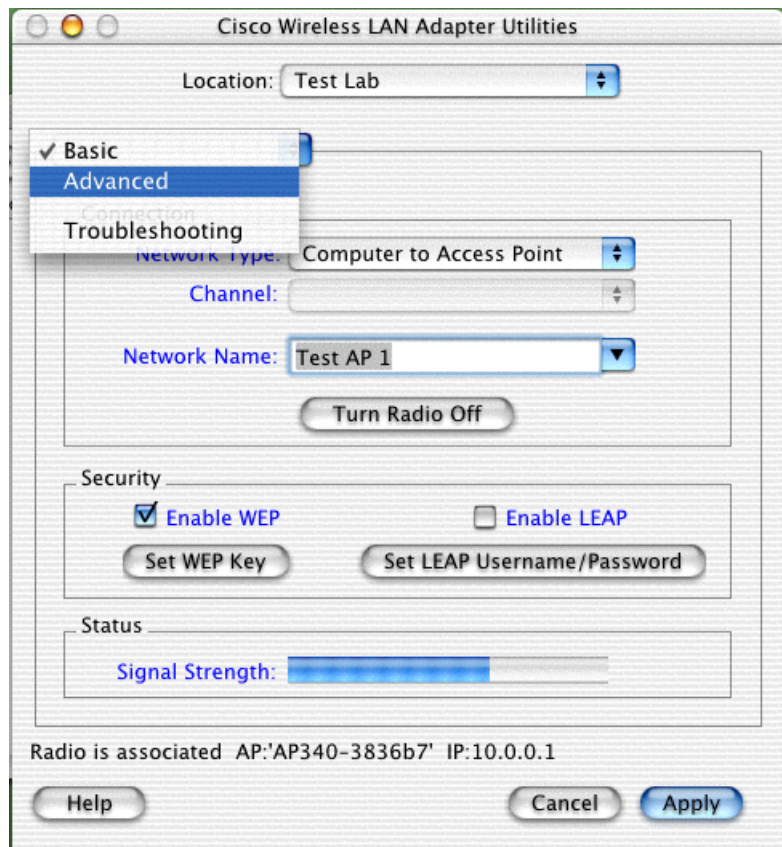
To open the client utility on a Mac OS X operating system, follow the steps below:

-
- Step 1** On the Finder menu bar, click **Go** and select **Applications** from the pull-down menu.
- Step 2** Double-click the **Aironet Client Utility** icon in the Applications folder. The computer searches for the radio on the client adapter. After the adapter and radio are found, the client utility basic properties screen appears.
-

Switching Between Screens

You can change the client utility's active screen by clicking the parameter option field's up or down arrows. [Figure 1-7](#) shows the screen pull-down parameter options.

Figure 1-7 Client Utility Screen Pull-Down Parameter Options



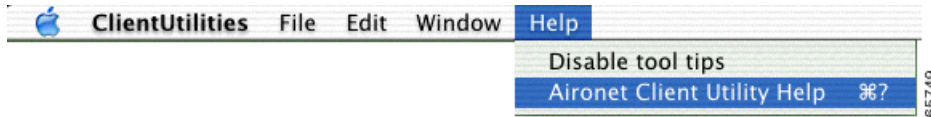
Note

You can click the highlighted blue text on the client utility screens to obtain additional descriptive information on the highlighted words. You can also click the Help button to obtain detailed information on the client utility parameters and fields.

Getting Help

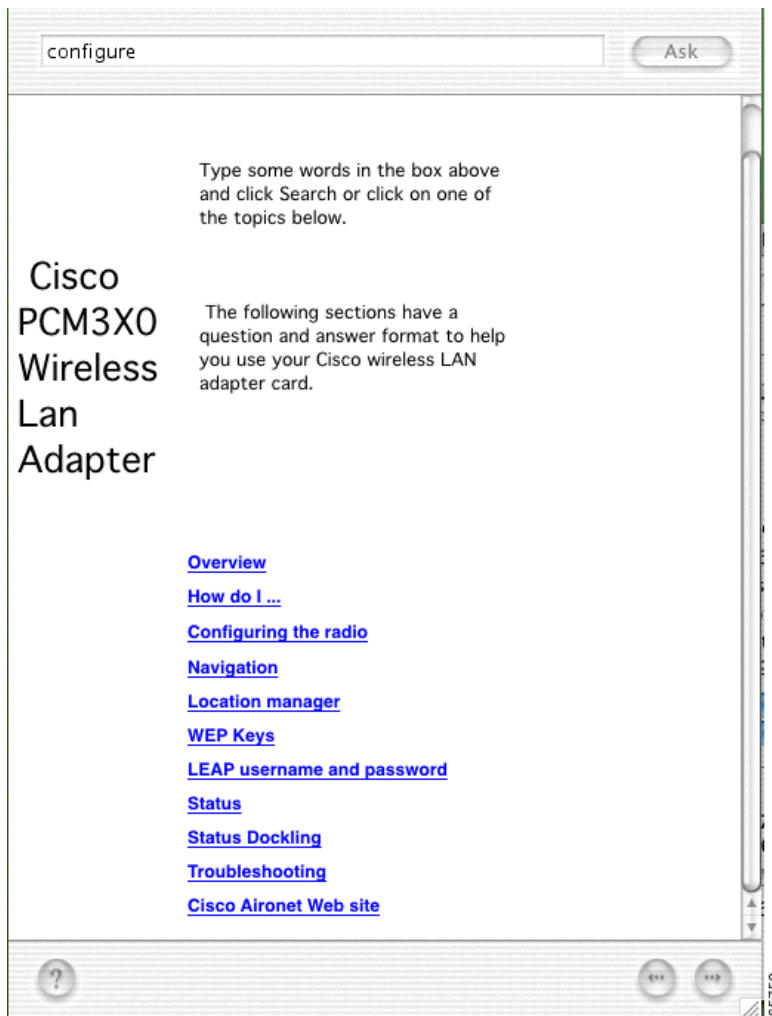
To access information about your client utility, click **Help** on the Client Utility main menu bar, then select **Aironet Client Utility Help** from the pull-down menu (see [Figure 1-8](#)) or click **Help** on the bottom of the client utility screens (see [Figure 1-7](#)).

Figure 1-8 Help Pull-Down Menu



The client utility help screen appears (see [Figure 1-9](#)).

Figure 1-9 Client Utility Help Screen



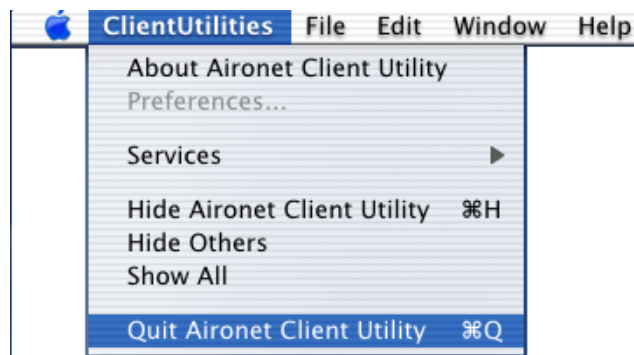
From the client utility help screen, you can access information on the client utility.

- To search for a specific word or phrase, enter the word or phrase in the Search box at the top of the screen and click **Ask**.
- To access information on an indicated topic, click the desired topic in the middle of the screen, such as Navigation or Status.

Exiting the Client Utility

To exit the client utility, click **Client Utilities** from the main menu bar and select **Quit Aironet Client Utility** (see [Figure 1-10](#)).

Figure 1-10 Client Utility Pull-Down Menu Screen



Buttons on the Client Utility Screens and Dialog Boxes

The buttons supported by the client utility are used to perform specific functions. [Table 1-2](#) describes the most common buttons.

Table 1-2 Client Utility Buttons for Mac OS X

Button	Description
Apply	Saves any changes but does not exit the application.
Cancel	Exits the application or screen without saving any changes. If changes have been made, a message appears asking if you want to save the changes.
Turn Radio Off	Turns the radio off or on.
Turn Radio On	
Set WEP Key	Sets the WEP keys.
Set LEAP Username/Password	Sets the LEAP username and password.
Help	Provides information on the screen and its parameters.



Preparing for Installation

This chapter provides information that you need to know before installing a client adapter.

The following topics are covered in this section:

- [Safety Information, page 2-2](#)
- [System Requirements, page 2-3](#)
- [Site Requirements, page 2-4](#)

Safety Information

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

FCC Safety Compliance Statement

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

Safety Guidelines

- Do not touch or move the antenna while the unit is transmitting or receiving.
- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise, the radio may be damaged.
- Use in specific environments:
 - The use of wireless devices in hazardous locations is limited to the constraints posed by the safety directors of such environments.
 - The use of wireless devices on airplanes is governed by the Federal Aviation Administration (FAA).
 - The use of wireless devices in hospitals is restricted to the limits set forth by each hospital.
- Antenna use:
 - In order to comply with FCC RF exposure limits, dipole antennas should be located at a minimum distance of 7.9 inches (20 cm) or more from the body of all persons.
 - High-gain, wall-mount, or mast-mount antennas are designed to be professionally installed. Please contact your professional installer, VAR, or antenna manufacturer for proper installation requirements.

Warnings

Observe the following warnings when operating the client adapter:



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.



In order to comply with RF exposure limits established in the ANSI C95.1 standards, it is recommended when using a laptop with a PC card client adapter that the adapter's integrated antenna is positioned more than 2 inches (5 cm) from your body or nearby persons during extended periods of transmitting or operating time. If the antenna is positioned less than 2 inches (5 cm) from the user, it is recommended that the user limit exposure time.

Translated versions of these safety warnings are provided in Appendix B.

System Requirements

As a minimum, your computer system must support the following:

- Macintosh computer with Mac OS 9.x or Mac OS X (version 10.1.x) operating system
 - Apple PowerMac G3 (Blue and White) or G4 computer
 - Apple PowerBook G3 Series 1998, G3 Series 1999, G3 (with firewire), or G4 computer

You also need the following to install and configure the client adapter:

- A Type II or Type III PC card slot or an empty PCI expansion slot



Note If you are using a PC card client adapter, all supporting software for the PC card slot must be loaded and configured.

- The following information from your system administrator:
 - The client name to use for your client adapter
 - The case-sensitive network name or service set identifier (SSID) for your wireless network
 - If you are not connected to a DHCP server, the IP address, subnet mask, and default gateway address for your Macintosh
 - The username and password for your network account
 - If you are using WEP security, the WEP keys for your wireless network
 - If you are using LEAP security, your LEAP username and password

**Note**

To install the client utility on the Mac OS X operating system, you must have administrator privileges.

Site Requirements

Because the client adapter is a radio device, it is susceptible to RF obstructions and common sources of interference that can reduce throughput and range. Follow these guidelines to ensure the best possible performance:

- Install the client adapter in an area where large steel structures such as shelving units, bookcases, and filing cabinets will not obstruct radio signals to and from the client adapter.
- Install the client adapter away from microwave ovens and 2.4 GHz cordless phones. These devices operate on the same frequency as the client adapter and can cause signal interference.

**Note**

Refer to the [Appendix E, “Positioning Wireless Devices,”](#) for additional guidelines on achieving optimum placement of your Macintosh workstation.



Installing the Driver, Client Utility, and Client Adapter

This chapter provides installation and configuration instructions for the driver, client utilities, and the client adapter.

The following topics are covered in this section:

- [System Requirements, page 3-2](#)
- [Obtaining the Driver and Client Utility Software, page 3-2](#)
- [Installing the Driver and Client Utility, page 3-2](#)
- [Inserting the Client Adapter into a Computing Device, page 3-8](#)
- [Configuring the Client Adapter, page 3-10](#)

System Requirements

The instructions in this section can be used only with the following:

- Cisco Aironet Wireless LAN Adapters
 - 340, 350, and 4800 series client adapters
 - PC Cards and PCI client adapters
- Apple Macintosh computers running the Mac OS 9.x or Mac OS X (version 10.1.x) operating system
 - Apple PowerBook G3 and G4 laptops using PC card client adapters
 - Apple PowerMac G3 desktops (Blue and White) using PCI client adapters
 - Apple PowerMAC G4 desktops using PCI client adapters

Obtaining the Driver and Client Utility Software

The following sections describe the steps you must follow to obtain the driver and client utility software from the Cisco web site.

Cisco Software Center

The Cisco Software Center contains the latest driver and client utility software. To obtain the software from the Cisco web site, follow these 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** In the client adapters section, click on the link for the Macintosh operating system.
 - Step 3** Click on the latest software file (*MACOSInstallv2x.sit*) that supports both Mac OS X and Mac OS 9.x operating systems. The *2x* identifies the software package version number.
 - Step 4** Read and accept the terms and conditions of the Software License Agreement.
 - Step 5** Download and save the file to a temporary directory on your hard drive and then exit your Internet browser.
 - Step 6** Double-click **MACOSInstallv2x.sit** to expand the file.
 - Step 7** Go to the [“Installing the Driver and Client Utility”](#) section.
-

Installing the Driver and Client Utility

This section describes the driver and client utility installation procedures for the Mac OS 9.x and the Mac OS X operating systems.

For Mac OS 9.x, you must install the driver and client utility before installing the client adapter into your PowerBook or PowerMac. Follow the instructions in this section.

For Mac OS X, you should install the client adapter into your PowerBook or PowerMac before installing the driver and client utility. Follow the instructions in the [“Inserting the Client Adapter into a Computing Device” section on page 3-8](#) to insert the client adapter into your PowerBook or PowerMac.

Follow the steps below to install the driver and client utility:

Step 1 Open the folder on your hard driver where you expanded the driver and utility (*.sit) file.

Step 2 Double-click **Cisco WLAN Install** to activate the installer.



Note You should keep the Cisco WLAN Install file. The file may be needed in the future to possibly uninstall your client utility and driver for a clean install.

Step 3 If you are using Mac OS X, when the Authenticate screen appears, enter your password in the Password field. Your Macintosh user name will appear in the Name field. Click **OK**.



Note To install the client utility on Mac OS X, you must have administrator privileges for the Macintosh.

Step 4 When the Cisco Aironet Wireless LAN Adapter Software screen appears, click **Continue**.

Step 5 Read the terms and conditions of the Software License Agreement and click **Accept** or **Decline**. If you decline the license agreement, the client utility installation ends.



Note You can print or save the software license agreement by clicking **Print** or **Save As**.

Step 6 Read the Read Me screen information and click **Continue**.



Note You can print or save the read-me information by clicking **Print** or **Save As**.

The Cisco WLAN Installer detects your computer operating system and displays the appropriate installation screen (see [Figure 3-1](#) for Mac OS 9.x or [Figure 3-2](#) for Mac OS X).

Figure 3-1 Mac OS 9.x Install Screen

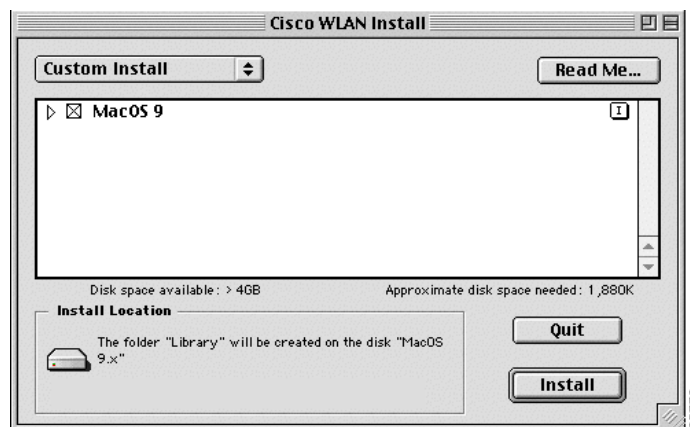
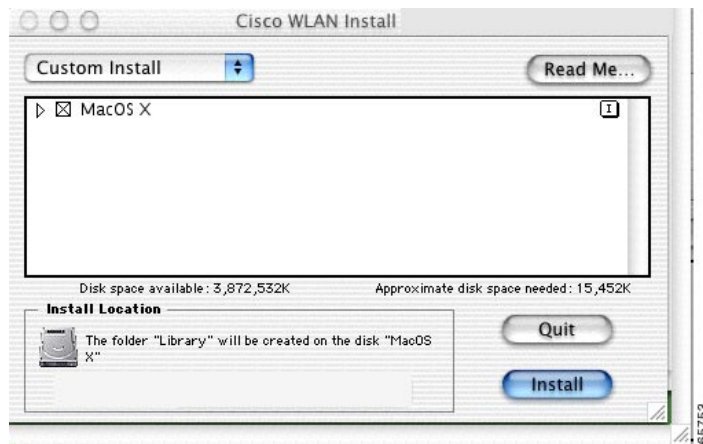


Figure 3-2 Mac OS X Install Screen



- Step 7** When the Cisco WLAN Install screen appears, perform the following operations:
- Expand the Mac OS software component list by clicking the right triangle on the left of the Mac OS name.



Note Both the PCI and PC Card drivers are normally installed by the installer. You can deselect one of the drivers by clicking the selection box to remove the X; for example: you can deselect the PCI driver when using a PowerBook or you can deselect the PC Card driver when using a PowerMac.

- Click **Install** to begin the installation process.

- Step 8** Click **Continue** when a screen appears indicating your computer must restart after installing the software.



Note You can click **Cancel** to terminate the install process.

- Step 9** A message appears indicating “One moment please...” then a screen appears that shows the installation progress. After the files are copied to the Macintosh hard disk, a window appears indicating that the installation was successful. Perform one of the following steps:

- Click **Restart** to restart your computer and finish the client utility installation.
- Click **Continue** if you need to perform additional installations.
- Click **Quit** to leave the installer program and return to your computer desktop screen. You must manually restart your computer at a later time to finish the client utility installation and to manually configure the client adapter using the client utility.

The client utility, the help files, and the drivers have been installed by the installer program.



Note When your Mac OS 9.x computer restarts, a pop-up message appears and indicates that you must use the client utility to set your LEAP username and password.

For Mac OS 9.x, follow the instructions in the [“Inserting the Client Adapter into a Computing Device” section on page 3-8](#) to insert the client adapter into your PowerBook or PowerMac

For Mac OS X, follow the instructions in the [Initial Configuration Settings for Mac OS X](#) section.

Initial Configuration Settings for Mac OS X

When your Macintosh completes the power-up process following a successful install, the client adapter setup assistant activates. The setup assistant guides you through the initial configuration options of your client adapter or it allows you to manually select the screens by clicking the configuration tabs. Each screen contain descriptive information to assist you in configuring your client adapter.

**Note**

You can click underlined words or blue colored words on the setup assistant screens to obtain additional descriptive information. You can also click the Back button to return to a previous screen.

Follow the steps below to complete the initial configuration settings for your wireless system:

Step 1 If the Introduction screen is not visible, click the **Introduction** tab. Read the screen information and click **Start** to continue to the Client Name screen.

**Note**

Click the Done button (on any screen) to exit the setup assistant and to manually configure your client adapter using the client utility.

Step 2 Read the Client Name screen information and enter the client name (case-sensitive) for your client adapter. Click **Next** to continue to the Network Name screen.

Step 3 Read the Network Name screen information and enter the Network Name or SSID (case-sensitive) for your wireless network. Click **Next** to continue to the Network Type screen.

Step 4 Read the Network Type screen information. Click the up and down arrows next to the Network Type field and perform one of the following operations:

- If your computer connects to an access point, select **Computer to Access Point** in the dialog box. Click **Next** to continue to the Power screen.
- If your computer connects to another computer in a peer-to-peer (ad hoc) network, select **Computer to Computer** in the dialog box. Click the up and down arrows next to the Channel field and select the operating frequency channel for the computers on your network. Click **Next** to continue to the Power screen.

Step 5 On the Power screen, read the power mode information, click the up and down arrows next to the Power Mode field and select one of the following modes in the dialog box:

- a. Constant Awake Mode—provides the least power savings because your client adapter is always powered on. This is the typical setting for desktop systems with AC power.
- b. Power Save Mode—provides some power savings because your client adapter is occasionally turned off. This setting is typically used for battery powered systems that need quicker response and have sufficient battery capacity to support higher usage.
- c. Maximum Power Save Mode—provides the greatest power savings because your client adapter is only occasionally turned on to receive and send data. This setting is typically used for battery powered systems that have limited battery capacity and can tolerate delayed transmissions.

Step 6 On the Power screen, read the screen information, click the Transmit Power up and down arrows, and select the desired client adapter transmit power level. To help minimize cell overlaps, you should strive to use the lowest power setting that supports full coverage of your wireless cell. Click **Next** to continue to the Security screen.

Step 7 Read the Security screen information on wireless network security options. If your wireless network uses these security options, click the **Enable WEP** or **Enable LEAP** check boxes.



Note For computer-to-access point configurations, you must check with your corporate or enterprise network administrator for the appropriate security settings. For computer-to-computer configurations, you must only determine if WEP is used by the other computers because WEP is not available.

Step 8 When you have completed all setup assistant screens, click **Done**.

Step 9 When the summary screen appears, review your selected configuration options and perform one of the following steps:

- a. If the configuration options are correct, click **OK** and go to Step 10.
- b. If the configuration options are not correct, click **Cancel** and go to Step 1.
- c. Click **Quit** to exit the setup assistant and to manually configure your client adapter using the client utility.

Step 10 When a drop-down screen appears stating that your settings have been saved, read the information and perform one of the following steps:



- a. If you previously selected the Enable WEP option, click the Hexadecimal or ASCII check box and enter your WEP key in the entry box. Click **OK**.
- b. If you previously selected the Enable LEAP option, enter your LEAP username and password in the entry boxes. Click **OK**.

A screen drops down to indicate your client adapter is being configured and trying to associate to an access point. When the test process completes, one of four screens will appear:

- Congratulations
- Almost There
- Troubleshoot screen
- Done

The screens provide the following status information:

- Saving of configuration settings—indicates whether your settings have been successfully saved in the preferences file.
- Detection of client adapter radio—indicates whether your client adapter radio was detected.
- Access point association—indicates if your client adapter is associated to an access point.
- Data transfer progress—indicates whether your client adapter was able to successfully send data to an access point.

- Step 11** If the Congratulations screen appears, your client adapter has successfully associated and sent data to an access point. Perform one of the following operations:
- Click **Network Settings** to configure your Macintosh network parameters. Go to Step 15.
 - Click **Quit** to configure your Macintosh network parameters at a later time. When you are ready to complete the configuration of your client adapter go to the [“Configuring the Client Adapter” section on page 3-10](#).
- Step 12** If the Almost There screen appears, this indicates your client adapter is associated to an access point but is unable to pass data through the access point. Perform one of the following operations:
- Click **Finish** to exit the setup assistant and use the client utility to help resolve the problem. See [“Troubleshooting” section on page 9-1](#).
 - Click **Return to Setup Assistant** to revise your settings using the setup assistant. Return to Step 3.
- Step 13** If the Troubleshoot screen appears, this indicates your client adapter is unable to associate to an access point. The screen status information identifies the problem area. Perform one of the following operations:
- If you want to manually troubleshoot the problem or use the client utility to change your configuration settings, click **Finish**. See [“Troubleshooting” section on page 9-1](#).
-  **Note** Installation problems are typically caused by mismatched parameter settings between the client adapter and the access point. Check your settings for the Network Name (or SSID), Network Type, your WEP settings, and your LEAP settings.
- Click **Return to Setup Assistant** to revise your settings using the setup assistant. Return to Step 3.
- Step 14** If the Done screen appears, read the screen information and click **OK**. This message appears when your client adapter is not installed in your Macintosh. Your configuration parameters are saved in your preference file on the hard disk but your Mac OS X Network settings and your client adapter are not configured. Perform the following operations:
- Refer to the [“Inserting the Client Adapter into a Computing Device” section on page 3-8](#) for instructions on inserting your client adapter into your computer.
-  **Note** If you are using LEAP, a wireless network login screen appears when you restart your computer. Enter your LEAP username and password. Click **OK**.
- Refer to the [“Setting TCP/IP Options” section on page 3-12](#) for instructions on configuring your Mac OS X Network settings.
 - Go to [“Verifying a Successful Installation and Configuration on Mac OS X” section on page 3-13](#).
- Step 15** When the Network screen appears, verify that the Location dialog box contains *Automatic* or click the Location up or down arrows and select **Automatic**.
- Step 16** Click the Show up or down arrows and select **Ethernet Adaptor (enx)** or **PCI Ethernet Slot x** (where x is a number that indicates a specific adapter or slot).
- Step 17** Click the **TCP/IP** tab. The TCP/IP window appears.

Step 18 Perform one of the following operations:

- If you are connected to a DHCP server, select **Using DHCP** in the Configure drop-down box and type your computer's unique client name in the DHCP Client ID field. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you need to specify a fixed IP address when using your DHCP server, select **Using DHCP with fixed IP Address** in the Configure drop-down box and enter the client adapter IP address. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you are connected to a BootP server, select **Using BootP** in the Configure drop-down box. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you are not connected to a DHCP or BootP server, select **Manually** in the Configure drop-down box and enter the client adapter IP address, the subnet mask, and the router IP address. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).

Step 19 Click **Apply Now** to apply your TCP/IP configuration options.

Step 20 Click **System Prefs** on the main menu bar and click **Quit System Prefs**.



Note

To uninstall the client utilities, follow the instructions in the [“Removing the Driver and Client Utility” section on page 8-4](#).

You have completed the basic configuration of your client adapter. To verify a successful installation, refer to the [“Verifying a Successful Installation and Configuration on Mac OS X” section on page 3-13](#).

Inserting the Client Adapter into a Computing Device

This section provides instructions for inserting a PC card or a PCI client adapter into an Apple Macintosh computing device.

Inserting a PC Card

Step 1 Before you begin, examine the PC card. One end has a dual-row, 68-pin PC card connector. The card is keyed so it can be inserted only one way into the PC card slot.



Note

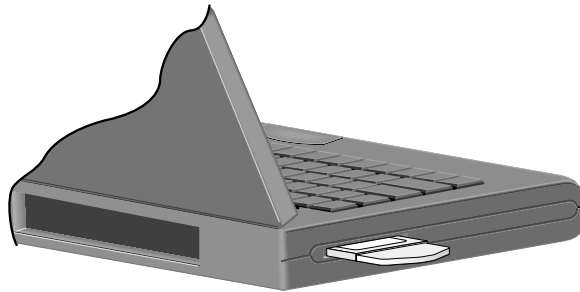
The PC card slot is on the left side of the computer, depending on the model.

- Step 2** Hold the PC card with the Cisco logo facing up and insert it into the PC card slot, applying just enough pressure to make sure it is fully seated (see [Figure 3-3](#)).

**Caution**

Do not force the PC card into your computer's PC card slot. Forcing it will damage both the card and the slot. If the PC card does not insert easily, remove the card and reinsert it.

Figure 3-3 Inserting a PC Card into a Computing Device

**Note**

You can remove and reinsert your PC card when necessary. Refer to the [“Removing a PC Card” section on page 8-6](#) for instructions.

- Step 3** Perform one of the following operations:
- If you are using the Mac OS 9.x operating system, go to the [“Configuring the Client Adapter” section on page 3-10](#).
 - If you are using the Mac OS X operating system, go to the [“Obtaining the Driver and Client Utility Software” section on page 3-2](#).

Inserting a PCI Client Adapter

**Caution**

Static electricity can damage your computer and your client adapter. Before opening your computer or removing the adapter from the anti-static packaging, discharge static by touching the metal PCI port covers of your grounded computer (connected to a grounded power connector).

- Step 1** Turn off the computer and all its components.

**Note**

Refer to your Macintosh computer manual for instructions on opening or removing your computer cover and on locating the PCI expansion slots.

- Step 2** Remove or open the computer cover.
- Step 3** Locate an empty PCI expansion slot in your computer.

- Step 4** Examine the client adapter and ensure the antenna is not attached to the card. The antenna connector and the LEDs face out of your computer and are visible when you put the cover back on. The bottom edge of the adapter is the connector you will insert into the PCI expansion slot.
- Step 5** Tilt the adapter to allow the antenna connector and LEDs to slip through the opening in the computer back panel.
- Step 6** Press the client adapter into the empty PCI expansion slot until the adapter is firmly seated.

**Caution**

Do not force or rock the adapter into the expansion slot as this could damage the adapter and the slot. If the adapter does not insert easily, remove the adapter and reinsert it.

- Step 7** Replace the computer cover.
- Step 8** Attach the 2-dBi antenna to the adapter's antenna connector until it is finger-tight. Do *not* overtighten.
- Step 9** For optimal reception, position the antenna so it is straight up.
- Step 10** Boot up your computer.
- Step 11** Perform one of the following operations:
- a. If you are using the Mac OS 9.x operating system, go to the [“Basic Configuration on Mac OS 9.x” section on page 3-10](#).
 - b. If you are using the Mac OS X operating system, go to the [“Obtaining the Driver and Client Utility Software” section on page 3-2](#).

**Note**

Instructions are provided in the [“Removing a PCI Client Adapter” section on page 8-7](#) in case you ever need to remove your PCI client adapter.

Configuring the Client Adapter

This section describes the client adapter's configuration process for Mac OS 9.x and Mac OS X operating systems.

Basic Configuration on Mac OS 9.x

- Step 1** Click the apple-shaped icon in the top left corner of the desktop.
- Step 2** Select **Control Panels > AppleTalk**. The AppleTalk window appears.
- Step 3** Make sure the name of the correct wireless LAN adapter appears in the Connect via dialog box. If it does not, click the up or down arrow on the right side of the Connect via dialog box and select the correct adapter.
- Step 4** Close the AppleTalk window.
- Step 5** If a window appears asking if you want to save changes to the current configuration, click the **Save** button.
- Step 6** Click the apple-shaped icon in the top left corner of the desktop.

- Step 7** Select **Control Panels > TCP/IP**. The TCP/IP window appears.
- Step 8** Select **Cisco Wireless LAN Adapter** in the Connect via drop-down box.
- Step 9** Perform one of the following:
- If you are connected to a DHCP server, select **Using DHCP Server** in the Configure drop-down box and type your computer's unique client name in the DHCP Client ID field.
 - If you are not connected to a DHCP server, select **Manually** in the Configure drop-down box and enter the client adapter IP address, the subnet mask, and the router IP address. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- Step 10** Close the TCP/IP window.
- Step 11** If a window appears asking if you want to save changes to the current configuration, click the **Save** button.
- Step 12** Double-click the Macintosh hard disk icon on the desktop. The Macintosh hard disk window appears.
- Step 13** Locate and double-click the **Cisco pcm3x0 Folder** icon. The Cisco pcm3x0 Folder window appears.
- Step 14** Double-click the **pcm3x0PPC** icon. The Cisco pcm3x0 window appears, and the computer searches for the client adapter. After the adapter is found, the Cisco pcm3x0 - Basic Properties window appears.
- Step 15** Under Radio, make sure that radio status is on. If it is off, click the **Turn radio on** button.
- Step 16** Perform one of the following:
- If your computer connects to an access point or to the Cisco Aironet 340 Series Base Station, select **Computer to base station** in the Network subwindow.
 - If your computer connects to another computer in a peer-to-peer (ad hoc) network, select **Computer to computer** in the Network subwindow.
- Step 17** Type your RF network's (case-sensitive) SSID in the SSID dialog box.
- Step 18** Click **OK**.

The basic configuration of the driver and client utility is complete. If security is not used in your wireless network, your client adapter should now be able to associate to a local access point, base station, or another computer. You can check the association of your client adapter on the bottom of the Cisco Wireless LAN Adapter Utilities screen. If associated, you should also see the MAC address and IP address of the associated device.



Note If security is needed, refer to the [“Security Features” section on page 4-1](#).



Note If you ever need to uninstall the client utilities, follow the instructions in the [“Removing the Driver and Client Utility” section on page 8-4](#).

Basic Configuration on Mac OS X

During the installation process, the setup assistant is typically used to configure the client adapter and the Mac OS X network options. This section describes the process used to set and verify basic configuration options when the setup assistant is not used. If you have used the setup assistant, proceed to “[Verifying a Successful Installation and Configuration on Mac OS X](#)” section on page 3-13.

Setting TCP/IP Options

Step 1 Click the apple-shaped icon in the top left corner of your desktop.

Step 2 Click **System Preferences**. The System Preferences window appears.

Step 3 Click the **Network** icon. The Network window appears.



Note If a New Port Detected screen appears, click **OK** to activate the new port, such as Ethernet Adapter (en1) or PCI Ethernet Slot 1.

Step 4 Click the Show up or down arrows and select **Ethernet Adaptor (enx)** or **PCI Ethernet Slot x** (where x is a number that indicates a specific adapter or slot).

Step 5 Select the **TCP/IP** tab. The TCP/IP window appears.

Step 6 Perform one of the following:

- If you are connected to a DHCP server, select **Using DHCP** in the Configure drop-down box and type your computer’s unique client name in the DHCP Client ID field. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you need to specify a fixed IP address when using your DHCP server, select **Using DHCP with fixed IP Address** in the Configure drop-down box and enter the client adapter IP address. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you are connected to a BootP server, select **Using BootP** in the Configure drop-down box. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).
- If you are not connected to a DHCP or BootP server, select **Manually** in the Configure drop-down box and enter the client adapter IP address, the subnet mask, and the router IP address. If required by your wireless network, enter the IP addresses for the domain name servers (obtained from your system administrator).

Step 7 Click **Apply Now** to save the TCP/IP configuration options you have specified.

Step 8 Click **System Prefs** on the main menu bar and click **Quit System Prefs**.

Setting Basic Wireless LAN options

Step 1 Click **Go** on the main Finder menu bar and select **Applications** from the drop down menu.

Step 2 Double click **Aironet Client Utility** on the Applications screen.

- Step 3** Click the Network Type up or down arrows and select one of the following options:
- If your computer connects to an access point or to the Cisco Aironet 340 Series Base Station, select **Computer to Access Point**.
 - If your computer connects to another computer in a peer-to-peer (ad hoc) network, select **Computer to Computer**.
- Step 4** If you selected Computer to Computer, click the Channels up or down arrows and select the desired frequency channel from the drop-down list.
- Step 5** Type your network's (case-sensitive) name (or SSID) in the Network Name dialog box.
- Step 6** Click **Turn Radio On** if the button is visible.
- If security is needed, refer to the [“Security Features” section on page 4-1](#).
- To verify a successful install, refer to the [“Verifying a Successful Installation and Configuration on Mac OS X” section on page 3-13](#).



Note If you ever need to uninstall the client utilities, follow the instructions in the [“Removing the Driver and Client Utility” section on page 8-4](#).

Verifying a Successful Installation and Configuration on Mac OS 9.x

The installation and configuration of your client adapter is successful when your client card is associated and authenticated to an access point. To verify a successful configuration, perform the following steps:

- Step 1** Double-click the pcm3x0PPC icon in the cisco pcm3x0 folder to open the client utility.
- If the Aironet Client Utility icon is not in the pcm3x0 folder or the client utility screen does not appear, verify that your Macintosh is running Mac OS 9.x and reinstall the client utility and driver again. If you continue to have problems refer to the [“Obtaining Technical Assistance” section on page xiv](#).
- Step 2** When the client utility screen appears, check the status line on the bottom of the screen. The status line should indicate that the radio is associated to an access point, the access point name, and the IP address. The status line should be similar to: *Radio is associated AP: 'AP340-3836b7' IP: 10.0.0.1*.

Verifying a Successful Installation and Configuration on Mac OS X

The installation and configuration of your client adapter is successful when your client card is associated and authenticated to an access point. To verify a successful configuration, perform the following steps:

- Step 1** On the Finder main menu bar, click **Go** and select **Applications**.
- Step 2** Double-click **Aironet Client Utility** on the Applications screen.
- If the Aironet Client Utility icon is not on the Applications screen or the client utility screen does not appear, verify that your Macintosh is running Mac OS X and reinstall the client utility and driver. If you continue to have problems refer to the [“Obtaining Technical Assistance” section on page xiv](#).

Step 3 When the client utility screen appears, check the status line on the bottom of the screen. The status line should indicate that the radio is associated to an access point, the access point name, and the IP address. The status line should be similar to: *Radio is associated AP: 'AP340-3836b7' IP: 10.0.0.1.*

If the client utility screen appears but your client card is not associated, verify your settings match with the access point. If you are unable to determine your problem, refer to the [“Troubleshooting” section on page 9-1.](#)



Security Features

This chapter describes the security features of your client adapter and provides instructions for enabling security.

The following topics are covered in this section:

- [Overview of Security Features, page 4-2](#)
- [Security Options for Mac OS 9.x, page 4-5](#)
- [Security Options for Mac OS X, page 4-13](#)

Overview of Security Features

When you use your client adapter with the Mac OS operating system, you can protect your data as it is transmitted through your wireless network by encrypting it through the use of Wired Equivalent Privacy (WEP) encryption keys. With WEP encryption, the transmitting device encrypts each packet with a WEP key, and the receiving device uses that same key to decrypt each packet.

The WEP keys used to encrypt and decrypt transmitted data can be statically associated with your adapter or dynamically created as part of the LEAP authentication process. The information in the sections below can help you to decide which type of WEP keys you want to use. Dynamic WEP keys with LEAP offer a higher degree of security than static WEP keys.

WEP keys, whether static or dynamic, are either 40 or 128 bits in length. The 128-bit WEP keys contain more characters than the 40-bit keys and, therefore, offer a greater level of security.

Message integrity check (MIC) is a security protection feature supported by your client adapter in conjunction with an access point (see the [“MIC” section on page 4-4](#)).

Static WEP Keys

Each device (or profile) within your wireless network can be assigned up to four static WEP keys. If a device receives a packet that is not encrypted with the appropriate key (as the WEP keys must match in all devices that are to communicate with each other), the device discards the packet.

For the Mac OS X, the Static WEP keys are write-only and stored in an encrypted format (for security reasons) in your Macintosh; therefore, you cannot read them back. When the driver loads and reads the client adapter's parameters, it also finds the static WEP keys, decrypts them, and stores them in volatile memory on the client adapter. The WEP keys in the client adapter are temporary and they are lost when power to the adapter is removed or the Macintosh is rebooted. Although the keys in the client adapter are temporary, you do not need to re-enter them when you restore power or reboot because the keys are stored in your Macintosh.

For the Mac OS 9.x, the Static WEP keys can be permanently or temporarily stored in your client adapter. If the keys are temporarily stored in volatile memory, the keys will be lost when power is removed from your client adapter.

The client utility allows you to enable or disable static WEP and to add or change keys.

Dynamic WEP Keys with EAP

The new standard for wireless LAN security, as defined by the Institute of Electrical and Electronics Engineers (IEEE), is called *802.1X for 802.11*, or simply *802.1X*. An access point that supports 802.1X and its protocol, Extensible Authentication Protocol (EAP), acts as the interface between a wireless client and an authentication server, such as a Remote Authentication Dial-In User Service (RADIUS) server, to which the access point communicates over the wired network.

The use of an 802.1X authentication type, which is supported by the client and the authentication server, causes the following to occur:

- After associating to the access point, the client does not gain access to the network until mutual authentication between the client and the authentication server is successful.
- The client and authentication server derive the same dynamic WEP key.
- The authentication server sends the dynamic WEP key to the access point.
- For the length of a session, or time period, the access point and the client use the dynamic WEP key to encrypt and decrypt all unicast packets that travel between the access point and the client.

A Cisco Aironet client adapter running on the Mac OS operating system supports the following 802.1X authentication type:

- EAP-Cisco Wireless (or LEAP)

EAP-Cisco Wireless or LEAP

Support for EAP-Cisco Wireless or LEAP is provided in a Cisco Aironet client adapter's firmware and the Cisco software that supports it. The RADIUS servers that support LEAP include Cisco Secure ACS version 2.6 and above and Cisco Access Registrar version 1.7 and above.

LEAP is enabled or disabled using the client utility. When LEAP is enabled, the client adapter uses your LEAP username and password to perform mutual authentication with the RADIUS server through the access point. The username and password are stored in the client adapter's volatile memory; therefore, they are temporary and need to be re-entered whenever the radio is turned off, the client adapter is removed, or the Macintosh is powered down.

**Note**

In Mac OS 9.x, when your computer is rebooted, a pop-up message appears to inform you that you must use the client utility to enter your LEAP username and password.

**Note**

In Mac OS X, when your computer is rebooted, the Wireless Network Login screen appears and prompts you to enter your LEAP username and password.

When you enable Network-EAP on your access point and LEAP on your client adapter, authentication to the network occurs in the following sequence:

- a. The client adapter associates to an access point and begins the authentication process.



Note The client adapter does not gain access to the network until the mutual authentication with the authentication server is successful.

- b. Communicating through the access point, the client adapter and the authentication server complete a mutual authentication process, with the password being the shared secret for authentication. The password is never transmitted during the process.
- c. If mutual authentication is successful, the client adapter and the authentication server derive a dynamic, session-based WEP key that is unique.
- d. The authentication server transmits the key to the access point using a secure channel on the wired LAN.
- e. For the length of a session, or a time period, the access point and the client adapter use this key to encrypt or decrypt all unicast packets that travel between them.



Note Refer to the IEEE 802.11 Standard for more information on 802.1X authentication and to the following URL for additional information on RADIUS servers:
http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/12cgcr/secur_c/scprt2/scrad.htm

MIC

Your client adapter, in conjunction with a Cisco Aironet Access Point, supports message integrity check (MIC) to protect against bit-flip attacks on encrypted packets. During a bit-flip attack, an intruder intercepts an encrypted message, alters it slightly, and retransmits it, and the receiver accepts the retransmitted message as legitimate. Client adapters using driver version 1.0.3 and firmware version 4.25.2x or greater support MIC; however, MIC can be used only if it is enabled on the access point.



Note If the access point is using MIC, your client adapter's driver and firmware must support MIC; otherwise, the client cannot associate. MIC operation on your client adapter is automatic when the feature is enabled on the access point.

Security Options for Mac OS 9.x

Configuring WEP Keys

The client utility allows you to create a new WEP key or use an existing key.



Note

Entering a WEP key does not enable WEP.

Entering a New WEP Key

Follow the instructions below to enter a new WEP key for your client adapter. If you wish to select an existing WEP key, go to the [“Selecting an Existing WEP Key” section on page 4-8](#).

- Step 1** Select **WEP Keys** from the Edit pull-down menu (see [Figure 4-1](#)).

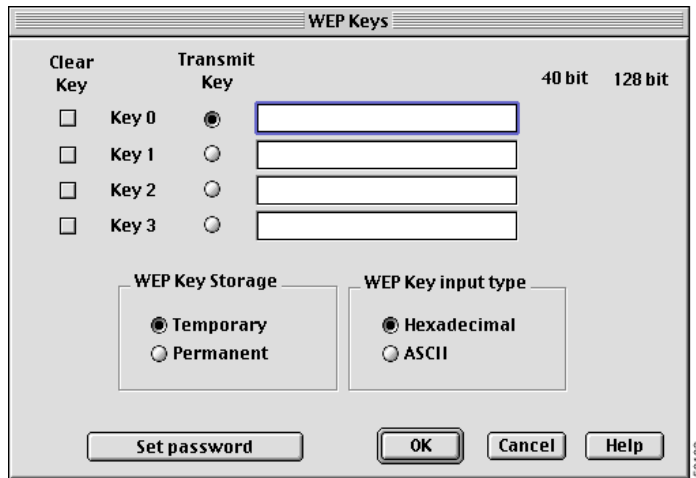
Figure 4-1 Edit Pull-Down Menu

File	Edit	Windows	Help
	Undo Typing		⌘Z
	Cut		⌘X
	Copy		⌘C
	Paste		⌘V
	Clear		
	Select All		⌘A
	WEP Keys ...		⌘K
	LEAP user & password ...		⌘L
	Load firmware ...		⌘F

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The WEP Keys screen (see [Figure 4-2](#)) allows you to create up to four WEP keys.

Figure 4-2 WEP Keys Screen



- Step 2** Under WEP Key input type, select whether the WEP keys are entered in hexadecimal characters (0-9, A-F, and a-f) or ASCII text.
- Step 3** Decide on a WEP key and enter it in the blank field for the key you are creating. Follow the guidelines below to create a new WEP key:
- Your client adapter's WEP key must match the WEP key used by the access point or clients with which you are planning to communicate.
 - When setting more than one WEP key, the WEP keys must be assigned to the same WEP key numbers for all devices.
 - WEP keys can be comprised of ASCII text or hexadecimal characters, depending on the option you selected in Step 2.
 - WEP keys must contain the following number of characters:
 - 13 characters for 128-bit WEP keys using ASCII input
 - 26 characters for 128-bit WEP keys using hexadecimal input
 - 5 characters for 40-bit WEP keys using ASCII input
 - 10 characters for 40-bit WEP keys using hexadecimal input



Note Any key that is entered with more than 10 characters is padded by the client adapter to 26 characters to create a 128-bit key.



Note After you create a WEP key, you can delete it by selecting the Clear Key check box to the left of the key.

- Step 4** Click **Transmit Key** next to the key you just created to indicate that this is the key you want to use to transmit packets.

- Step 5** Click **Permanent** under WEP Key Storage to allow your client adapter to retain this WEP key even when power to the adapter is removed or the computer in which it is installed is rebooted.
- If you select **Temporary**, the WEP key is lost when power is removed from your client adapter or when the adapter is reset.
- Step 6** If you want the WEP Keys screen to be password protected, click the **Set Password** button. The Set Password screen (see [Figure 4-3](#)) appears.

Figure 4-3 Set Password Screen



Follow these steps to password protect the WEP keys:

- a. Enter a password in the Password field.



Note Passwords are case sensitive and must contain at least eight characters.

- b. Re-enter the password in the Verify Password field.
- c. Click **OK** to set the password protection.



Note The next time you attempt to enter the WEP Keys screen you will be prompted to enter the correct password. After you enter the screen, the password can be changed using the Change Password button. If you leave the fields blank in the Change Password screen, the password is cleared.

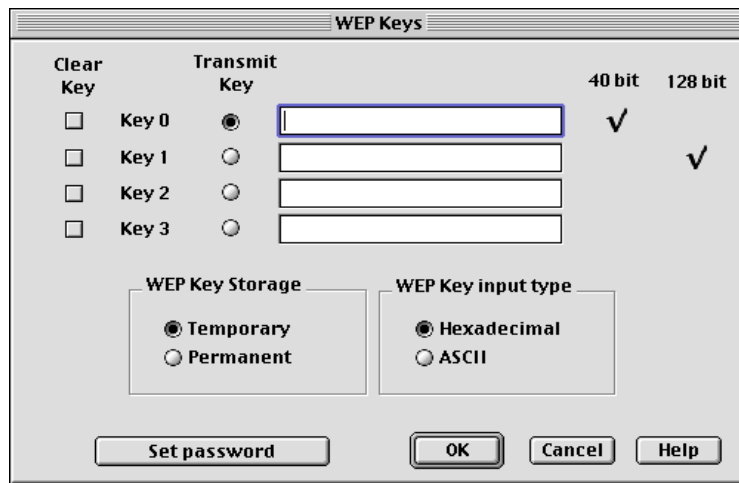
- Step 7** When you have completed the entry of the WEP keys, click **OK**
- To enable WEP, follow the instructions in the [“Enabling WEP”](#) section on page 4-9.

Selecting an Existing WEP Key

If you want an existing WEP key to be used with your client adapter, follow the instructions below.

- Step 1** Select **WEP Keys** from the Edit pull-down menu (see [Figure 4-1](#)).
- Step 2** Enter the correct password and click **OK**.
- Step 3** The WEP Keys screen appears (see [Figure 4-4](#)).

Figure 4-4 WEP Keys Screen



A checkmark appears in the 40-bit or 128-bit column for all existing WEP keys.



Note To protect WEP key security, the codes for existing WEP keys do not appear on the screen.

- Step 4** Click **Transmit Key** next to the key you want to use to transmit packets.
- Step 5** Click **OK**.

To enable WEP, follow the instructions in the [“Enabling WEP”](#) section on page 4-16.

Enabling WEP

The client utility provides several screens that allow you to enable WEP for an office network or a home network.

For an Office Network

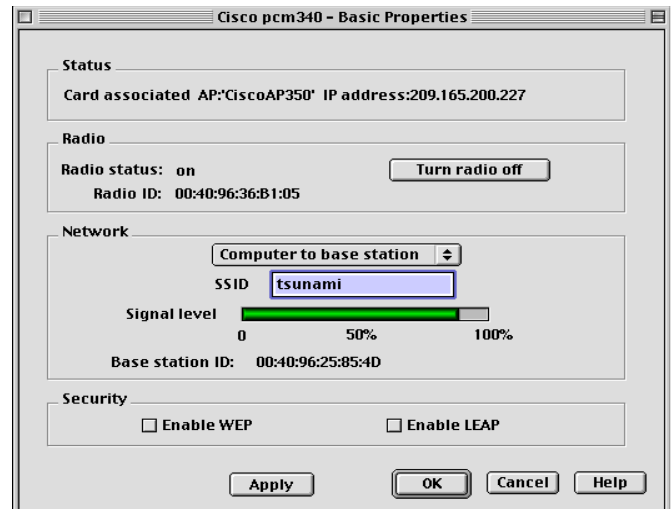
After you have created or selected a WEP key, follow the steps below to enable WEP.

- Step 1** Open one of the following screens:
- Basic Properties screen (see [Figure 4-6](#)) by selecting **Basic Properties** from the File pull-down menu (see [Figure 4-5](#)).

Figure 4-5 File Pull-Down Menu

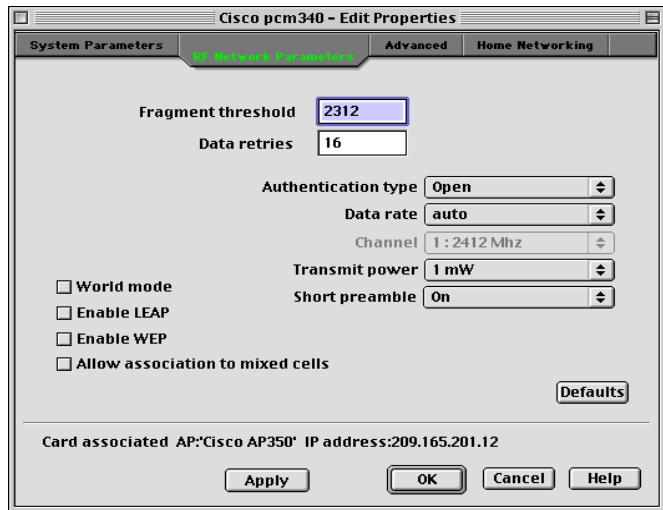


Figure 4-6 Basic Properties Screen



- b. RF Network Parameters screen (see [Figure 4-7](#)) by selecting **Edit Properties** from the File pull-down menu (see [Figure 4-5](#)) and click the **RF Network Parameters** tab.

Figure 4-7 RF Network Parameters Screen



- Step 2** Select the **Enable WEP** check box in the Basic Properties screen or RF Network Parameters screen.



Note You can disable WEP at any time by deselecting the Enable WEP check box.

- Step 3** Click **Apply**.

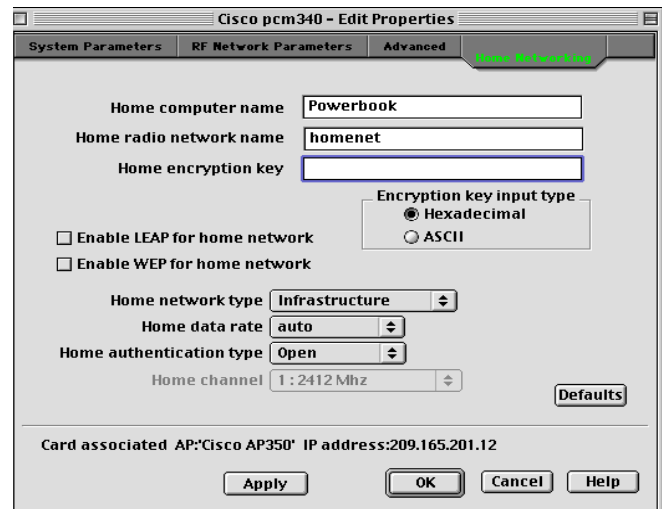
To enable LEAP, refer to the [“LEAP” section on page 4-12](#).

For a Home Network

After you have created or selected a WEP key, follow the steps below to enable WEP.

- Step 1** Open the Home Networking screen (see [Figure 4-8](#)) by selecting **Edit Properties** from the File pull-down menu (see [Figure 4-5](#)) and clicking the **Home Networking** tab.

Figure 4-8 Home Networking Screen



- Step 2** Select the **Enable WEP for Home Network** check box in the Home Networking screen.



Note You can disable WEP at any time by deselecting the Enable WEP for home network check box.

- Step 3** Click **Apply**.

To enable LEAP, refer to the “LEAP” section on page 4-12.

LEAP

Follow the instructions below to enable LEAP for your client adapter.

- Step 1** Select **LEAP User & Password** from the Edit pull-down menu (see [Figure 4-1 on page 4-5](#)). The Set LEAP Username and Password screen appears (see [Figure 4-9](#)).

Figure 4-9 Set LEAP Username and Password Screen



- Step 2** Enter your LEAP username in the Username field.



Note If you work in an environment with multiple domains and want your login domain to be passed to the RADIUS server along with your username, you must append the domain name to your username; for example: *domain\username*. Check with your network administrator.

- Step 3** Enter a LEAP password in the Password field.
- Step 4** Click **OK**.
- Step 5** Select the **Enable LEAP** check box on one of the following screens:

- For the office network use one of the following screens:
 - Basic Properties screen (see [Figure 4-6](#)).
 - RF Network Parameters screen (see [Figure 4-7](#)).
- For the home network use the Home Networking screen (see [Figure 4-8](#)).

After LEAP is enabled, your client adapter authenticates to the RADIUS server using your LEAP username and password and receives a session-based WEP key.



Note When you enable LEAP, the Enable WEP check box is automatically checked. This indicates that dynamic, session based WEP is active. You do not have to enter a static WEP key.



Note You can disable LEAP at any time by deselecting the Enable LEAP check box, but to enable LEAP again, you will have to reenter your LEAP username and password.

Verifying Installation

To verify that you have properly installed the appropriate driver and client utilities, perform one of the following:

- Double-click the **pcm3x0PPC** icon in the Cisco pcm3x0 folder to open the pcm3x0PPC client utility. If the installation was successful, the top of the Basic Properties screen indicates that your client adapter is associated to an access point and provides its IP address.



Note

If your installation was unsuccessful or you experienced problems during or after driver installation, refer to Chapter 8 for troubleshooting tips.

Security Options for Mac OS X

Configuring WEP Keys

The client utility allows you to enable or disable WEP and to create new WEP keys or use an existing key.



Note

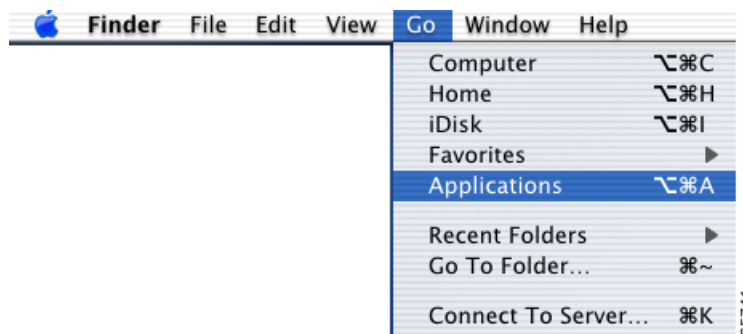
Entering a WEP key does not enable WEP.

Entering a New WEP Key

Follow the instructions below to enter a new WEP key for your client adapter. If you wish to select an existing WEP key, go to the [“Selecting an Existing WEP Key” section on page 4-15](#).

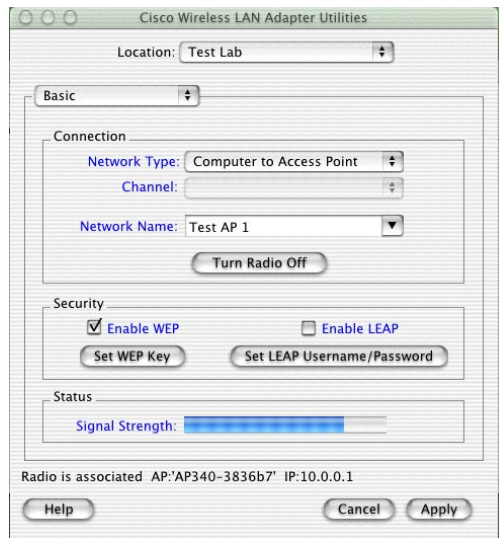
- Step 1** If the client utility is not active on your desktop perform the following steps:
- a. From the Finder menu bar on the top of the screen, select **Go** and click **Applications** (see [Figure 4-10](#)). The applications screen appears.

Figure 4-10 Finder Menu Bar



- b. Double-click the **Aironet Client Utility** icon. The client utility screen appears, and the computer searches for the client adapter radio. After the radio is found, the basic properties screen appears (see [Figure 4-11](#)).

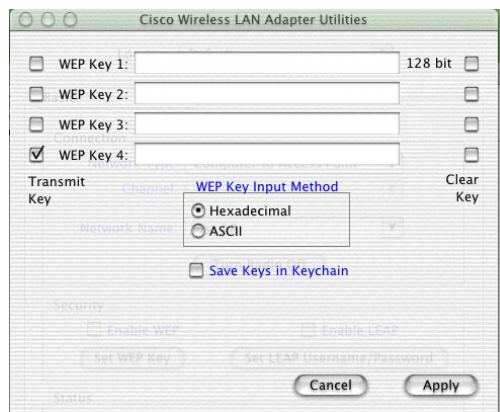
Figure 4-11 Client Utility Basic Properties Screen



- Step 2** On the Client Utility Basic Properties screen, click **Set WEP Key** (see [Figure 4-11](#)). The WEP key screen appears (see [Figure 4-12](#)).

The WEP key screen allows you to create up to four WEP keys.

Figure 4-12 WEP Key Screen



- Step 3** Under WEP Key Input Method, select whether the WEP keys are entered in hexadecimal characters (0-9, A-F, and a-f) or ASCII text.

- Step 4** Decide on a WEP key and enter it in the blank field for the key you are creating. Follow the guidelines below to create a new WEP key:
- Your client adapter's WEP key must match the WEP key used by the access point or clients with which you are planning to communicate.
 - When setting more than one WEP key, the WEP keys must be assigned to the same WEP key numbers (1 to 4) for all devices.
 - WEP keys can be comprised of ASCII text or hexadecimal characters, depending on the option you selected in Step 3.
 - WEP keys must contain the following number of characters
 - For 128-bit ASCII WEP keys, use 13 ASCII characters
 - For 128-bit hexadecimal WEP keys, use 26 hexadecimal characters
 - For 40-bit ASCII WEP keys, use 5 ASCII characters
 - For 40-bit hexadecimal WEP keys, use 10 hexadecimal characters



Note You must enter the number of characters shown above because the client utility does not fill the WEP key with zeros or nulls. The client utility also uses the number of characters entered to determine 40-bit or 128-bit WEP keys.

- Step 5** Click **Transmit Key** next to the key you want to use to transmit packets.



Note Only one WEP key can be selected as the Transmit Key.



Note You can delete an existing WEP key by selecting the Clear Key check box to the right of the key.

- Step 6** Click **Apply** when you have finished entering WEP keys.
To enable WEP, follow the instructions in the [“Enabling WEP”](#) section on page 4-16.
-

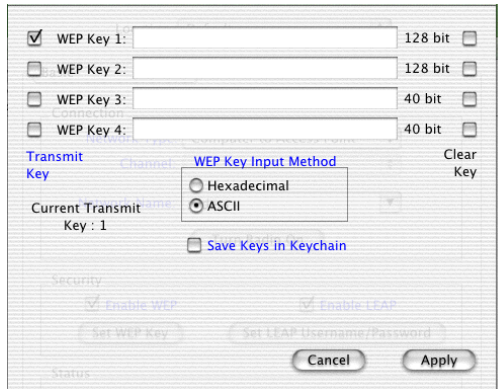
Selecting an Existing WEP Key

If you want an existing WEP key to be used with your client adapter, follow the instructions below.

- Step 1** If the client utility is not active on your desktop perform the following steps:
- a. From the Finder menu bar on the top of the screen, select **Go** and click **Applications** (see [Figure 4-10](#)). The Applications window appears.
 - b. Double-click the **Aironet Client Utility** icon. The client utility screen appears, and the computer searches for the client adapter radio. After the radio is found, the basic properties screen appears.

- Step 2** On the Client Utility Basic Properties screen, click **Set WEP Key** (see [Figure 4-11](#)). The WEP key screen appears (see [Figure 4-13](#)).

Figure 4-13 WEP Keys Screen



The WEP key size identifies all existing WEP keys; for example: 128 bit or 40 bit.



Note To protect WEP key security, the existing WEP keys do not appear on the screen.

- Step 3** Click **Transmit Key** next to the key you want to use to transmit packets.



Note You can delete a WEP key by selecting the Clear Key check box to the right of the key.

- Step 4** Click **Apply**.

Enabling WEP

The client utility allows you to enable or disable WEP.

- Step 1** If the client utility is not active on your desktop perform the following steps:
- From the Finder menu bar on the top of the screen, select **Go** and click **Applications** (see [Figure 4-10](#)). The Applications window appears.
 - Double-click the **Aironet Client Utility** icon. The client utility screen appears, and the computer searches for the client adapter radio. After the radio is found, the basic properties screen appears.

- Step 2** On the Client Utility Basic Properties screen (see [Figure 4-11](#)), you can enable WEP by clicking the **Enable WEP** check box.



Note You can disable WEP at any time by deselecting the Enable WEP check box.

- Step 3** Click **Apply**.

LEAP

The client utility allows you to enable or disable LEAP and to set your LEAP username and password.


Note

You must enter your LEAP username and password each time you power-up your Macintosh, reinsert your client adapter, or turn-on the radio.

Step 1

If the client utility is not active on your desktop perform the following steps:

- a. From the Finder menu bar on the top of the screen, select **Go** and click **Applications** (see [Figure 4-10](#)). The applications screen appears.
- b. Double-click the **Aironet Client Utility** icon. The client utility screen appears, and the computer searches for the client adapter radio. After the radio is found, the basic properties screen appears.

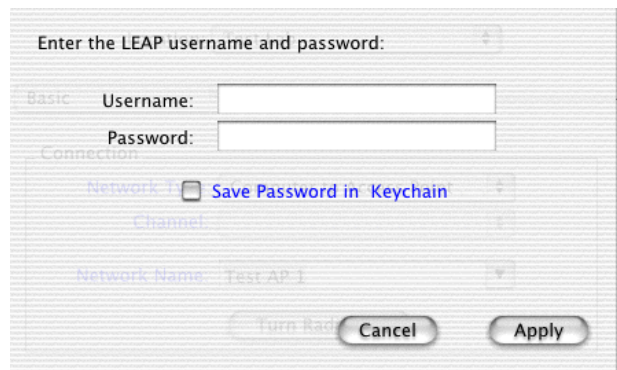
Step 2

On the Client Utility Basic Properties screen, you can enable LEAP by clicking the **Enable LEAP** check box (see [Figure 4-11](#)).

Step 3

On the Client Utility Basic Properties screen, click **Set LEAP Username/Password** and the LEAP username and password screen appears (see [Figure 4-14](#)).

Figure 4-14 LEAP Username and Password Screen


Step 4

Type your LEAP username in the **Username** field.


Note

If you work in an environment with multiple domains and want your login domain to be passed to the RADIUS server along with your username, you must append the domain name to your username; for example: domain\username.

Step 5

Type your LEAP password in the **Password** field.

Step 6

Click **Save Password in Keychain**, if you want to save your LEAP username and password in your Macintosh keychain. When saved, your LEAP password is stored (in an encrypted format) and will be automatically entered into the password field.

Step 7 Click **Apply** when you have finished entering your username and password.

After LEAP is enabled, your client adapter authenticates to the RADIUS server using your LEAP username and password and receives a session-based WEP key.

**Note**

When you enable LEAP, the Enable WEP check box is automatically checked. This indicates that dynamic, session based WEP is active. You do not have to enter a static WEP key.

**Note**

You can disable LEAP at any time by deselecting the Enable LEAP check box, but to enable LEAP again, you will have to reenter your LEAP username and password.

Verifying Installation

To verify that you have properly installed the driver and client utility, perform the following:

Step 1 From the Finder menu bar, click **Go** and select **Applications**. The applications screen appears.

Step 2 Double-click the **Aironet Client Utility** icon. The client utility screen appears.

If the installation was successful, the client utility successfully detects the client adapter radio and your client adapter associates to an access point and provides its IP address (check the bottom of the client utility basic properties screen).

**Note**

If your installation was unsuccessful or you experienced problems during or after driver installation, refer to [Chapter 9, “Troubleshooting.”](#)



Advanced Configuration on Mac OS 9.x

This chapter describes the advanced configuration options of the Cisco Aironet Wireless Client Utility running on the Mac OS 9.x operating system.

The following topics are covered in this chapter:

- [Using the Client Utility on Mac OS 9.x, page 5-2](#)
- [Getting Started, page 5-2](#)
- [Loading New Firmware, page 5-5](#)
- [Configuring Your Client Adapter, page 5-7](#)
- [Turning Your Client Adapter Radio On or Off, page 5-26](#)
- [Obtaining System Address and Software Version Information, page 5-27](#)

Using the Client Utility on Mac OS 9.x

This section explains how to use pcm3x0PPC, the Mac OS 9.x client utility, to load new firmware, and to configure your client adapter for use in a wireless enterprise or home network. You can set parameters that prepare the adapter for network use, govern how the adapter transmits or receives data, and controls the adapter's operation within an infrastructure or ad hoc network.

Getting Started

To open the pcm3x0PPC client utility, follow the steps below.

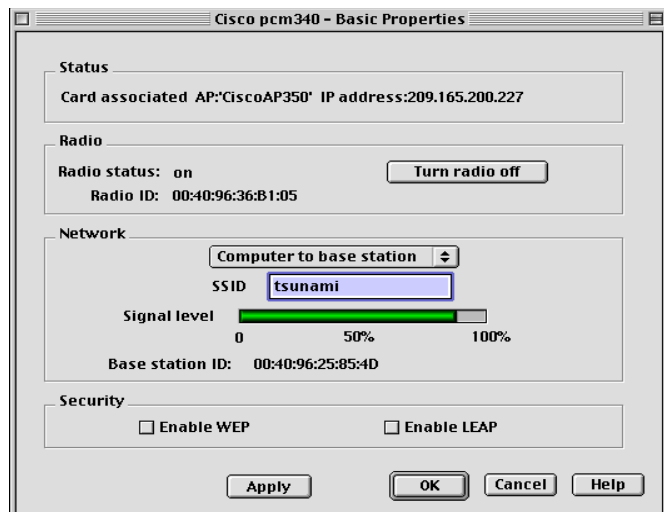
- Step 1** Double-click the Macintosh hard disk icon on the desktop.
- Step 2** Double-click the **Cisco pcm3x0** folder icon.



Note If you selected a location other than the default (the Cisco pcm3x0 Folder) during the installation process, select the folder in which you directed the utility to be installed.

- Step 3** Double-click the **pcm3x0PPC** icon. The computer searches for the client adapter. After the adapter is found, the Basic Properties screen appears (see [Figure 5-1](#)).

Figure 5-1 Basic Properties Screen



The Basic Properties screen provides useful information about your client adapter, enables you to set a few key configuration parameters initially, and serves as a quick configuration menu for later use. This screen reflects the information and parameters for either an office network or a home network, depending on which one is set in the System Parameters screen (see [Figure 5-6 on page 5-8](#)). Office network is the default value.

The Basic Properties screen displays the following information:

- **Status**—The operational mode of your client adapter. If your client adapter is associated to an access point, the name and IP address of the access point are also displayed, if this information is available.
 - Error retrieving status—Your client adapter experienced a communication error.
 - Card associated—Your client adapter is associated to an access point.
 - Card not associated—Your client adapter is ready and enabled but not associated to an access point.
 - Card not enabled—Your client adapter is ready but not enabled.
 - Card not configured—Your client adapter is not ready and not enabled.
- **Radio Status**—Indicates whether your client adapter’s radio is on or off. You can click the Turn Radio On/Off button to turn the radio on or off.
- **Radio ID**—The MAC address of your client adapter.
- **Signal Level**—The strength of your client adapter’s radio signal (Range: 0 to 100%).
- **Base Station ID**—The MAC address of the access point or base station to which your client adapter is associated.

Table 5-1 lists and describes the parameters that can be set from the Basic Properties screen. Follow the instructions in the table to initially set or change any parameters.

Table 5-1 Basic Properties Parameters

Parameter	Description						
Network	Specifies the type of network in which your client adapter is installed. Default: Computer to Base Station						
	<table border="1"> <thead> <tr> <th>Network Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Computer to Computer</td> <td>Also referred to as <i>ad hoc</i> or <i>peer to peer</i>. Used to set up a small network between two or more devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.</td> </tr> <tr> <td>Computer to Base Station</td> <td>Also referred to as <i>infrastructure</i>. Used to set up a connection to a wired Ethernet network (through an access point or base station).</td> </tr> </tbody> </table>	Network Type	Description	Computer to Computer	Also referred to as <i>ad hoc</i> or <i>peer to peer</i> . Used to set up a small network between two or more devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.	Computer to Base Station	Also referred to as <i>infrastructure</i> . Used to set up a connection to a wired Ethernet network (through an access point or base station).
	Network Type	Description					
Computer to Computer	Also referred to as <i>ad hoc</i> or <i>peer to peer</i> . Used to set up a small network between two or more devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.						
Computer to Base Station	Also referred to as <i>infrastructure</i> . Used to set up a connection to a wired Ethernet network (through an access point or base station).						
SSID	The service set identifier (SSID) identifies the wireless network that you want to access. Range: Up to 32 characters (case sensitive) Note If you leave this parameter blank, your client adapter can associate to any access point on the network that is configured to allow broadcast SSIDs (see the AP Radio Hardware page in the access point Management System). If the access points with which you wish to communicate are not configured to allow broadcast SSIDs, the value of this parameter must match the SSID of the access points. Otherwise, you will not be able to access the network.						

Table 5-1 Basic Properties Parameters (continued)

Parameter	Description
Enable WEP	<p>Enables or disables Wired Equivalent Privacy (WEP) for your client adapter.</p> <ul style="list-style-type: none"> If you want to enable WEP for your client adapter, you must select this check box and create a WEP key. Refer to Chapter 4, “Security Features” for more information on WEP and instructions on setting a WEP key. <p>Note This check box can also be used to disable or enable WEP after it is enabled.</p> <ul style="list-style-type: none"> If you enable LEAP for your client adapter, this check box is selected automatically. <p>Default: Deselected</p>
Enable LEAP	<p>Enables or disables LEAP (also referred to as <i>EAP - Cisco Wireless</i>) for your client adapter.</p> <p>If you want to enable LEAP for your client adapter, you must select this check box and set a username and password. Refer to the “LEAP” section on page 4-17 for more information about LEAP and instructions on setting a LEAP username and password.</p> <p>Note This check box can also be used to disable or enable LEAP after it is enabled.</p> <p>Default: Deselected</p>

Step 4 The menu bar (see [Figure 5-2](#)) in the top left-hand corner of the desktop allows you to choose menu options that you can use to configure and diagnose your client adapter.

Figure 5-2 Menu Bar

Loading New Firmware

Your client adapter's firmware is contained in the adapter's Flash memory, which allows it to be easily updated in the future. The current version of your adapter's firmware is provided in the Status screen. See the [“Viewing the Current Status of Your Client Adapter” section on page 7-2](#) for instructions on accessing this screen.

You can find the latest firmware version for your client adapter at the Cisco Software Center web site. Follow the instructions below to obtain and load the new firmware into your client adapter:

**Note**

If a power failure occurs while you are loading new firmware, your client adapter can become inoperable. If this occurs, start the procedure again.

Step 1

To obtain the latest client adapter radio firmware from the Cisco web site, follow these steps:

- a. Use your web browser to access the Cisco Software Center at the following URL:
<http://www.cisco.com/public/sw-center/sw-wireless.shtml>
- b. In the firmware section, click on the link for your client adapter's series, such as Cisco Aironet 350 Series.
- c. Click on the latest radio firmware filename for your client adapter, such as PC350v42523.exe.

**Note**

The firmware image file (*.exe) is a compressed file. You can use Stuffit Expander to expand (uncompress) this file.

**Note**

To support the message integrity check (MIC) feature, you must use firmware version 4.25.23 or later.

- d. Read and accept the terms and conditions of the Software License Agreement.
- e. Select the Cisco server from which to download the file.
- f. Save the file to your hard drive then exit the web browser.

Step 2

Locate and use the Stuffit Expander program on your hard drive to expand (uncompress) the radio firmware image file you copied to your hard drive. This creates an image file (filename.img) in the folder where the compressed file is located.

Step 3

Make sure the client adapter is installed in your computer and is operational.

- Step 4** Select **Load Firmware** from the Edit pull-down menu (see Figure 5-3). The Firmware window appears (see Figure 5-4).

Figure 5-3 Edit Pull-Down Menu

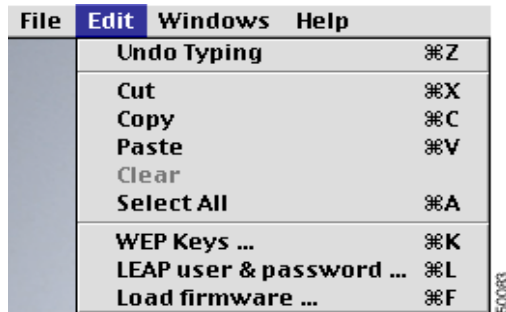
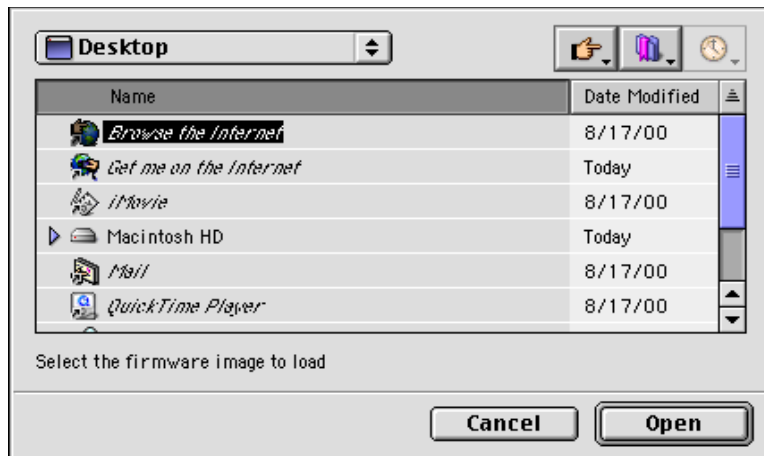


Figure 5-4 Firmware Window



- Step 5** Under Name, select the location of the new firmware (for example, Macintosh HD).
- Step 6** Click the new firmware image file (*.img).
- Step 7** Click the **Open** button. A dialog box appears indicating the progress of the download. The selected image is loaded into the client adapter's Flash memory.
- Step 8** When the *Firmware download successful* message appears, click **OK**.

Configuring Your Client Adapter

The pcm3x0PPC client utility enables you to change the configuration parameters of your client adapter. The adapter's parameters are organized into two main categories depending on your network's configuration:

- **Enterprise parameters**—Use these parameters to configure your client adapter for use in an enterprise network, such as that found in a large organization:
 - **System parameters**—Prepare the client adapter for use in a wireless network
 - **RF network parameters**—Control how the client adapter transmits and receives data
 - **Advanced infrastructure parameters**—Control how the client adapter operates within an infrastructure network
 - **Advanced ad hoc parameters**—Control how the client adapter operates within an ad hoc (peer-to-peer) network
- **Home networking parameters**—Use these parameters to prepare your client adapter to operate in a home network.



Note Despite their name, the home networking parameters are not limited to use in a home network. For instance, these parameters, which are confined to one screen, provide a convenient way to minimally configure the client adapter.

[Table 5-2](#) enables you to quickly locate the instructions for modifying the client adapter's parameters.

Table 5-2 Locating Configuration Instructions

Parameter Category	Page Number
Enterprise	5-8
System	5-8
RF network	5-12
Advanced infrastructure	5-16
Advanced ad hoc	5-19
Home networking	5-22

Setting Enterprise Parameters

The parameters in this section can be used to configure your client adapter for use in an enterprise network. If you are planning to use your client adapter in a home network, go to the “Setting Home Networking Parameters” section on page 5-22.

Setting System Parameters

The System Parameters screen (see Figure 5-6) enables you to set parameters that prepare the client adapter for use in a wireless network. To access this screen, select **Edit Properties** from the File pull-down menu (see Figure 5-5) and click the **System Parameters** tab.



Note

The Basic Properties screen and the Edit Properties screen cannot be open at the same time. Use the **Close** option from the File menu (see Figure 5-5) or click the square **Close** button in the top left-hand corner to close the screen.

Figure 5-5 File Pull-Down Menu



Figure 5-6 System Parameters Screen

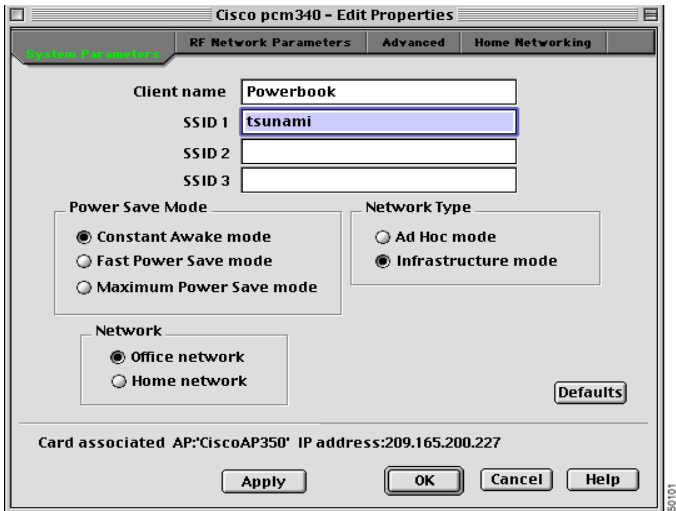


Table 5-3 lists and describes the client adapter’s system parameters. Follow the instructions in the table to initially set or change any parameters.

Table 5-3 System Parameters

Parameter	Description
Client Name	<p>A logical name for your workstation. It enables an administrator to determine which devices are connected to the access point without having to memorize every MAC address. This name is included in the access point's list of connected devices.</p> <p>Range: Up to 16 characters</p> <p>Note Each computer on the network should have a unique client name.</p>
SSID1	<p>The service set identifier (SSID) identifies the specific wireless network that you want to access.</p> <p>Range: Up to 32 characters (case sensitive)</p> <p>Note If you leave this parameter blank, your client adapter can associate to any access point on the network that is configured to allow broadcast SSIDs (see the AP Radio Hardware page in the Access Point Management System). If the access points with which you wish to communicate are not configured to allow broadcast SSIDs, the value of this parameter must match the SSID of the access points. Otherwise, you cannot access the network.</p>
SSID2	<p>An optional SSID that identifies a second distinct network and enables you to roam to that network without having to reconfigure your client adapter. See the note below.</p> <p>Range: Up to 32 characters (case sensitive)</p>
SSID3	<p>An optional SSID that identifies a third distinct network and enables you to roam to that network without having to reconfigure your client adapter. See the note below.</p> <p>Range: Up to 32 characters (case sensitive)</p>

**Note**

If your client adapter's firmware version is below 4.04, your optional SSIDs, which are set by the SSID2 and SSID3 parameters, are effective only for access points that are configured to allow broadcast SSIDs (see the AP Radio Hardware page in the Access Point Management System). To take full advantage of the optional SSID feature, upgrade your firmware to version 4.04 or higher.

Table 5-3 System Parameters (continued)

Parameter	Description								
Power Save Mode	Sets your client adapter to its optimum power consumption setting. Default: Constant Awake Mode (CAM)								
	<table border="1"> <thead> <tr> <th>Power Save Mode</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Constant Awake Mode</td> <td>Keeps the client adapter powered up continuously so there is little lag in message response time. Consumes the most power but offers the highest throughput. Is recommended for desktop computers and devices that use AC power.</td> </tr> <tr> <td>Fast Power Save Mode</td> <td>Switches between a PSP mode and CAM mode, depending on network traffic. This mode switches to CAM when retrieving a large number of packets and switches back to PSP after the packets are retrieved. Is recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP.</td> </tr> <tr> <td>Maximum Power Save Mode</td> <td>Causes the access point to buffer incoming messages for the client adapter, which wakes up periodically and polls the access point to see if any buffered messages are waiting for it. The adapter can request each message and then go back to sleep. Conserves the most power but offers the lowest throughput. Is recommended for devices for which power consumption is the ultimate concern (such as small battery-powered devices).</td> </tr> </tbody> </table>	Power Save Mode	Description	Constant Awake Mode	Keeps the client adapter powered up continuously so there is little lag in message response time. Consumes the most power but offers the highest throughput. Is recommended for desktop computers and devices that use AC power.	Fast Power Save Mode	Switches between a PSP mode and CAM mode, depending on network traffic. This mode switches to CAM when retrieving a large number of packets and switches back to PSP after the packets are retrieved. Is recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP.	Maximum Power Save Mode	Causes the access point to buffer incoming messages for the client adapter, which wakes up periodically and polls the access point to see if any buffered messages are waiting for it. The adapter can request each message and then go back to sleep. Conserves the most power but offers the lowest throughput. Is recommended for devices for which power consumption is the ultimate concern (such as small battery-powered devices).
Power Save Mode	Description								
Constant Awake Mode	Keeps the client adapter powered up continuously so there is little lag in message response time. Consumes the most power but offers the highest throughput. Is recommended for desktop computers and devices that use AC power.								
Fast Power Save Mode	Switches between a PSP mode and CAM mode, depending on network traffic. This mode switches to CAM when retrieving a large number of packets and switches back to PSP after the packets are retrieved. Is recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP.								
Maximum Power Save Mode	Causes the access point to buffer incoming messages for the client adapter, which wakes up periodically and polls the access point to see if any buffered messages are waiting for it. The adapter can request each message and then go back to sleep. Conserves the most power but offers the lowest throughput. Is recommended for devices for which power consumption is the ultimate concern (such as small battery-powered devices).								

Table 5-3 System Parameters (continued)

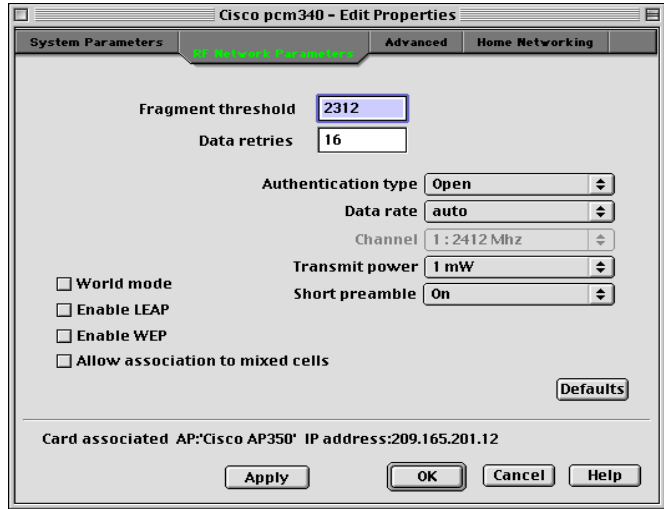
Parameter	Description	
Network Type	Specifies the type of network in which your client adapter is installed. Default: Infrastructure Mode	
	Network Type	Description
	Ad Hoc Mode	Often referred to as <i>peer to peer</i> . Used to set up a small network between two or more devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.
	Infrastructure Mode	Used to set up a connection to a wired Ethernet network (through an access point).
Network	Specifies the network configuration in which your client adapter is used. Default: Office Network Note Select Office Network if your client adapter will be used in an enterprise network. If you are planning to use your client adapter in a home network, go to the “Setting Home Networking Parameters” section on page 5-22.	

Click **Apply** at the bottom of the System Parameters screen to save any changes you have made.

Setting RF Network Parameters

The RF Network Parameters screen (see [Figure 5-7](#)) enables you to set parameters that control how and when the client adapter transmits and receives data. To access this screen, select **Edit Properties** from the File pull-down menu (see [Figure 5-5 on page 5-8](#)) and click the **RF Network Parameters** tab.

Figure 5-7 RF Network Parameters Screen



[Table 5-4](#) lists and describes the client adapter's RF network parameters. Follow the instructions in the table to initially set or change any parameters.

Table 5-4 RF Network Parameters

Parameter	Description
Fragment Threshold	<p>Defines the threshold above which an RF data packet is split up or fragmented. If one of those fragmented packets experiences interference during transmission, only that specific packet would need to be resent.</p> <p>Throughput is generally lower for fragmented packets because the fixed packet overhead consumes a higher portion of the RF bandwidth.</p> <p>Range: 256 to 2312</p> <p>Default: 2312</p>
Data Retries	<p>Defines the number of times a packet is resent if the initial transmission is unsuccessful.</p> <p>Range: 1 to 128</p> <p>Default: 16</p> <p>Note If your network protocol performs its own retries, set this to a smaller value than the default. This way notification of a "bad" packet will be sent up the protocol stack quickly so the application can retransmit the packet if necessary.</p>

Table 5-4 RF Network Parameters (continued)

Parameter	Description												
Authentication Type	Defines how your client adapter will attempt to authenticate to an access point. Default: Open												
	<table border="1"> <thead> <tr> <th>Authentication</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.</td> </tr> <tr> <td>Shared Key</td> <td>Allows your client adapter to communicate only with access points that have the same WEP keys. The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</td> </tr> </tbody> </table>	Authentication	Description	Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.	Shared Key	Allows your client adapter to communicate only with access points that have the same WEP keys. The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.						
	Authentication	Description											
Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.												
Shared Key	Allows your client adapter to communicate only with access points that have the same WEP keys. The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.												
Note	If LEAP is enabled on your client adapter, Open is the only available option.												
Note	The Shared Key option is available only if the client adapter has been assigned a WEP key and WEP is enabled. Refer to the Chapter 4, “Security Features” for instructions on setting a WEP key and enabling WEP.												
Data Rate	Specifies the rate at which you want your client adapter to transmit or receive packets to or from access points (in infrastructure mode) or other clients (in ad hoc mode). The data rate must be auto or the same as the wireless device with which you wish to communicate. Default: Auto												
	<table border="1"> <thead> <tr> <th>Data Rate</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Auto</td> <td>Uses the 11-Mbps data rate when possible but drops to lower rates when necessary.</td> </tr> <tr> <td>1 Mbps</td> <td>Offers the greatest range but the lowest throughput.</td> </tr> <tr> <td>2 Mbps</td> <td>Offers less range but greater throughput than the 1 Mbps Only option.</td> </tr> <tr> <td>5.5 Mbps</td> <td>Offers less range but greater throughput than the 2 Mbps Only option.</td> </tr> <tr> <td>11 Mbps</td> <td>Offers the greatest throughput but the lowest range.</td> </tr> </tbody> </table>	Data Rate	Description	Auto	Uses the 11-Mbps data rate when possible but drops to lower rates when necessary.	1 Mbps	Offers the greatest range but the lowest throughput.	2 Mbps	Offers less range but greater throughput than the 1 Mbps Only option.	5.5 Mbps	Offers less range but greater throughput than the 2 Mbps Only option.	11 Mbps	Offers the greatest throughput but the lowest range.
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	5.5 Mbps	Offers less range but greater throughput than the 2 Mbps Only option.											
11 Mbps	Offers the greatest throughput but the lowest range.												

Table 5-4 RF Network Parameters (continued)

Parameter	Description						
Channel	<p>Specifies which frequency your client adapter uses as the channel for communications. These channels conform to the IEEE 802.11 Standard for your regulatory domain.</p> <ul style="list-style-type: none"> In infrastructure mode, this parameter is set automatically and cannot be changed. The client adapter listens to the entire spectrum, selects the best access point to associate to, and uses the same frequency as that access point. In ad hoc mode, the channel of the client adapter must be set to match the channel used by the other clients with which you wish to communicate. <p>Range: Dependent on regulatory domain Example: 1 to 11 (2412 to 2462 MHz) in North America</p> <p>Note Refer to Appendix A for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>						
Transmit Power	<p>Defines the level at which your client adapter transmits power. This value must not be higher than that allowed by your country's regulatory agency (FCC in the U.S., DOC in Canada, ETSI in Europe, MKK in Japan, etc.). When World Mode is enabled, only the transmit power levels supported by the country of operation's regulatory agency are available.</p> <p>Range: 1, 5, 15, 20, 30, 50, or 100 mW (30 mW is the maximum power level supported by 340 series client adapters)</p> <p>Default: The minimum level allowed by your country's regulatory agency</p> <p>Note 15 mW is supported by 340 series client adapters only, and 20 mW is supported by 350 series client adapters only.</p> <p>Note Reducing the transmit power level conserves battery power but decreases radio range.</p>						
Short Preamble	<p>Specifies if your client adapter uses short radio headers. However, the adapter can use short radio headers only if the access point is also configured to support them. Short radio headers improve throughput performance; long radio headers ensure compatibility with clients and access points that do not support short radio headers.</p> <p>Default: On</p> <table border="1"> <thead> <tr> <th>Short Preamble</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Off</td> <td>Prevents short radio headers from being used during transmissions</td> </tr> <tr> <td>On</td> <td>Allows short radio headers to be used during transmissions</td> </tr> </tbody> </table>	Short Preamble	Description	Off	Prevents short radio headers from being used during transmissions	On	Allows short radio headers to be used during transmissions
Short Preamble	Description						
Off	Prevents short radio headers from being used during transmissions						
On	Allows short radio headers to be used during transmissions						

Table 5-4 RF Network Parameters (continued)

Parameter	Description
World Mode	<p>Selecting this check box enables the client adapter to assume the legal transmit power level and channel set of the access point to which it is associated. This parameter is available only in infrastructure mode and is designed for users who travel between countries because it allows the adapter to be used in different regulatory domains.</p> <p>Default: Deselected</p> <p>Note When World Mode is enabled, only the transmit power levels supported by the country of operation's regulatory agency are available.</p>
Enable LEAP	<p>Enables or disables LEAP for your client adapter.</p> <p>If you want to enable LEAP for your client adapter, you must select this check box and set a username and password. Refer to the “LEAP” section on page 4-17 for more information about LEAP and instructions on setting a LEAP username and password.</p> <p>Note This check box can also be used to disable or enable LEAP after it is enabled.</p> <p>Default: Deselected</p>
Enable WEP	<p>Enables or disables WEP for your client adapter.</p> <ul style="list-style-type: none"> • If you want to enable WEP for your client adapter, you must select this check box and create a WEP key. Refer to the Chapter 4, “Security Features” for more information on WEP and instructions on setting a WEP key. • If you enable LEAP for your client adapter, this check box is selected automatically. <p>Default: Deselected</p>
Allow Association To Mixed Cells	<p>If your network's access points are set to communicate with either WEP-enabled or WEP-disabled clients (that is, if the Use of Data Encryption by Stations parameter on the AP Radio Data Encryption screen is set to Optional), you must select this check box, even if your client adapter is not using WEP. If this setting is not enabled, your client adapter cannot establish a connection with the access point.</p> <p>Default: Deselected</p> <p>Note For security reasons, Cisco recommends that both WEP-enabled and WEP-disabled clients not be allowed in the same cell because broadcast packets will be sent unencrypted, even to clients running WEP.</p>

Click **Apply** at the bottom of the RF Network Parameters screen to save any changes you have made.

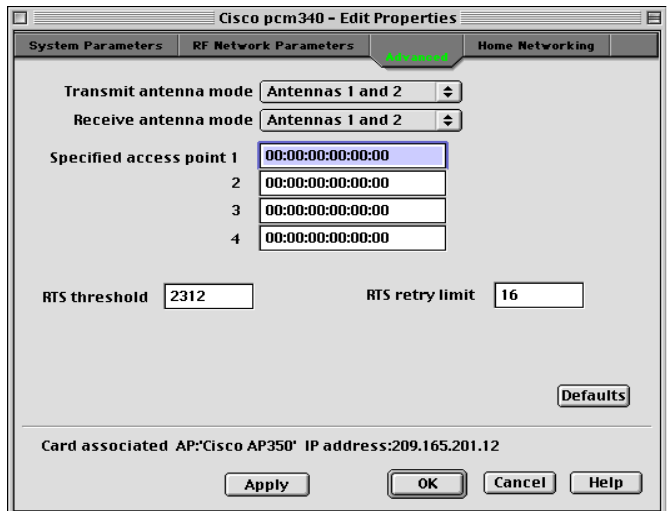
Setting Advanced Infrastructure Parameters


Note

You can set advanced infrastructure parameters only if your client adapter has been set to operate in an infrastructure network. See the Network Type parameter in the “[Setting System Parameters](#)” section on [page 5-8](#).

The Advanced screen (see [Figure 5-8](#)) allows you to set parameters that control how the client adapter operates within an infrastructure network. To access this screen, select **Edit Properties** from the File pull-down menu (see [Figure 5-5 on page 5-8](#)) and click the **Advanced** tab.

Figure 5-8 Advanced Screen



[Table 5-5](#) lists and describes the client adapter’s advanced infrastructure parameters. Follow the instructions in the table to initially set or change any parameters.

Table 5-5 Advanced (Infrastructure) Parameters

Parameter	Description
Transmit Antenna Mode	<p>Specifies the antenna that your client adapter uses to transmit data.</p> <ul style="list-style-type: none"> PC card—The PC card’s integrated, permanently attached antenna operates best when used in Antennas 1 and 2 mode (also referred to as <i>diversity mode</i>). Diversity mode allows the card to use the better signal from its two antenna ports. Range: Antenna 1 Only, Antenna 2 Only, Antennas 1 and 2 Default: Antennas 1 and 2 LM card—The LM card is shipped without an antenna; however, an antenna can be connected through the card’s external connector. If a snap-on antenna is used, diversity mode is recommended. Otherwise, select the mode that corresponds to the antenna port to which the antenna is connected. Range: Antenna 1 Only, Antenna 2 Only, Antennas 1 and 2 Default: Antennas 1 and 2 PCI client adapter—The PCI client adapter must use the Antenna 1 Only option. Default: Antenna 1 Only
Receive Antenna Mode	<p>Specifies the antenna that your client adapter uses to receive data. See the Transmit Antenna Mode parameter above for information on the options available for your client adapter.</p>
Specified Access Point 1- 4	<p>Specifies the MAC addresses of up to four preferred access points to which you want to associate. If the specified access points are not found or you roam out of range, you may associate to another access point.</p> <p>You can enter the MAC addresses of the access points in the edit boxes or choose not to specify access points by leaving the boxes blank.</p> <p>Default: No access points specified</p> <p>Note This parameter should be used only for access points that are in repeater mode. For normal operation, these fields should be left blank because specifying an access point slows down the roaming process.</p>

Table 5-5 *Advanced (Infrastructure) Parameters (continued)*

Parameter	Description
RTS Threshold	<p>Specifies the size of the data packet that the low-level RF protocol issues to a request-to-send (RTS) packet.</p> <p>Setting this parameter to a small value causes RTS packets to be sent more often. When this occurs, more of the available bandwidth is consumed and the throughput of other network packets is reduced, but the system is able to recover faster from interference or collisions, which may be caused from a high multipath environment characterized by obstructions or metallic surfaces.</p> <p>Range: 0 to 2312</p> <p>Default: 2312</p> <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p>
RTS Retry Limit	<p>Specifies the number of times the client adapter resends a request-to-send (RTS) packet if it does not receive a clear-to-send (CTS) packet from the previously sent RTS packet. You can type a number in the edit box to change this value.</p> <p>Setting this parameter to a large value decreases the available bandwidth whenever interference is encountered but makes the system more immune to interference and collisions, which may be caused from a high multipath environment characterized by obstructions or metallic surfaces.</p> <p>Range: 1 to 128</p> <p>Default: 16</p> <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p>

Click **Apply** at the bottom of the Advanced screen to save any changes you have made.

Setting Advanced Ad Hoc Parameters

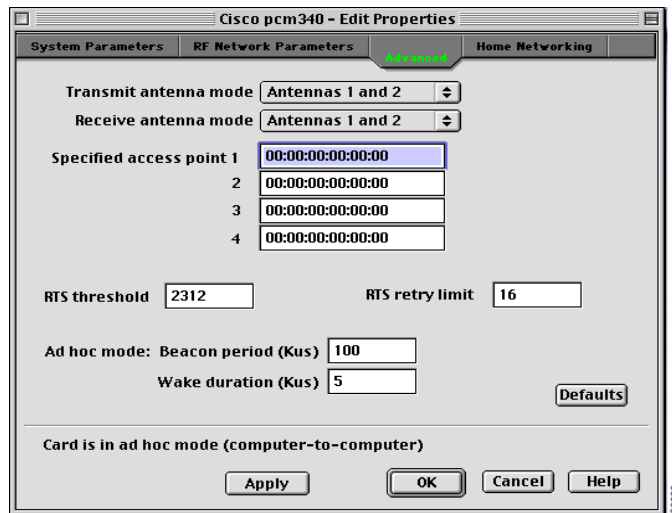


Note

You can set advanced ad hoc parameters only if your client adapter has been set to operate in an ad hoc network. See the Network Type parameter in the “[Setting System Parameters](#)” section on page 5-8.

The Advanced screen (see [Figure 5-9](#)) enables you to set parameters that control how the client adapter operates within an ad hoc network. To access this screen, select **Edit Properties** from the File pull-down menu (see [Figure 5-5](#) on page 5-8) and click the **Advanced** tab.

Figure 5-9 Advanced Screen



[Table 5-6](#) lists and describes the client adapter’s advanced ad hoc parameters. Follow the instructions in the table to initially set or change any parameters.

Table 5-6 Advanced (Ad Hoc) Parameters

Parameter	Description
Transmit Antenna Mode	<p>Specifies the antenna that your client adapter uses to transmit data.</p> <ul style="list-style-type: none"> PC card—The PC card's integrated, permanently attached antenna operates best when used in Antennas 1 and 2 mode (also referred to as <i>diversity mode</i>). Diversity mode allows the card to use the better signal from its two antenna ports. Range: Antenna 1 Only, Antenna 2 Only, Antennas 1 and 2 Default: Antennas 1 and 2 LM card—The LM card is shipped without an antenna; however, an antenna can be connected through the card's external connector. If a snap-on antenna is used, diversity mode is recommended. Otherwise, select the mode that corresponds to the antenna port to which the antenna is connected. Range: Antenna 1 Only, Antenna 2 Only, Antennas 1 and 2 Default: Antennas 1 and 2 PCI client adapter—The PCI client adapter must use the Antenna 1 Only option. Default: Antenna 1 Only
Receive Antenna Mode	<p>Specifies the antenna that your client adapter uses to receive data. See the Transmit Antenna Mode parameter above for information on the options available for your client adapter.</p>
Specified Access Point 1- 4	<p>These parameters are not available in ad-hoc mode.</p>
RTS Threshold	<p>Specifies the size of the data packet that the low-level RF protocol issues to a request-to-send (RTS) packet.</p> <p>Setting this parameter to a small value causes RTS packets to be sent more often. When this occurs, more of the available bandwidth is consumed and the throughput of other network packets is reduced, but the system is able to recover faster from interference or collisions, which may be caused from a high multipath environment characterized by obstructions or metallic surfaces.</p> <p>Range: 0 to 2312</p> <p>Default: 2312</p> <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p>

Table 5-6 Advanced (Ad Hoc) Parameters (continued)

Parameter	Description
RTS Retry Limit	<p>Specifies the number of times the client adapter resends a request-to-send (RTS) packet if it does not receive a clear-to-send (CTS) packet from the previously sent RTS packet.</p> <p>Setting this parameter to a large value decreases the available bandwidth whenever interference is encountered but makes the system more immune to interference and collisions, which may be caused from a high multipath environment characterized by obstructions or metallic surfaces.</p> <p>Range: 1 to 128</p> <p>Default: 16</p> <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p>
Beacon Period (K μ s)	<p>Specifies the duration between beacon packets, which are used to help clients find each other in ad hoc mode.</p> <p>Range: 20 to 976 Kμs</p> <p>Default: 100 Kμs</p> <p>Note Kμs is a unit of measurement in software terms. K = 1024, μ = 10⁻⁶, and s = seconds, so Kμs = .001024 seconds, 1.024 milliseconds, or 1024 microseconds.</p>
Wake Duration (K μ s)	<p>Specifies the amount of time following a beacon that the client adapter stays awake to receive announcement traffic indication message (ATIM) packets, which are sent to the adapter to keep it awake until the next beacon.</p> <p>This parameter is used only in Power Save Mode (Max PSP or Fast PSP). Refer to the Power Save Mode parameter in the “Setting System Parameters” section on page 5-8.</p> <p>Range: 5 to 60 Kμs</p> <p>Default: 5 Kμs</p>

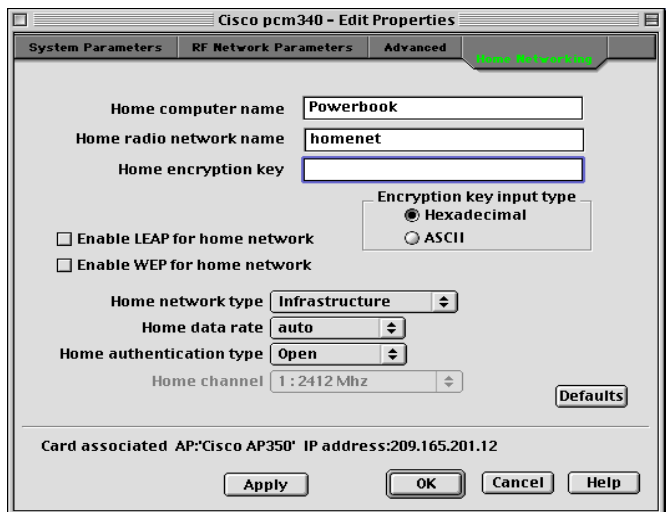
Click **Apply** at the bottom of the Advanced screen to save any changes you have made.

Setting Home Networking Parameters

The parameters in this section can be used to configure your client adapter for use in a home (non-enterprise) network. If you are planning to use your client adapter in an enterprise network, go to the “[Setting Enterprise Parameters](#)” section on page 5-8.

The Home Networking screen (see [Figure 5-10](#)) enables you to set parameters that prepare the client adapter to operate in a home network. To access this screen, select **Edit Properties** from the File pull-down menu (see [Figure 5-5 on page 5-8](#)) and click the **Home Networking** tab.

Figure 5-10 Home Networking Screen



[Table 5-7](#) lists and describes the client adapter’s home networking parameters. Follow the instructions in the table to initially set or change any parameters.

Table 5-7 Home Networking Parameters

Parameter	Description
Home Computer Name	<p>The client name for the home network. It is a logical name for your workstation. It allows you to determine which devices are connected to the <i>base station</i> (the home equivalent of an access point) without having to memorize every MAC address. This name is included in the base station’s list of connected devices.</p> <p>Range: Up to 16 characters</p> <p>Note Each computer on the home network must have a unique computer name.</p>
Home Radio Network Name	<p>The service set identifier (SSID) for the home network. It allows you to access the home network.</p> <p>Range: Up to 32 characters (case sensitive)</p> <p>Note Only one SSID can be set in a home network, and each device on the network must use the same SSID.</p>

Table 5-7 Home Networking Parameters (continued)

Parameter	Description						
Encryption Key Input Type	Specifies whether the WEP key is entered in hexadecimal characters or ASCII text. Default: Hexadecimal						
	<table border="1"> <thead> <tr> <th>Encryption Key Input Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Hexadecimal</td> <td>Specifies that the WEP key be entered in hexadecimal characters, which include 0-9, A-F, and a-f. Example:ADC423BE04</td> </tr> <tr> <td>ASCII Text</td> <td>Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks. Example:ZZ18YXPRA3</td> </tr> </tbody> </table>	Encryption Key Input Type	Description	Hexadecimal	Specifies that the WEP key be entered in hexadecimal characters, which include 0-9, A-F, and a-f. Example: ADC423BE04	ASCII Text	Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks. Example: ZZ18YXPRA3
	Encryption Key Input Type	Description					
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ASCII Text	Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks. Example: ZZ18YXPRA3						
ASCII Text	Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks. Example: ZZ18YXPRA3						
Home Encryption Key	The WEP key for the home network. Refer to the Chapter 4, “Security Features” for information on WEP keys. Range: Up to 13 characters (case sensitive in ASCII format) Note Only one WEP key can be set in a home network, and each device on the network must use the same key.						
Enable LEAP for Home Network	Enables or disables LEAP for your client adapter. If you want to enable LEAP for your client adapter, you must select this check box and set a username and password. Refer to Chapter 4, “Security Features” for more information about LEAP and instructions on setting a LEAP username and password. Note This check box can also be used to disable or enable LEAP after it is enabled. Default: Deselected						
Enable WEP for Home Network	Enables or disables WEP for your client adapter. <ul style="list-style-type: none"> If you want to enable WEP for your client adapter, you must select this check box and create a WEP key. Refer to the Chapter 4, “Security Features” for more information on WEP and instructions on setting a WEP key. Note This check box can also be used to disable or enable WEP after it is enabled. <ul style="list-style-type: none"> If you enable LEAP for your client adapter, this check box is selected automatically. Default: Deselected Note 40-bit client adapters cannot be used with the Cisco Aironet 340 Series Base Station.						

Table 5-7 Home Networking Parameters (continued)

Parameter	Description												
Home Network Type	Specifies the type of network in which your client adapter is installed. Default: Infrastructure												
	<table border="1"> <thead> <tr> <th>Home Network Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Ad Hoc</td> <td>Also referred to as <i>peer to peer</i>. Used to set up a small network between two or more devices. For example, a network without a base station could be set up between computers in a room so information can be shared.</td> </tr> <tr> <td>Infrastructure</td> <td>Used to set up a connection to a wired Ethernet network (through a base station).</td> </tr> </tbody> </table>	Home Network Type	Description	Ad Hoc	Also referred to as <i>peer to peer</i> . Used to set up a small network between two or more devices. For example, a network without a base station could be set up between computers in a room so information can be shared.	Infrastructure	Used to set up a connection to a wired Ethernet network (through a base station).						
	Home Network Type	Description											
Ad Hoc	Also referred to as <i>peer to peer</i> . Used to set up a small network between two or more devices. For example, a network without a base station could be set up between computers in a room so information can be shared.												
Infrastructure	Used to set up a connection to a wired Ethernet network (through a base station).												
Home Data Rate	Specifies the rate at which you want your client adapter to transmit or receive packets to or from other devices on the home network. The data rate must be auto or the same as the wireless device with which you wish to communicate. Default: Auto												
	<table border="1"> <thead> <tr> <th>Home Data Rate</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Auto</td> <td>Uses the 11-Mbps data rate when possible but drops to lower rates when necessary.</td> </tr> <tr> <td>1 Mbps</td> <td>Offers the greatest range but the lowest throughput.</td> </tr> <tr> <td>2 Mbps</td> <td>Offers less range but greater throughput than the 1 Mbps Only option.</td> </tr> <tr> <td>5.5 Mbps</td> <td>Offers less range but greater throughput than the 2 Mbps Only option.</td> </tr> <tr> <td>11 Mbps</td> <td>Offers the greatest throughput but the lowest range.</td> </tr> </tbody> </table>	Home Data Rate	Description	Auto	Uses the 11-Mbps data rate when possible but drops to lower rates when necessary.	1 Mbps	Offers the greatest range but the lowest throughput.	2 Mbps	Offers less range but greater throughput than the 1 Mbps Only option.	5.5 Mbps	Offers less range but greater throughput than the 2 Mbps Only option.	11 Mbps	Offers the greatest throughput but the lowest range.
	Home Data Rate	Description											
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	5.5 Mbps	Offers less range but greater throughput than the 2 Mbps Only option.											
11 Mbps	Offers the greatest throughput but the lowest range.												

Table 5-7 Home Networking Parameters (continued)

Parameter	Description						
Home Authentication Type	<p>Defines how your client adapter attempts to authenticate to a base station.</p> <p>If LEAP is enabled on your client adapter, Open is the only available option.</p> <p>The Shared Key option is available only if the client adapter is assigned a WEP key and WEP is enabled. For additional information, refer to the Chapter 4, “Security Features.”</p> <p>Default: Open</p>						
	<table border="1"> <thead> <tr> <th>Authentication</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with a base station.</td> </tr> <tr> <td>Shared Key</td> <td> <p>Allows your client adapter to communicate only with base stations that have the same WEP keys.</p> <p>The base station sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the base station. The base station attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p> </td> </tr> </tbody> </table>	Authentication	Description	Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with a base station.	Shared Key	<p>Allows your client adapter to communicate only with base stations that have the same WEP keys.</p> <p>The base station sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the base station. The base station attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p>
	Authentication	Description					
Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with a base station.						
Shared Key	<p>Allows your client adapter to communicate only with base stations that have the same WEP keys.</p> <p>The base station sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the base station. The base station attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p>						
Home Channel	<p>Specifies which frequency your client adapter uses as the channel for communications. These channels conform to the IEEE 802.11 Standard for your regulatory domain.</p> <ul style="list-style-type: none"> • If your home network uses a base station, this parameter does not appear because it is set automatically and cannot be changed. The client adapter uses the same frequency as the base station. • If your home network does not use a base station, the channel of the client adapter must be set to match the channel used by the other clients with which you wish to communicate. <p>Range: Dependent on regulatory domain Example: 1 to 11 (2412 to 2462 MHz) in North America</p> <p>Note Refer to Appendix A for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>						

Click **Apply** at the bottom of the Home Networking screen to save any changes you have made.

Go to the [“Specifying a Home Network Configuration”](#) section below for instructions on activating a home network configuration.

Specifying a Home Network Configuration

After you have set the parameters to prepare your client adapter for use in a home network, you must specify a home network configuration. To do so, follow the instructions below.

-
- Step 1** Select **Edit Properties** from the File pull-down menu (see [Figure 5-5 on page 5-8](#)) and click the **System Parameters** tab. The System Parameters screen appears (see [Figure 5-6 on page 5-8](#)).
 - Step 2** Select **Home Network** under Network.
 - Step 3** Click **Apply** to save this setting.
-

Turning Your Client Adapter Radio On or Off

Your client adapter radio can be turned on or off. Turning the radio off prevents the adapter from transmitting RF energy. You might want to turn off the client adapter radio when you are not transmitting data and want to conserve battery power or when you are using a laptop on an airplane and want to prevent the adapter's transmissions from potentially interfering with electronic devices.

If the radio is not turned off, it periodically sends out inquiry packets even if it is not associated to an access point, as required by the 802.11 specification. Therefore, it is important to turn it off around devices that are susceptible to RF interference.



Note

Your client adapter is not associated while the radio is off.

Follow the steps below to turn the client adapter radio on or off.

-
- Step 1** If your client adapter radio is on, select **Radio Off** from the File pull-down menu (see [Figure 5-11](#)) or click the **Turn Radio Off** button on the Basic Properties screen (see [Figure 5-12](#)) to turn the radio off.
 - Step 2** If your client adapter radio is off, select **Radio On** from the File pull-down menu or click the **Turn Radio On** button on the Basic Properties screen to turn the radio on.
-

Figure 5-11 File Pull-Down Menu

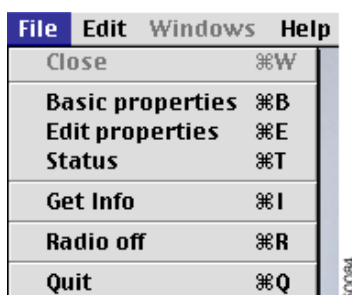
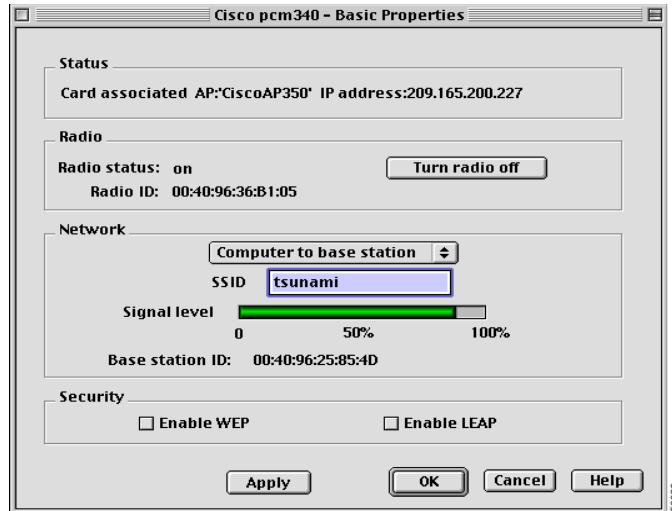


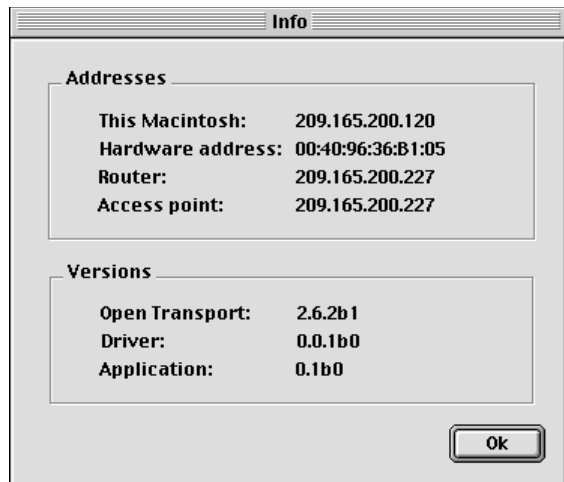
Figure 5-12 Basic Properties Screen



Obtaining System Address and Software Version Information

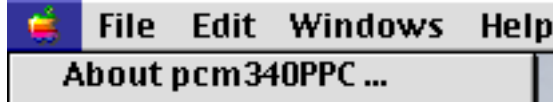
To obtain information on system addresses and versions of software, select **Get Info** from the File pull-down menu (see Figure 5-11 on page 5-26). The Info screen (see Figure 5-13) appears.

Figure 5-13 Info Screen



The top of the screen displays the IP address and MAC address of your computer, the IP address of your network's router, and the IP address of the access point. The bottom of the screen displays the version of the open transport software that is used with the driver, the version of the driver, and the version of the pcm3x0PPC client utility.

You can also determine the pcm3x0PPC version by selecting the **apple** icon (see Figure 5-14) from the menu bar and clicking **About pcm3x0PPC**.

Figure 5-14 Apple Pull-Down Menu

The About pcm3x0PPC screen appears (see [Figure 5-15](#)).

Figure 5-15 About pcm3x0PPC Screen



Advanced Configuration on Mac OS X

This chapter describes the client utility used with a Cisco Aironet Wireless LAN Adapter running on the Mac OS X operating system.

The following topics are covered in this chapter:

- [Overview, page 6-2](#)
- [Opening the Client Utility, page 6-2](#)
- [Basic Properties, page 6-3](#)
- [Location Profiles, page 6-6](#)
- [Loading New Firmware, page 6-8](#)
- [Advanced Properties, page 6-10](#)
- [Turning Your Client Adapter Radio On or Off, page 6-18](#)
- [Obtaining Software Version Information, page 6-21](#)

Overview

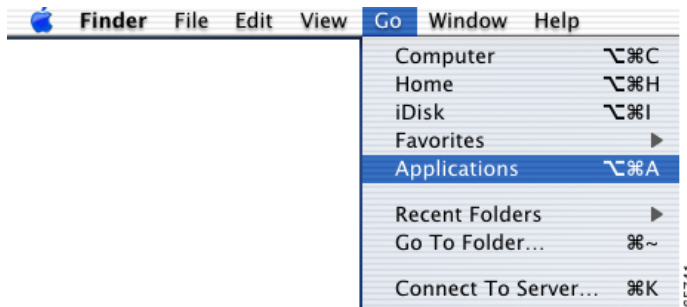
This section explains how to use the client utility to load new firmware and to configure your client adapter for use in a wireless network. This section also explains how you can use the client utility to set parameters that govern how the adapter transmits or receives data, and controls the adapter's operation within an infrastructure or ad hoc network.

Opening the Client Utility

To open the client utility, follow the steps below.

- Step 1** From the **Finder** menu bar on the top of the screen, select **Go** and click **Applications** (see [Figure 6-1](#)). The Applications screen appears.

Figure 6-1 Finder Menu Bar



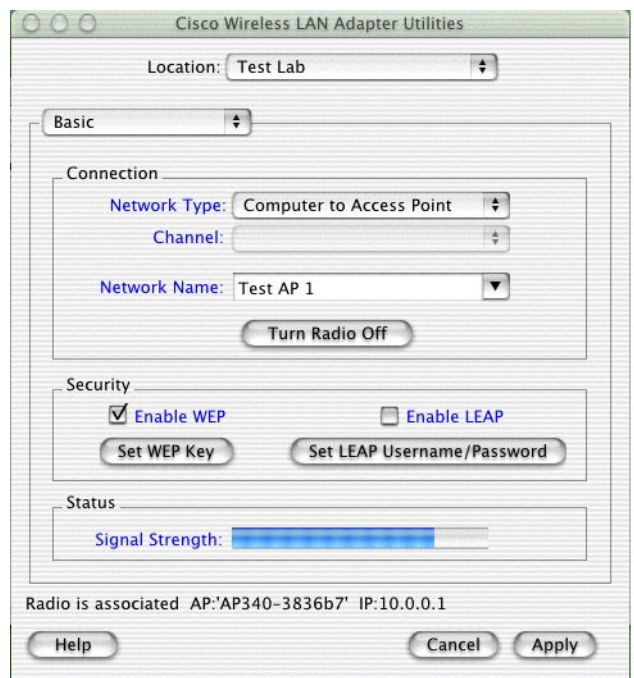
- Step 2** On the Applications screen, double-click the **Aironet Client Utility** icon. The client utility screen appears, and the computer searches for the client adapter radio. When the radio is found, the basic properties screen appears (see [Figure 6-2](#)).

Basic Properties

The basic properties screen displays when you open the client utility. The screen provides useful information about your client adapter and enables you to quickly set key configuration parameters needed to successfully communicate with an access point or another wireless device.

The basic properties screen is shown in [Figure 6-2](#).

Figure 6-2 Client Utility Basic Properties Screen



Note

You can click the blue words on any client utility screen to obtain descriptive information, such as Signal Strength or Enable WEP.

The basic properties screen provides the following information:

- **Location**—Allows you to select or define different wireless network profiles for various operating locations.
- **Connection**—Allows you to specify the network type, the network name, and the frequency channel for computer to computer (Ad-Hoc) networks. You can also turn the radio on or off.
- **Security**—Allows you to specify the WEP and LEAP security settings. You can enable WEP and LEAP, set up to four WEP keys, and set your LEAP username and password.
- **Status**—Shows a bar graph to represent the signal strength of the received RF signal.
- **Association Status**—Shows the association status of your client adapter.
 - **Radio associated**—Your client adapter is associated to an access point or other wireless device. For an access point, the name and IP address are shown.
 - **Radio not associated**—Your client adapter is ready and enabled but not associated to an access point or wireless device.

Table 6-1 lists and describes the parameters that can be set from the basic properties screen. Follow the instructions in the table to initially set or change any parameter. Click **Apply** at the bottom of the basic properties screen to save any changes you make.

Table 6-1 Basic Properties Parameters

Parameter	Description						
Location	<p>Specifies different radio network profile settings used in various locations, such as your office, your home, the factory, or the airport. For each profile, you can specify unique connection and security settings. Click the up and down arrows to select a different profile. For additional information see the “Location Profiles” section on page 6-6.</p> <p>Range: (number of profiles supported is limited by available disk space)</p> <p>Default: Default</p>						
Network Type	<p>Specifies the type of network in which your client adapter is installed.</p> <p>Default: Computer to Access Point</p> <table border="1"> <thead> <tr> <th>Network Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Computer to Access Point</td> <td>Also referred to as <i>infrastructure</i>. Used to set up a connection to a wired Ethernet network (through an access point).</td> </tr> <tr> <td>Computer to Computer</td> <td>Also referred to as <i>ad hoc</i> or <i>peer to peer</i>. Used to set up a small network between two or more wireless devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.</td> </tr> </tbody> </table>	Network Type	Description	Computer to Access Point	Also referred to as <i>infrastructure</i> . Used to set up a connection to a wired Ethernet network (through an access point).	Computer to Computer	Also referred to as <i>ad hoc</i> or <i>peer to peer</i> . Used to set up a small network between two or more wireless devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.
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Channel	<p>Specifies which frequency your client adapter uses as the channel for communications. These channels conform to the IEEE 802.11 Standard for your regulatory domain.</p> <ul style="list-style-type: none"> In infrastructure mode, this parameter is set automatically and cannot be changed. The client adapter listens to the entire spectrum, selects the best access point to associate to, and uses the same frequency as that access point. In ad hoc mode, the channel of the client adapter must be set to match the channel used by the other clients with which you wish to communicate. <p>Range: Dependent on regulatory domain Example: 1 to 11 (2412 to 2462 MHz) in North America</p> <p>Note Refer to Appendix D, “Channels and Antenna Settings,” for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>						

Table 6-1 Basic Properties Parameters (continued)

Parameter	Description
Network Name	<p>Network name is the same as service set identifier (SSID) and it identifies the wireless network that you want to access.</p> <p>Range: Up to 32 characters (case sensitive)</p> <p>Note If you leave this parameter blank, your client adapter can associate to any access point or wireless device on the network that is configured to allow broadcast SSIDs. If the access points or wireless devices with which you wish to communicate are not configured to allow broadcast SSIDs, the value of this parameter must exactly match their SSID or network name. Otherwise, you will not be able to access the access point or wireless device.</p>
Enable WEP	<p>Enables or disables Wired Equivalent Privacy (WEP) for your client adapter. If you want to enable WEP for your client adapter, you must select this check box and create a WEP key. This check box can also be used to disable WEP. Refer to Chapter 4, “Security Features” for more information on WEP and instructions on setting a WEP key.</p> <p>Note If you enable LEAP for your client adapter, this check box is automatically selected (check marked) to indicate the use of dynamic WEP keys.</p> <p>Default: Deselected</p>
Enable LEAP	<p>Enables or disables LEAP (also referred to as <i>EAP - Cisco Wireless</i>) for your client adapter. If you want to enable LEAP for your client adapter, you must select this check box and set a LEAP username and password. Refer to Chapter 4, “Security Features” for more information about LEAP and instructions on setting a LEAP username and password.</p> <p>Default: Deselected</p>

Table 6-2 describes the buttons on the basic properties screen.

Table 6-2 Buttons on the Basic Properties Screen

Button	Description
Turn Radio On Turn Radio Off	Turns the client adapter radio on or off. The button changes to indicate the operation to be performed; for example: <i>Turn Radio On</i> indicates the radio is turned on when you click the button and <i>Turn Radio Off</i> indicates the radio is turned off when you click the button.
Set WEP Key	Allows you to set up to four WEP keys (for additional information see Chapter 4, “Security Features”).
Set LEAP Username/Password	Allows you to set your LEAP username and password (for additional information see Chapter 4, “Security Features”).
Cancel	Exits the application or screen without saving revised settings.
Apply	Exits the application or screen and saves the revised settings.
Help	Allows you to access the client utility help screen (for additional information see the “Getting Help” section on page 1-12).

Location Profiles

The client utility allows you to specify different wireless network profile settings used in up to 16 operating locations, such as your office, your home, the factory, or the airport. You can specify unique connection and security settings for each location profile. These unique settings are stored in your Macintosh and recalled when you select each location.

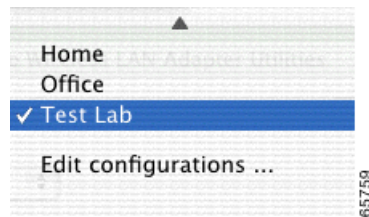
To configure a location profile involves the following operations:

- Select a location profile or add a new profile. See [“Selecting a Location Profile” section on page 6-7](#).
- Specify unique connection parameters on the basic properties screen (see [Figure 6-2](#)) or the advanced properties screen (see [Figure 6-8](#)).
 - Set the network type
 - Set the network name or SSID
- Specify security parameters on the basic properties screen (see [Figure 6-2](#)) or the advanced properties screen (see [Figure 6-8](#)). Refer to [Chapter 4, “Security Features”](#) for information on LEAP and WEP and instructions on setting these security features.
 - Enable or disable WEP
 - If WEP is enabled, set up to four WEP keys
 - Enable or disable LEAP
 - If LEAP is enabled, set your LEAP username and password
- Click the **Apply** button on the basic properties screen (see [Figure 6-2](#)) or the advanced properties screen (see [Figure 6-8](#)) to set and store the parameters for the specified profile.

Selecting a Location Profile

To select a location profile from the client utility basic or advanced screens, click the up and down arrows at the end of the Location field and select the desired location from the pull-down menu (see [Figure 6-3](#)).

Figure 6-3 Location Pull-Down Menu

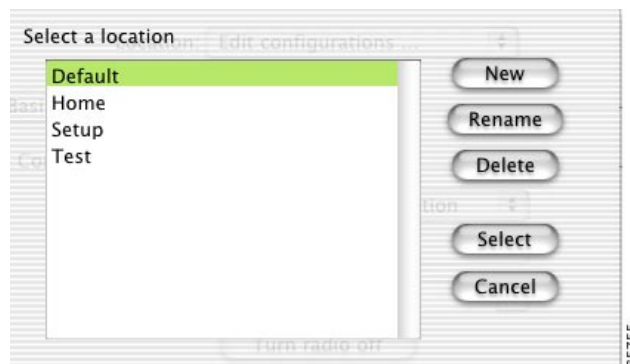


Click **Apply** on the basic or advanced properties screen to activate the selected location profile.

Editing a Location Profile

To add a new location profile name or to rename, delete, or select an existing location profile, click **Edit Configurations** from the location pull-down menu (see [Figure 6-3](#)). The Edit Configurations screen appears (see [Figure 6-4](#)).

Figure 6-4 Edit Configurations Screen



Use the buttons on the Edit Configurations screen to perform the following operations:

- To add a new location profile name, click **New** and enter a new name in the drop-down screen. Click **OK** to add the new name or click **Cancel** to return to the basic or advanced screen without setting a new name. When you create a new location profile name, you should enter the specific connection and security settings for that location on the basic or advanced screens.
- To rename an existing location profile, click **Rename** and enter the revised name in the drop-down screen. Click **OK** to revise the name or click **Cancel** to return to the basic or advanced screen without changing the name.
- To delete an existing location profile, select the profile to delete from the Edit Configuration screen and click **Delete**. The basic or advanced screen appears.
- To select an existing location profile as the client utility default location, select the profile from the Edit Configuration screen and click **Select**. The basic or advanced screen appears.

- To exit the Edit Configuration screen without making changes, click **Cancel**. The basic or advanced screen appears.

Table 6-3 lists and describes the buttons on the Edit Configurations screen.

Table 6-3 Buttons on the Edit Configurations Screen

Button	Description
New	Allows you to specify a name for a new location profile.
Rename	Allows you to rename an existing location profile name.
Delete	Allows you to delete an existing location profile name.
Select	Allows you to select the location profile name to be used as the client utility default.
Cancel	Exits the application or screen without saving revised settings.

Loading New Firmware

Your client adapter firmware is contained in the adapter's Flash memory, where it can be easily updated. The current version of the firmware is displayed on the Status screen. See the “[Obtaining Software Version Information](#)” section on page 6-21 for instructions on accessing this screen.

You can find the latest firmware version for your client adapter at the Cisco Software Center web site. Follow the instructions below to obtain and load the new firmware into your client adapter:



Note

If a power failure occurs while you are loading new firmware, your client adapter can become inoperable. If this occurs, start the procedure again.

Step 1

To obtain the latest client adapter radio firmware from the Cisco Web site, follow these steps:

- a. Use your web browser to access the Cisco Software Center at the following URL:
<http://www.cisco.com/public/sw-center/sw-wireless.shtml>
- b. In the firmware section, click on the link for your client adapter's series, such as Cisco Aironet 350 Series.
- c. Click on the latest client adapter radio firmware filename, such as PC350v42523.exe.



Note

The firmware image file (*.exe) is a compressed file. You can use Stuffit Expander to expand (uncompress) this file.



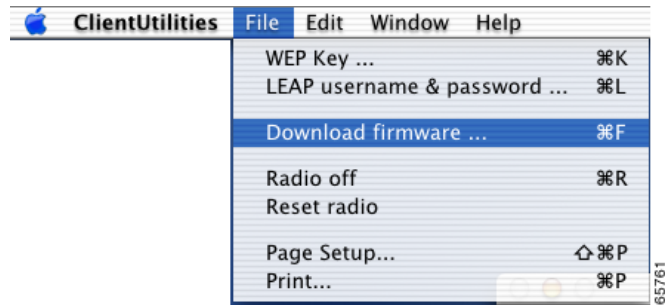
Note

To support the message integrity check (MIC) feature, you must use firmware version 4.25.23 or later.

- d. Read and accept the terms and conditions of the Software License Agreement.
- e. Select the Cisco server from which to download the file.
- f. Save the file to your hard drive then exit the web browser.

- Step 2** Locate and use the Stuffit Expander program on your hard drive to expand (uncompress) the radio firmware image file (*.exe) you copied to your hard drive. This creates an image file (filename.img) in the folder where the compressed file is located.
- Step 3** Make sure your client adapter is installed in your computer (refer to “[Inserting the Client Adapter into a Computing Device](#)” section on page 3-8).
- Step 4** Select **Download firmware** from the File pull-down menu (see [Figure 6-5](#)). The file location screen appears.

Figure 6-5 File Pull-Down Menu



- Step 5** Click the up and down arrows on the right of the From field and select the location (volume and folder) of the new radio firmware file on your hard disk.
- Step 6** Click the new radio firmware image file (*.img); see [Figure 6-6](#).

Figure 6-6 Firmware File Location Screen



- Step 7** Click the **Open** button. A dialog box appears indicating the progress of the download. The selected image is loaded into the client adapter's Flash memory.
- Step 8** Click **OK** when a message appears indicating the firmware download was successful.

Advanced Properties

The advanced properties screen is similar to the basic properties screen but provides additional screen tabs to configure advanced settings and to provide status information for the wireless network.

To access the advanced properties screen perform the following steps:

-
- Step 1** Click the up and down arrows to the right of the basic properties field (see [Figure 6-2](#)).
- Step 2** Select **Advanced** on the pull-down menu and the advanced properties screen appears.
-

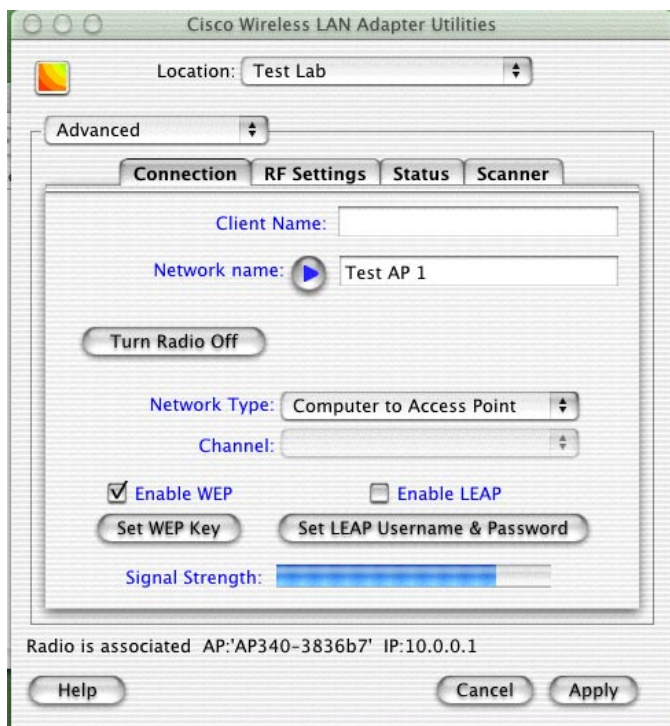
The following tabs are provided on the advanced properties screen (see [Figure 6-7](#)):

- **Connection**—allows you to specify the network type and the network name for your wireless network. You can also turn the radio on or off.
- **RF Settings**—allow you to specify RF (radio) parameters.
- **Status**—allows you to view client adapter status information.
- **Scanner**—allows you to view information on detected access points.

Advanced Connection Properties

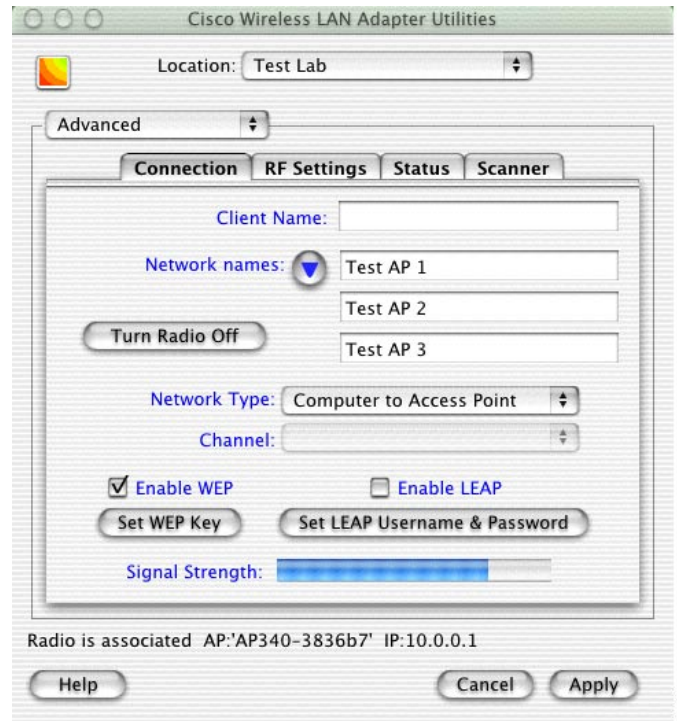
To access the advanced connection properties screen, click the **Connection** tab (see [Figure 6-7](#)).

Figure 6-7 Client Utility Advanced Connection Properties Screen



The advanced connection properties screen is similar to the basic properties screen but allows you to specify a client name for your client adapter and up to three network names or SSIDs (see [Figure 6-8](#)).

Figure 6-8 Client Utility Advanced Connection Parameters Screen



[Table 6-4](#) lists and describes the client adapter’s system parameters on the advanced connection parameters screen. Follow the instructions in the table to initially set or change any parameter. Click **Apply** at the bottom of the advanced connection properties screen to save any changes you have made, or click **Cancel** to exit the client utility.

Table 6-4 Advanced Connection Properties Screen Parameters

Parameter	Description
Location	Specifies different wireless network profile settings used in various locations, such as your office, home, factory, or airport. For each profile, you can specify unique connection parameters required for that operating location. For additional information see the “Location Profiles” section on page 6-6. Range: Up to 16 locations can be specified Default: Default
Client Name	A logical name for your client adapter. It enables an administrator to quickly determine which devices are connected to the access point. This name is included in the access point’s list of connected devices. Range: Up to 16 characters Note Each computer on the network should have a unique client name.

Table 6-4 Advanced Connection Properties Screen Parameters (continued)

Parameter	Description						
Network Name	<p>Network name is the same as service set identifier (SSID) and it identifies the wireless network that you want to access. Up to three names can be specified for different wireless networks by pressing the arrow on the right of the Network Name field (see Figure 6-7).</p> <p>Range: Up to 32 characters (case sensitive) for each name</p> <p>Note If you leave this parameter blank, your client adapter can associate to any access point or wireless device on the network that is configured to allow broadcast SSIDs. If the access points or wireless devices with which you wish to communicate are not configured to allow broadcast SSIDs, the value of this parameter must exactly match their SSID or network name. Otherwise, you cannot access the access point or wireless device.</p>						
Network Type	<p>Specifies the type of network in which your client adapter is installed.</p> <p>Default: Computer to Access Point</p> <table border="1"> <thead> <tr> <th>Network Type</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Computer to Computer</td> <td>Also referred to as <i>ad hoc</i> or <i>peer to peer</i>. Used to set up a small network between two or more wireless devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.</td> </tr> <tr> <td>Computer to Access Point</td> <td>Also referred to as <i>infrastructure</i>. Used to set up a connection to a wired Ethernet network (through an access point).</td> </tr> </tbody> </table>	Network Type	Description	Computer to Computer	Also referred to as <i>ad hoc</i> or <i>peer to peer</i> . Used to set up a small network between two or more wireless devices. For example, an ad hoc network could be set up between computers in a conference room so users can share information in a meeting.	Computer to Access Point	Also referred to as <i>infrastructure</i> . Used to set up a connection to a wired Ethernet network (through an access point).
Network Type	Description						
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Computer to Access Point	Also referred to as <i>infrastructure</i> . Used to set up a connection to a wired Ethernet network (through an access point).						
Channel	<p>Specifies which frequency your client adapter uses as the channel for communications. These channels conform to the IEEE 802.11 Standard for your regulatory domain.</p> <ul style="list-style-type: none"> In infrastructure mode, this parameter is set automatically and cannot be changed. The client adapter listens to the entire spectrum, selects the best access point to associate to, and uses the same frequency as that access point. In ad hoc mode, the channel of the client adapter must be set to match the channel used by the other clients with which you wish to communicate. <p>Range: Dependent on regulatory domain Example: 1 to 11 (2412 to 2462 MHz) in North America</p> <p>Note Refer to Appendix D, “Channels and Antenna Settings” for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>						

Table 6-4 Advanced Connection Properties Screen Parameters (continued)

Parameter	Description
Enable WEP	<p>Enables or disables Wired Equivalent Privacy (WEP) for your client adapter.</p> <ul style="list-style-type: none"> If you want to enable WEP for your client adapter, you must select this check box and create a WEP key. Refer to Chapter 4, “Security Features” for more information on WEP and instructions on setting a WEP key. <p>Note This check box can also be used to disable WEP. If you enable LEAP for your client adapter, this check box is selected automatically.</p> <p>Default: Deselected</p>
Enable LEAP	<p>Enables or disables LEAP (also referred to as <i>EAP - Cisco Wireless</i>) for your client adapter.</p> <p>If you want to enable LEAP for your client adapter, you must select this check box and set a LEAP username and password. Refer to Chapter 4, “Security Features,” for more information about LEAP and instructions on setting a LEAP username and password.</p> <p>Default: Deselected</p>

[Table 6-5](#) describes the buttons on the advanced connection properties screen.

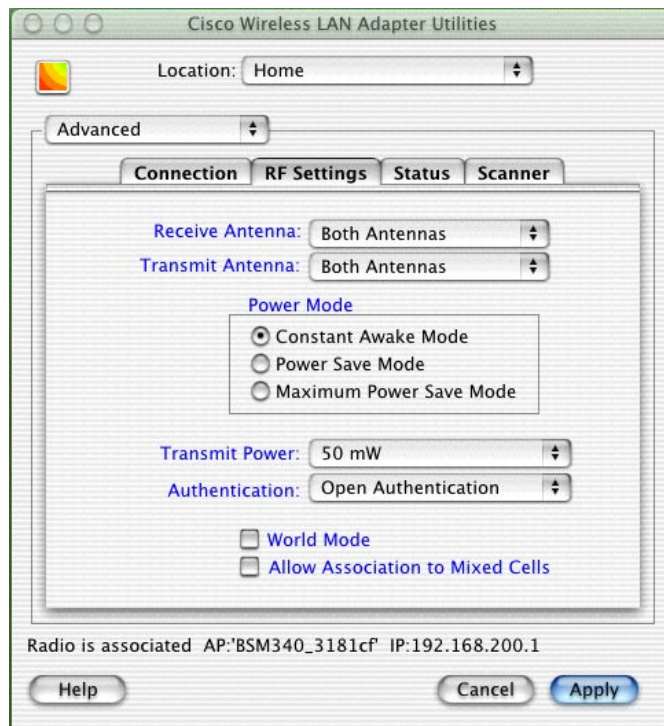
Table 6-5 Buttons on the Advanced Connection Properties Screen

Button	Description
Network Name Right Arrow or Down Arrow	Allows you to specify one or up to three network names. The right arrow indicates one network name can be entered. When you click the right arrow, it changes to a down arrow to indicate three network names can be entered and Network Name changes to Network Names.
Turn Radio On Turn Radio Off	Turns the client adapter radio on or off. The button changes to indicate the operation to be performed; for example: <i>Turn Radio On</i> indicates the radio is turned on when you click the button and <i>Turn Radio Off</i> indicates the radio is turned off when you click the button.
Set WEP Key	Allows you to set up to four WEP keys (for additional information refer to Chapter 4, “Security Features”).
Set LEAP Username/Password	Allows you to set your LEAP username and password (for additional information refer to Chapter 4, “Security Features”).
Cancel	Exits the application or screen without saving revised settings.
Apply	Exits the application or screen and saves the revised settings.
Help	Allows you to access the client utility help screen (for additional information see “Getting Help” section on page 1-12).

Setting RF Parameters

The advanced RF settings screen (see [Figure 6-9](#)) enables you to set parameters that control how your client adapter transmits and receives data. To access this screen, click the **RF Settings** tab on the advanced properties screen.

Figure 6-9 Client Utility Advanced RF Settings Screen



The advanced RF settings screen allows you to specify advanced radio parameters and also provides the following information:

- **Location**—Allows you to define up to 16 different wireless network profiles for various operating locations. In each profile you can specify a network type, network name, plus WEP and LEAP security settings for that operating location. For additional information, see the [“Location Profiles” section on page 6-6](#).
- **Radio Status**—Shows the operational mode of your client adapter. If your client adapter is associated to an access point or wireless device, the name and IP address are displayed.
 - **Radio associated**—Your client adapter is associated to an access point or other wireless device. The access point or wireless device name and IP address are shown.
 - **Radio not associated**—Your client adapter is ready and enabled but not associated to an access point or wireless device.

Table 6-6 lists and describes the parameters on the Client Utility Advanced RF Network Settings screen. Follow the instructions in the table to initially set or change any parameters. Click **Apply** at the bottom of the screen to save any changes you make.

Table 6-6 Client Utility Advanced RF Settings Screen Parameters

Parameter	Description
Location	<p>Allows you to define up to 16 different wireless network profiles for various operating locations. For each profile you can specify unique RF network parameters required for that operating location. For additional information see the “Location Profiles” section on page 6-6.</p> <p>Range: Up to 16 locations</p> <p>Default: Default</p>
Receive Antenna	<p>Specifies the antenna that your client adapter uses to receive data.</p> <ul style="list-style-type: none"> PC card—The PC card’s integrated, permanently attached antenna operates best when used in Antennas 1 and 2 mode (also referred to as <i>diversity mode</i>). Diversity mode allows the card to use the better signal from its two antenna ports. <p>Range: Left Antenna, Right Antenna, Both Antennas</p> <p>Default: Both Antennas</p> LM card—The LM card is shipped without an antenna; however, an antenna can be connected through the card’s external connector. If a snap-on antenna is used, diversity mode is recommended. Otherwise, select the mode that corresponds to the antenna port to which the antenna is connected. <p>Range: Left Antenna, Right Antenna, Both Antennas</p> <p>Default: Both Antennas</p> PCI client adapter—The PCI client adapter must use the Right Antenna. <p>Default: Right Antenna</p>
Transmit Antenna	<p>Specifies the antenna that your client adapter uses to transmit data. See the Receive Antenna parameter above for information on the options available for your client adapter.</p>

Table 6-6 Client Utility Advanced RF Settings Screen Parameters (continued)

Parameter	Description								
Power Save Mode	<p>Sets your client adapter to its optimum power consumption setting.</p> <p>Range: Constant Awake Mode, Power Save Mode, and Maximum Power Save Mode</p> <p>Default: Constant Awake Mode (CAM)</p>								
	<table border="1"> <thead> <tr> <th>Power Save Mode</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Constant Awake Mode (CAM)</td> <td> <p>Keeps the client adapter powered up continuously so there is little lag in message response time.</p> <p>Consumes the most power but offers the highest throughput. Recommended for desktop computers and devices that use AC power.</p> </td> </tr> <tr> <td>Power Save Mode (PSP)</td> <td> <p>Switches between a PSP mode and CAM mode, depending on network traffic. This mode switches to CAM when retrieving a large number of packets and switches back to PSP after the packets have been retrieved.</p> <p>Recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP.</p> </td> </tr> <tr> <td>Maximum Power Save Mode (Max PSP)</td> <td> <p>Causes the access point to buffer incoming messages for the client adapter, which wakes up periodically and polls the access point to see if any buffered messages are waiting for it. The adapter can request each message and then go back to sleep.</p> <p>Conserves the most power but offers the lowest throughput. Recommended for devices for which power consumption is the ultimate concern (such as small battery-powered devices).</p> </td> </tr> </tbody> </table>	Power Save Mode	Description	Constant Awake Mode (CAM)	<p>Keeps the client adapter powered up continuously so there is little lag in message response time.</p> <p>Consumes the most power but offers the highest throughput. Recommended for desktop computers and devices that use AC power.</p>	Power Save Mode (PSP)	<p>Switches between a PSP mode and CAM mode, depending on network traffic. This mode switches to CAM when retrieving a large number of packets and switches back to PSP after the packets have been retrieved.</p> <p>Recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP.</p>	Maximum Power Save Mode (Max PSP)	<p>Causes the access point to buffer incoming messages for the client adapter, which wakes up periodically and polls the access point to see if any buffered messages are waiting for it. The adapter can request each message and then go back to sleep.</p> <p>Conserves the most power but offers the lowest throughput. Recommended for devices for which power consumption is the ultimate concern (such as small battery-powered devices).</p>
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Table 6-6 Client Utility Advanced RF Settings Screen Parameters (continued)

Parameter	Description						
Authentication	<p>Defines how your client adapter attempts to authenticate to an access point.</p> <p>Range: Open Authentication or Shared Authentication</p> <p>Default: Open Authentication</p> <table border="1"> <thead> <tr> <th>Authentication</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Open</td> <td>Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.</td> </tr> <tr> <td>Shared</td> <td> <p>Allows your client adapter to communicate only with access points that have the same WEP keys.</p> <p>The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p> </td> </tr> </tbody> </table> <p>Note If LEAP is enabled on your client adapter, Open is the only available option.</p> <p>Note The Shared Authentication option is available only if the client adapter has been assigned a WEP key and WEP is enabled. Refer to the Chapter 4 for instructions on setting a WEP key and enabling WEP.</p>	Authentication	Description	Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.	Shared	<p>Allows your client adapter to communicate only with access points that have the same WEP keys.</p> <p>The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p>
Authentication	Description						
Open	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point.						
Shared	<p>Allows your client adapter to communicate only with access points that have the same WEP keys.</p> <p>The access point sends a known unencrypted “challenge packet” to the client adapter, which encrypts the packet and sends it back to the access point. The access point attempts to decrypt the encrypted packet and sends an authentication response packet indicating the success or failure of the decryption back to the client adapter.</p>						
Transmit Power	<p>Defines the level at which your client adapter transmits power. This value must not be higher than that allowed by your country’s regulatory agency (FCC in the U.S., DOC in Canada, ETSI in Europe, MKK in Japan, etc.). When World Mode is enabled, only the transmit power levels supported by the country of operation’s regulatory agency are available (refer to Appendix D, “Channels and Antenna Settings”).</p> <p>Range: 1, 5, 15, 30 mW (340 series client adapters) 1, 5, 20, 30, 50, or 100 mW (350 series client adapters)</p> <p>Default: The minimum level allowed by your country’s regulatory agency</p> <p>Note Reducing the transmit power level conserves battery power but decreases radio range.</p>						

Table 6-6 Client Utility Advanced RF Settings Screen Parameters (continued)

Parameter	Description
World Mode	<p>Selecting this check box enables the client adapter to assume the legal transmit power level and channel set of the access point to which it is associated. This parameter is available only in computer to access point (infrastructure) mode and is designed for users who travel between countries because it allows the adapter to be used in different regulatory domains.</p> <p>Default: Deselected</p> <p>Note When World Mode is enabled, only the transmit power levels supported by the country of operation's regulatory agency are available.</p>
Allow Association To Mixed Cells	<p>If your network's access points are set to communicate with either WEP-enabled or WEP-disabled clients (that is, if the Use of Data Encryption by Stations parameter on the AP Radio Data Encryption screen is set to Optional), you must select this check box, even if your client adapter is not using WEP. If this setting is not enabled, your client adapter cannot establish a connection with the access point.</p> <p>Default: Deselected</p> <p>Note For security reasons, Cisco recommends that both WEP-enabled and WEP-disabled clients not be allowed in the same cell because broadcast packets will be sent unencrypted, even to clients running WEP.</p>

Turning Your Client Adapter Radio On or Off

Your client adapter radio can be turned on or off. Turning the radio off prevents the adapter from transmitting RF energy. You might want to turn off the client adapter radio when you are not transmitting data and want to conserve battery power or when you are using a laptop on an airplane and want to prevent the adapter's transmissions from potentially interfering with electronic devices.

If the radio is not turned off, it periodically sends out inquiry packets even if it is not associated to an access point, as required by the 802.11 specification. Therefore, it is important to turn it off around devices that are susceptible to RF interference.

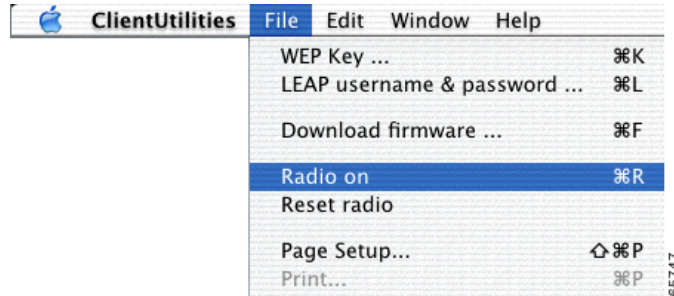


Note Your client adapter is not associated while the radio is off.

Follow the steps below to turn the client adapter's radio on or off.

- Step 1** To turn your radio on, perform one of the following steps:
- Select **Radio On** from the File pull-down menu (see [Figure 6-10](#)).

Figure 6-10 File Pull-Down Menu

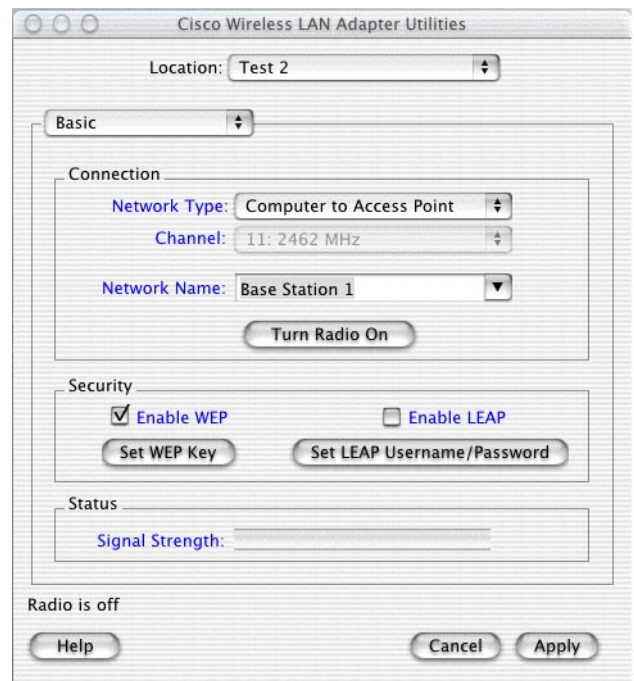


Note

The menu option changes to Radio Off when the radio is powered up.

- Click the **Turn Radio On** button on the basic properties screen (see [Figure 6-11](#)).

Figure 6-11 Client Utility Basic Properties Screen

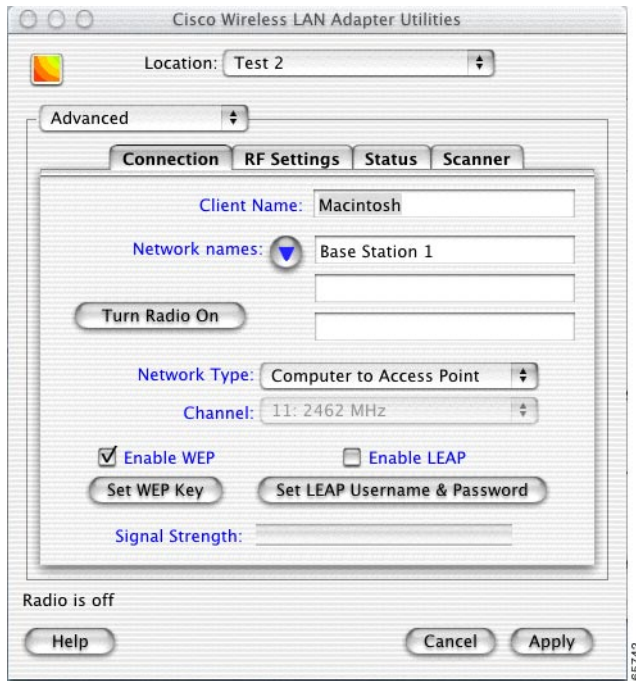


Note

The Turn Radio On button changes to Turn Radio Off when the radio is powered up.

- c. Click the **Turn Radio On** button on the advanced properties screen (see Figure 6-12).

Figure 6-12 Client Utility Advanced Properties Connection Screen



Note

The Turn Radio On button changes to Turn Radio Off when the radio is powered up.

Step 2

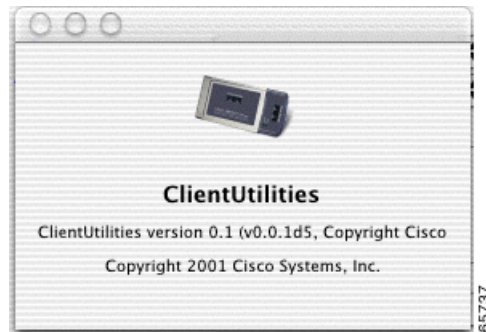
To turn your radio off, perform one of the following steps:

- a. Select **Radio Off** from the File pull-down menu
- b. Click the **Turn Radio Off** button on the basic properties screen
- c. Click the **Turn Radio Off** button on the advanced properties screen.

Obtaining Software Version Information

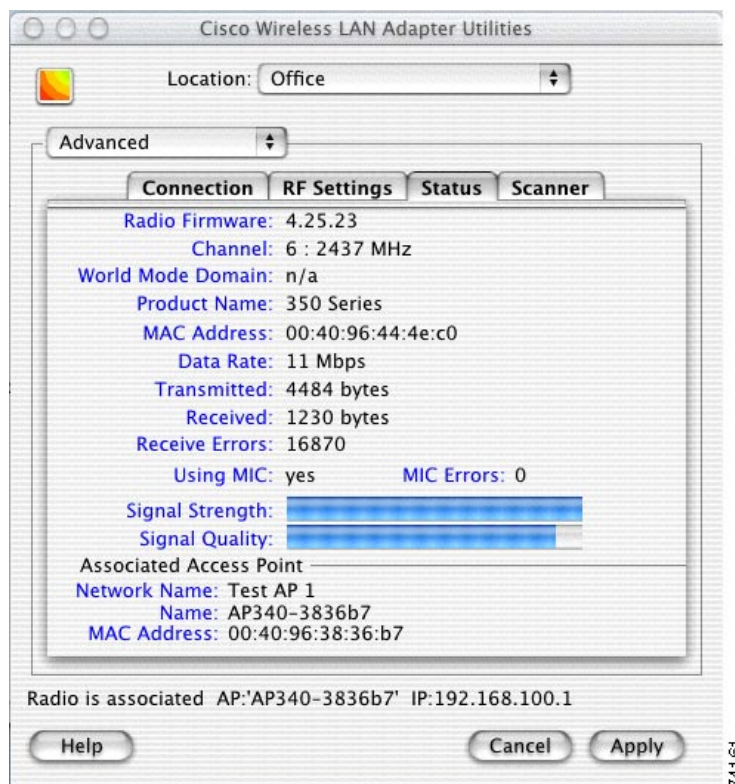
To obtain your client utility version, click **Client Utility** on the main menu bar and select **About Aironet Client Utility** from the pull-down menu. The Client Utility About screen displays and contains the client utility version number (see [Figure 6-13](#)).

Figure 6-13 Client Utility About Screen



To obtain your radio firmware version, click the **Status** tab on the advanced properties screen. The status screen (see [Figure 6-14](#)) appears and displays your client adapter radio firmware version number plus other information.

Figure 6-14 Client Utility Advanced Properties Status Screen





Performing Diagnostics

This chapter describes the client utility tools that enable you to assess the operation and performance of the client adapter and the wireless network.

The following topics are covered in this chapter:

- [Diagnostic Tools for Mac OS 9.x, page 7-2](#)
- [Diagnostic Tools for Mac OS X, page 7-15](#)

Diagnostic Tools for Mac OS 9.x

In addition to enabling you to configure your client adapter for use in various types of networks, the pcm3x0PPC client utility provides tools that enable you to assess the performance of the client adapter and other devices on the wireless network. ACU diagnostic tools perform the following functions:

- Display your client adapter's current status and configured settings
- Display statistics pertaining to your client adapter's transmission and reception of data
- Display the link status meter or run an RF link test to assess the performance of the RF link between your client adapter and its associated access point

Viewing the Current Status of Your Client Adapter

The pcm3x0PPC client utility enables you to view the current status of your client adapter as well as all of the settings configured for the adapter.

To view your client adapter's status and settings, select **Status** from the File pull-down menu (see [Figure 7-1](#)) and the **Link Status** tab.



Note

Up to four Status screens can be open at a time.

Figure 7-1 File Pull-Down Menu

File	Edit	Windows	Help
Close			⌘W
Basic properties			⌘B
Edit properties			⌘E
Status			⌘T
Get Info			⌘I
Radio off			⌘R
Quit			⌘Q

50084

The Status Screen appears (see [Figure 7-2](#)).

Figure 7-2 Status Screen

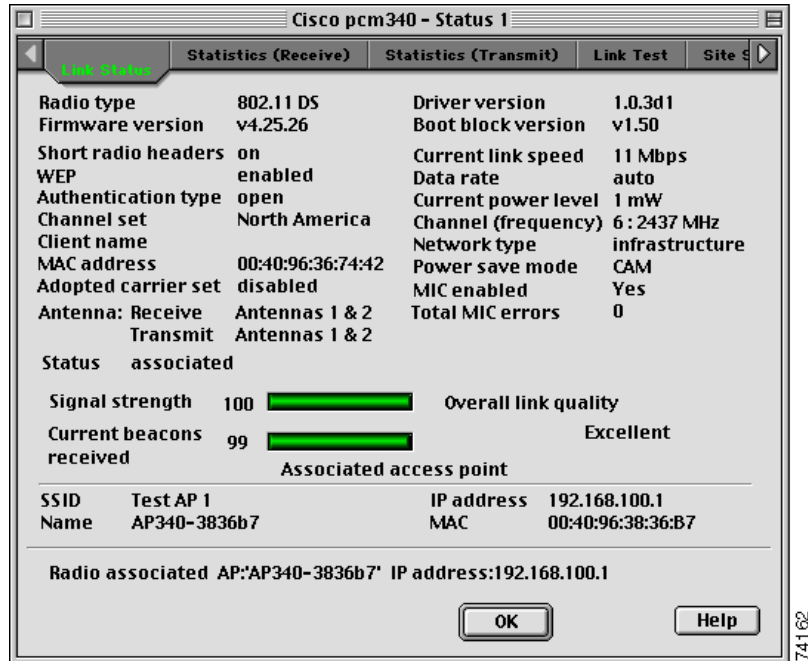


Table 7-1 describes each client adapter setting for which a status is displayed.

Table 7-1 Client Adapter Status

Client Adapter Setting	Description
Radio Type	A description of your client adapter's radio. For example, 802.11 DS indicates that the radio is an IEEE 802.11-compliant direct-sequence spread spectrum radio.
Firmware Version	The version of the firmware that is currently running on your client adapter.
Driver Version	The version of the driver that is currently installed on your computer.
Boot Block Version	The version of the boot block firmware that is currently in your client adapter. The boot block firmware contains identification information for the client adapter and functions to start up the radio and pass control to the main firmware, which (unlike the boot block) can be modified and upgraded by the user.
Short Radio Headers	Indicates whether your client adapter is set up to use short radio headers. Value: On, Off, or Unknown Note Refer to the Short Preamble parameter in Table 5-4 for information on using short radio headers.
WEP	Your client adapter's current WEP status. Value: Enabled or Disabled Note Refer to the "Enabling WEP" section on page 4-9 for instructions on enabling WEP.

Table 7-1 Client Adapter Status (continued)

Client Adapter Setting	Description
Authentication type	<p>Indicates whether the client adapter must share the same WEP keys as the access point in order to communicate or can communicate with the access point regardless of its WEP settings.</p> <p>Value: Open, Shared Key, or Unknown</p> <p>Note Refer to the Authentication Type parameter in Table 5-4 for information on setting the client adapter's authentication type.</p>
Channel set	<p>The regulatory domain for which your client adapter is currently configured, such as North America. This value is not user selectable.</p> <p>Note Refer to Appendix D, "Channels and Antenna Settings" for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>
Client name	<p>The name your client adapter uses when it associates to an access point.</p> <p>Note Refer to the Client Name parameter in Table 5-3 for information on setting the client name.</p>
MAC address	The MAC address assigned to your client adapter at the factory.
Adopted carrier set	<p>When world mode is enabled and your client adapter has associated to an access point, this is the channel set adopted by the adapter from the access point.</p> <p>Value: Disabled, Unknown, North America, Europe, Japan, Spain, France, Belgium, Israel, Canada, Australia</p>
MIC enabled	<p>Indicates whether your client adapter is using message integrity check (MIC) to protect bit-flip attacks on encrypted packets. During a bit-flip attack, an intruder intercepts an encrypted message, alters it slightly, and retransmits it, and the receiver accepts the retransmitted message as legitimate. Client adapters using driver version 1.0.3 and firmware version 4.25.2x or greater support MIC; however, MIC can be used only if it is also enabled on the access point.</p> <p>Note If the access point is using MIC, your client adapter's driver and firmware must support MIC; otherwise, the client cannot associate.</p> <p>Value: Yes—client adapter radio is MIC capable, MIC is enabled on the access point, and MIC is being used. No—client adapter radio is MIC capable, MIC is enabled on the access point, but MIC is not being used. N/A—client adapter radio is not MIC capable. Disabled—client adapter radio is MIC capable, but MIC is disabled.</p>
Total MIC errors	Indicates the total number of MIC errors that have occurred.
Current link speed	<p>The rate at which your client adapter is currently transmitting data packets.</p> <p>Value: 1, 2, 5.5, or 11 Mbps</p>

Table 7-1 Client Adapter Status (continued)

Client Adapter Setting	Description
Data rate	<p>The rate at which your client adapter has been configured to transmit or receive data packets.</p> <p>Value: 1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps, or Auto</p> <p>Note Refer to the Data Rate parameter in Table 5-4 for information on setting the client adapter's data rate.</p>
Current power level	<p>The power level at which your client adapter is currently transmitting. The maximum level is dependent upon the radio installed in your client adapter and your country's regulatory agency.</p> <p>Value: 1, 5, 15, 20, 30, 50, or 100 mW (30 mW is the maximum power level supported by 340 series client adapters)</p> <p>Note 15 mW is supported by 340 series client adapters only, and 20 mW is supported by 350 series client adapters only.</p> <p>Note Refer to the Transmit Power parameter in Table 5-4 for information on setting the client adapter's power level.</p>
Channel (frequency)	<p>The frequency that your client adapter is currently using as the channel for communications.</p> <p>Value: Dependent on regulatory domain</p> <p>Note Refer to the Channel parameter in Table 5-4 for information on selecting the frequency for your client adapter.</p>
Network type	<p>The type of network in which your client adapter is being used.</p> <p>Value: Infrastructure, Ad Hoc, or Unknown</p> <p>Note Refer to the Network Type parameter in Table 5-3 for information on setting the network type.</p>
Power save mode	<p>The client adapter's current power consumption setting.</p> <p>Value: CAM, Fast Power Save, Max Power Save, or Unknown</p> <p>Note Refer to the Power Save Mode parameter in Table 5-3 for information on setting the client adapter's power save mode.</p>
Antenna	<p>The antenna mode that your client adapter is currently using.</p> <p>Value: Antennas 1 and 2, Antenna 1 Only, Antenna 2 Only (Antenna 1 Only is the only option available for PCI client adapters)</p> <p>Note Refer to the Transmit Antenna Mode and Receive Antenna Mode parameters in Table 5-5 and Table 5-6 for information on setting the antenna mode.</p>
Status	<p>The operational mode of your client adapter.</p> <p>Value: Error, Configured, Associated, Not Associated, or Ad Hoc Mode</p>
Signal strength	<p>The signal strength for all received packets. The higher the value and the longer the green the bar graph is, the stronger the signal.</p> <p>Range: 0 to 100%</p>

Table 7-1 Client Adapter Status (continued)

Client Adapter Setting	Description
Current beacons received	<p>The percentage of beacon packets received versus those expected to be received. The higher the value and the longer the green the bar graph is, the better the quality of the signal.</p> <p>Example:The access point sends out 10 beacons per second, so you would expect the client adapter to receive 50 beacon packets in 5 seconds. If it receives only 40 packets, the percentage of beacons received would be 80%.</p> <p>Range:0 to 100%</p>
Overall link quality	<p>The client adapter's ability to communicate with the access point, which is determined by the combined result of the adapter's signal strength and signal quality.</p> <p>Value:Not Associated, Poor, Fair, Good, Excellent</p>
SSID	<p>The SSID that your client adapter is currently using if you are in infrastructure mode.</p> <p>Note Refer to the SSID1 parameter in Table 5-1 for information on the client adapter's SSID.</p>
Name	<p>The name of the access point to which your client adapter is associated. It is shown only if the access point was configured with a name and you are in infrastructure mode.</p>
IP address	<p>The IP address of the access point to which your client adapter is associated. It is shown only if the access point was configured with an IP address and you are in infrastructure mode.</p>
MAC	<p>The MAC address of the access point to which your client adapter is associated. It is shown only if you are in infrastructure mode.</p>

Viewing Statistics for Your Client Adapter

The pcm3x0PPC client utility allows you to view statistics that indicate how data is being received and transmitted by your client adapter.

Viewing Receive Statistics

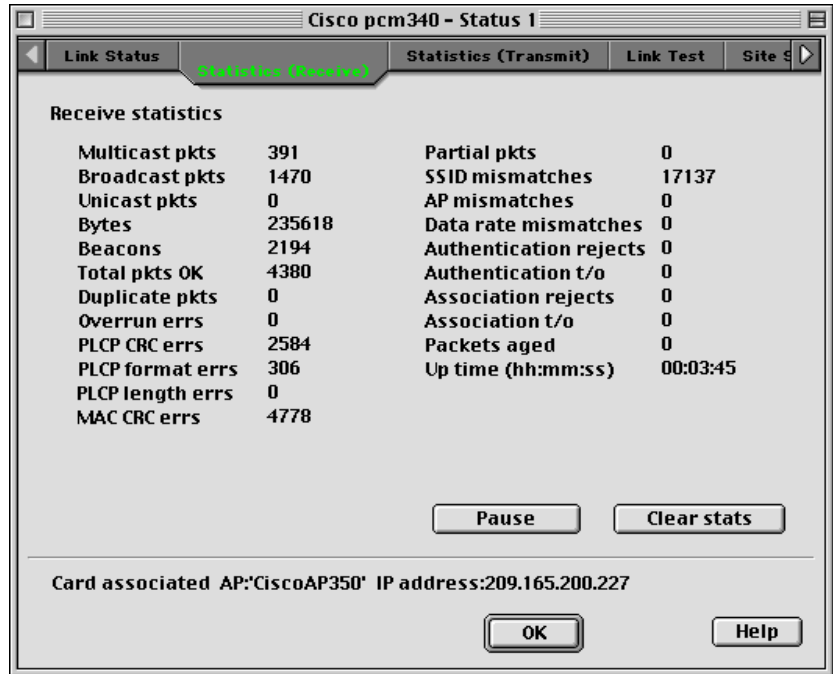
To view your client adapter's receive statistics, select **Status** from the File pull-down menu (see [Figure 7-2 on page 7-3](#)) and the **Statistics (Receive)** tab. The Receive Statistics screen appears (see [Figure 7-3](#)).



Note

To view your client adapter's transmit statistics, go to the [“Viewing Transmit Statistics” section on page 7-8](#).

Figure 7-3 Receive Statistics Screen



The statistics are calculated as soon as your client adapter is started or the Clear Stats button is selected.

Table 7-2 describes each receive statistic that is displayed for your client adapter.

Table 7-2 Client Adapter Receive Statistics

Receive Statistic	Description
Multicast Pkts	The number of multicast packets that were received successfully.
Broadcast Pkts	The number of broadcast packets that were received successfully.
Unicast Pkts	The number of unicast packets that were received successfully.
Bytes	The number of bytes of data that were received successfully.
Beacons	The number of beacon packets that were received successfully.
Total Pkts OK	The number of all packets that were received successfully.
Duplicate Pkts	The number of duplicate packets that were received successfully.
Overrun Errs	The number of packets received when no receive buffers were available. These errors usually occur when the host does not read the received packets from the client adapter fast enough.
PLCP CRC Errs	The number of times the client adapter started to receive an 802.11 physical layer convergence protocol (PLCP) header but the rest of the packet was ignored due to a cyclic redundancy check (CRC) error in the header.
PLCP Format Errs	The number of times an 802.11 PLCP header was received with a valid CRC but the rest of the packet was ignored due to an unknown value in the header.

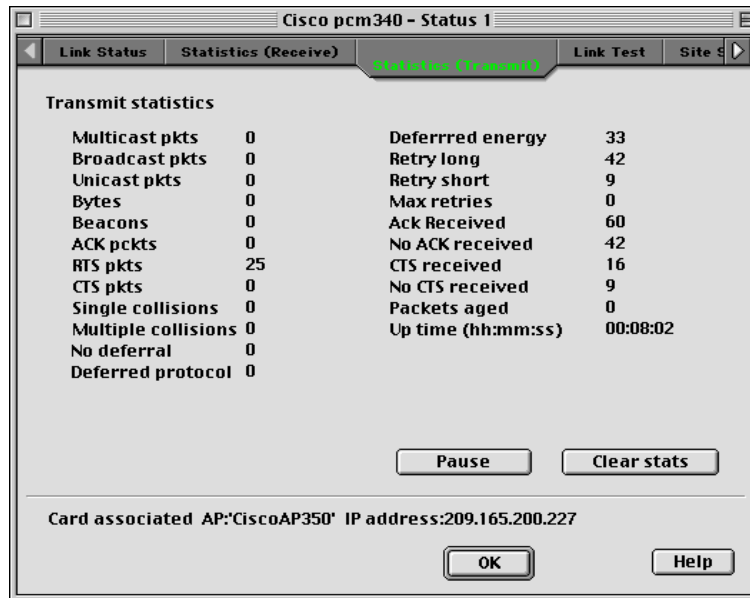
Table 7-2 Client Adapter Receive Statistics (continued)

Receive Statistic	Description
PLCP Length Errs	The number of times an 802.11 PLCP header was received but the rest of the packet was ignored due to an illegal header length.
MAC CRC Errs	The number of packets that had a valid 802.11 PLCP header but contained a CRC error in the data portion of the packet.
Partial Pkts	The number of fragments that were discarded because the entire packet was not received successfully.
SSID Mismatches	The number of times the client adapter tried to associate to an access point but was unable to because the adapter's SSID was not the same as the access point's.
AP Mismatches	The number of times the client adapter tried to associate to an access point but was unable to because the access point was not the adapter's specified access point. Note Refer to the Specified Access Point 1- 4 parameter in Table 5-5 for information on specifying access points.
Data Rate Mismatches	The number of times the client adapter tried to associate to an access point but was unable to because the adapter's data rate was not supported by the access point. Note Refer to the Data Rate parameter in Table 5-4 for information on supported data rates.
Authentication Rejects	The number of times the client adapter tried to authenticate to an access point but was rejected.
Authentication T/O	The number of times the client adapter tried to authenticate to an access point but was unable to because the access point did not respond fast enough (timed out).
Association Rejects	The number of times the client adapter tried to associate to an access point but was rejected.
Association T/O	The number of times the client adapter tried to associate to an access point but was unable to because the access point did not respond fast enough (timed out).
Packets Aged	The number of packets received successfully but discarded by the client adapter because either all fragments were not received within 10 seconds or the host did not read the packet from the adapter within 10 seconds.
Up Time (hh:mm:ss)	The amount of time (in hours:minutes:seconds) since your client adapter was started or the Clear Stats button was selected. If the client adapter has been running for more than 24 hours, the time is displayed in days, hours:minutes:seconds.

Viewing Transmit Statistics

To view your client adapter's transmit statistics, select **Status** from the File pull-down menu (see [Figure 7-1 on page 7-2](#)) and the **Statistics (Transmit)** tab. The Transmit Statistics screen appears (see [Figure 7-4](#)).

Figure 7-4 Transmit Statistics Screen



The statistics are calculated as soon as your client adapter is started or the Clear Stats button is selected. [Table 7-3](#) describes each transmit statistic that is displayed for your client adapter.

Table 7-3 Client Adapter Transmit Statistics

Transmit Statistic	Description
Multicast Pkts	The number of multicast packets that were transmitted successfully.
Broadcast Pkts	The number of broadcast packets that were transmitted successfully.
Unicast Pkts	The number of unicast packets that were transmitted successfully.
Bytes	The number of bytes of data that were transmitted successfully.
Beacons	The number of beacon packets that were transmitted successfully (in ad hoc mode only).
Ack Pkts	The number of acknowledgment (Ack) packets that were transmitted in response to successfully received unicast packets.
RTS Pkts	The number of request-to-send (RTS) packets that were transmitted successfully.
CTS Pkts	The number of clear-to-send (CTS) packets that were transmitted in response to a successfully received RTS packet.
Single Collisions	The number of packets that had to be retransmitted once due to a collision.
Multiple Collisions	The number of packets that had to be retransmitted more than once due to additional collisions.
No Deferral	The number of packets that were able to be transmitted immediately without being delayed due to energy detect or protocol deferral.

Table 7-3 Client Adapter Transmit Statistics (continued)

Transmit Statistic	Description
Deferred Protocol	The number of packets that were delayed due to 802.11 protocol reasons (such as not enough time left to send the packet).
Deferred Energy	The number of packets that were delayed because RF energy was already detected. This condition is usually caused by another radio transmitting a packet or by some other RF source jamming the signal (such as a microwave oven).
Retry Long	The number of normal data packets that were retransmitted.
Retry Short	The number of RTS packets that were retransmitted.
Max Retries	The number of packets that failed to be transmitted successfully after exhausting the maximum number of retries.
Ack Received	The number of transmitted packets that had their corresponding Ack packet received successfully.
No Ack Received	The number of transmitted packets that did not have their corresponding Ack packet received successfully.
CTS Received	The number of CTS packets that were received in response to an RTS packet.
No CTS Received	The number of packets for which no CTS packet was received in response to an RTS packet.
Packets Aged	The number of packets that were discarded by the client adapter because they were not transmitted successfully within 5 seconds.

Assessing the RF Link

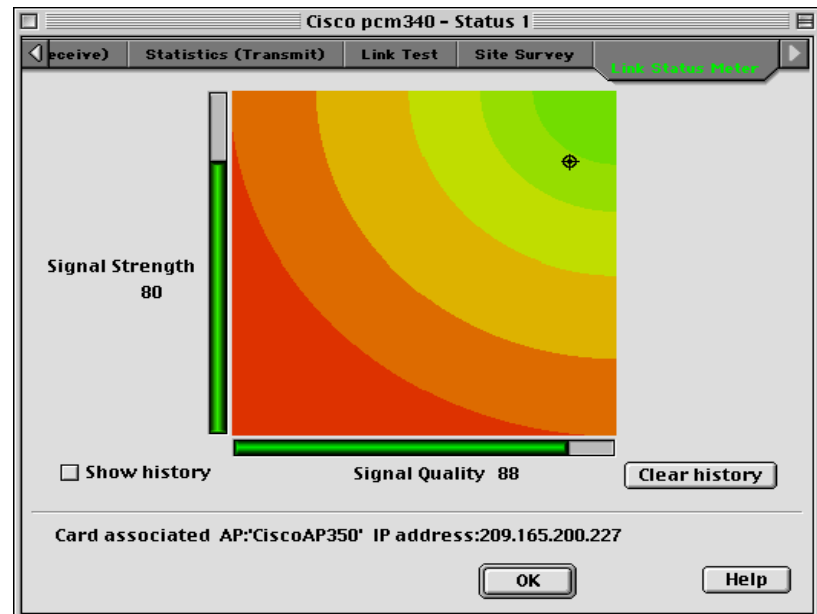
You can determine the performance of the RF link between your client adapter and its associated access point in two different ways:

- You can use the link status meter (LSM) to view a graphical display of the signal strength and quality of the client adapter's radio signal. Go to the [“Viewing the Link Status Meter”](#) section below.
- You can run an RF link test that allows you to set the number and size of the packets to be transmitted and then to determine the success or failure of those packets. Go to the [“Running an RF Link Test”](#) section on page 7-12.

Viewing the Link Status Meter

To access the Link Status Meter screen, select **Status** from the File pull-down menu (see [Figure 7-1](#)) and the **Link Status Meter** tab. The Link Status Meter screen appears (see [Figure 7-5](#)).

Figure 7-5 Link Status Meter Screen



The Link Status Meter screen provides a graphical display of the following:

- **Signal strength** – The strength of the client adapter’s radio signal at the time packets are being received. It is displayed as a percentage along the vertical axis.
- **Signal quality**—The quality of the client adapter’s radio signal at the time packets are being received. It is displayed as a percentage along the horizontal axis.

The combined result of the signal strength and signal quality is represented by a moving bull’s-eye (see [Figure 7-5](#)). Where the bull’s-eye falls on the graphical display determines the quality of the RF link between your client adapter and its associated access point. Differences in the quality of the RF link are indicated by the following colors: green (excellent), yellow (good), orange (fair), and red (poor).

This information can be used to determine the optimum number and placement of access points in your RF network. By using LSM to assess the RF link at various locations, you can avoid areas where performance is weak and eliminate the risk of losing the connection between your client adapter and the access point.

Selecting the Show History check box causes the graphical display to show a recent history of the RF performance between your client adapter and its associated access point. Black dots on the graphical display show the performance of the last 50 signals. These black dots can be cleared from the display by clicking the Clear History button.



Note

The access point that is associated to your client adapter and its IP address are indicated at the bottom of the display.

Running an RF Link Test

The pcm3x0PPC client utility's link test tool sends out pings to assess the performance of the RF link. The test is designed to be performed multiple times at various locations throughout your area and is run at the data rate set in the Edit Properties - RF Network Parameters section of the utility (see the Data Rate parameter in the "Setting RF Network Parameters" section on page 5-12). The results of the link test can be used to determine RF network coverage and ultimately the required number and placement of access points in your network. The test also helps you to avoid areas where performance is weak, thereby eliminating the risk of losing the connection between your client adapter and its associated access point.

Because the link test operates above the RF level, it does more than test the RF link between two network devices. It also checks the status of wired sections of the network and verifies that TCP/IP and the proper drivers have been loaded.



Note

A link test can also be run from an access point through a Telnet session. Refer to Chapter 4 of the *Cisco Aironet Access Point Software Configuration Guide* for information.

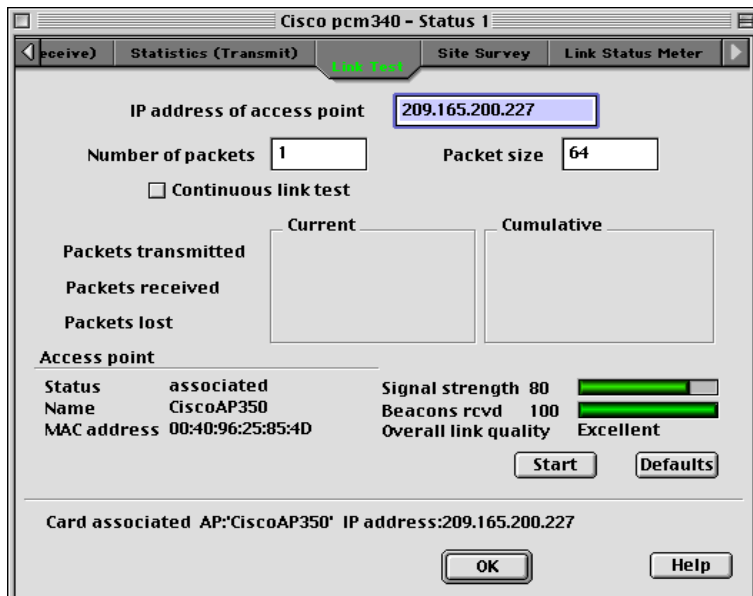
The following prerequisites are required before you can run an RF link test:

- The TCP/IP protocol must be installed on your system.
- An IP address must be configured for the access point.

Follow the steps below to run an RF link test.

- Step 1** Select **Status** from the File pull-down menu (see [Figure 7-1 on page 7-2](#)) and the **Link Test** tab. The Link Test screen appears (see [Figure 7-6](#)).

Figure 7-6 Link Test Screen



- Step 2** In the IP Address of access point field, enter the IP address of the access point with which you want to test the RF link.

Step 3 You can set the link test to run until it has attempted to send a specific number of packets or to run until you stop it. Follow one of the steps below to determine how long the link test will run:

- Type the number of packets that the link test should attempt to send in the Number of Packets field. (The Number of Packets parameter is ignored if the Continuous Link Test check box is selected.)

Range: 1 to 1000

Default: 1

- Select the Continuous Link Test check box to allow the link test to run continuously.

Default: Deselected

Step 4 Type the size of the data packet that is to be sent to the access point in the Packet Size field.

Range: 64 to 1514

Default: 64

Step 5 Click the **Start** button to run the link test. While the test is running, statistics are displayed and updated periodically.

Figure 7-7 shows the Link Test screen while it is running.

Figure 7-7 Link Test Screen (While Running)

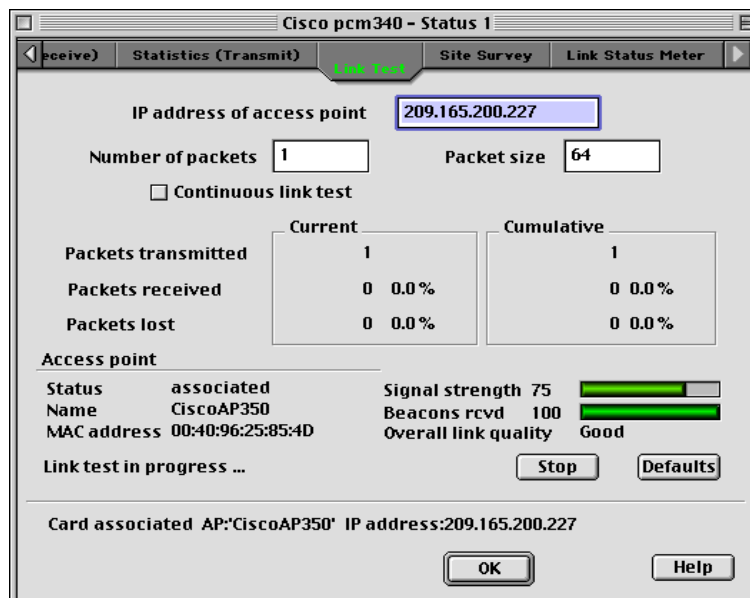


Table 7-4 interprets the statistics that are displayed on the Link Test screen while the link test is running.

Table 7-4 Link Test Statistics

Link Test Statistic	Description
Packets Transmitted	The number of packets of the specified size that have been transmitted successfully.
Packets Received	The number of packets of the specified size that have been received successfully.
Packets Lost	The number of packets of the specified size that have not been received successfully.
Status	The operational mode of your client adapter. Value: Error, Configured, Associated, Not Associated, or Ad Hoc Mode
Name	The name of the access point to which your client adapter is associated. It is shown only if the access point was configured with a name and you are in infrastructure mode.
MAC Address	The MAC address of the access point to which your client adapter is associated. It is shown only if you are in infrastructure mode.
Signal Strength	The signal strength for all received packets. The higher the value and the more green the bar graph is, the stronger the signal. Range: 0 to 100%
Beacons Received	The percentage of beacon packets received versus those expected to be received. The higher the value and the more green the bar graph is, the better the quality of the signal. Example: The access point sends out 10 beacons per second, so you would expect the client adapter to receive 50 beacon packets in 5 seconds. If it receives only 40 packets, the percentage of beacons received would be 80%. Range: 0 to 100%
Overall Link Quality	The client adapter's ability to communicate with the access point, which is determined by the combined result of the adapter's signal strength and signal quality. Value: Not Associated, Poor, Fair, Good, Excellent

Step 6 If you did not set the link test to run continuously, the test ends after the specified number of packets is sent, and the Stop button changes back to the Start button. To stop the link test at any time, click **Stop**.

Diagnostic Tools for Mac OS X

In addition to allowing you to configure your client adapter for use in various types of networks, the client utility provides tools that allow you to assess the operation of the client adapter and other devices on the wireless network. The client utility's diagnostic tools to perform the following functions:

- Display your client adapter's current status and configured settings
- Run a link test to assess the operation of the RF link between your client adapter and its associated access point
- Run a link test to assess the operation of the wired link between your access point and a wired device
- Obtain information on local access points (configured for broadcast SSID)

Viewing the Current Status of Your Client Adapter

To view your client adapter's status and settings, select the **Status** tab on the advanced properties screen. The status screen is displayed (see [Figure 7-8](#)).

Figure 7-8 Client Utility Advanced Properties Status Screen

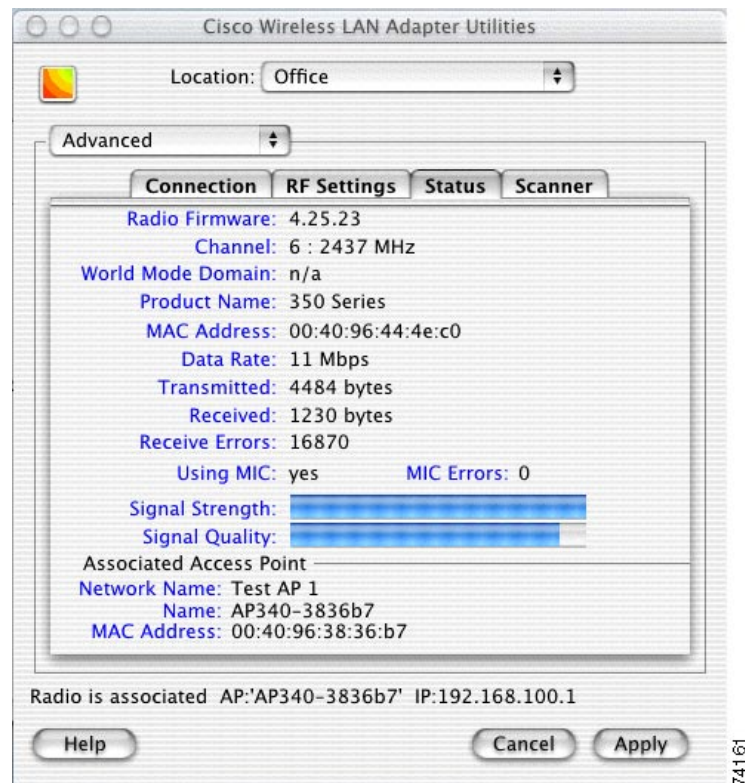


Table 7-5 describes the parameters on the status screen.

Table 7-5 Client Adapter Status Screen Parameters

Parameter	Description
Firmware Version	The version of the radio firmware that is currently running on your client adapter.
Channel	<p>Specifies which frequency your client adapter will use as the channel for communications. These channels conform to the IEEE 802.11 Standard for your regulatory domain.</p> <ul style="list-style-type: none"> In infrastructure mode, this parameter is set automatically and cannot be changed. The client adapter listens to the entire spectrum, selects the best access point to associate to, and uses the same frequency as that access point. In ad hoc mode, the channel of the client adapter must be set to match the channel used by the other clients with which you wish to communicate. <p>Range: Dependent on regulatory domain Example: 1 to 11 (2412 to 2462 MHz) in North America Note Refer to Appendix D, “Channels and Antenna Settings” for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>
World Mode Domain	<p>When world mode is enabled and your client adapter has associated to an access point, this is the channel set adopted by the adapter from the access point.</p> <p>Value: Disabled, Unknown, North America, Europe, Japan, Spain, France, Belgium, Israel, Canada, Australia</p>
Product Name	<p>Identifies the type of client adapter you are using.</p> <p>Value: 340 Series, 350 Series, or 4800 Series</p>
MAC Address	The MAC address assigned to your client adapter at the factory.
Data Rate	<p>The rate at which your client adapter is currently transmitting data packets.</p> <p>Value: 1 Mbps, 2 Mbps, 5.5 Mbps, or 11 Mbps</p>
Transmitted	The number of packets that have been transmitted successfully.
Received	The number of packets that have been received successfully.
Receive Errors	The total number of errors on receive packets.

Table 7-5 Client Adapter Status Screen Parameters (continued)

Parameter	Description
Using MIC	<p>Indicates whether your client adapter is using message integrity check (MIC) to protect bit-flip attacks on encrypted packets. During a bit-flip attack, an intruder intercepts an encrypted message, alters it slightly, and retransmits it, and the receiver accepts the retransmitted message as legitimate. Client adapters using driver version 1.0.3 and firmware version 4.25.2x or greater support MIC; however, MIC can be used only if it is also enabled on the access point.</p> <p>Note If the access point is using MIC, your client adapter’s driver and firmware must support MIC; otherwise, the client cannot associate.</p> <p>Value: Yes—client adapter radio is MIC capable, MIC is enabled on the access point, and MIC is being used. No—client adapter radio is MIC capable, MIC is enabled on the access point, but MIC is not being used. N/A—client adapter radio is not MIC capable. Disabled—client adapter radio is MIC capable, but MIC is disabled.</p>
MIC Errors	Indicates the total number of MIC errors that have occurred.
Signal Strength	The signal strength for received packets. The longer the bar graph is, the stronger the signal.
Signal Quality	The signal quality for received packets. The longer the bar graph is, the better the signal quality.
Network Name	<p>The network name or SSID of your wireless network.</p> <p>Note Refer to Table 6-1 for information on setting your wireless network’s network name.</p>
Name	The name of the access point to which your client adapter is associated. It is shown only if the access point was configured with a name and you are in infrastructure mode.
MAC Address	The MAC address of the access point or wireless device to which your client adapter is associated.

Assessing the Wireless and Wired Links

You can determine the operation of the wireless and wired links from your client adapter in two different ways:

- You can use the link status meter to view a graphical display of the signal strength and quality of the radio signals from the local access points (configured for broadcast SSID). Go to the [“Viewing the Link Status Meter”](#) section below.
- You can run a link test with an access point or a wired device. Go to the [“Running a Link Test”](#) section on page 7-19.

Viewing the Link Status Meter

To access the Link Status Meter (LSM) screen, click the LSM icon on the upper left of the Client Utility Advanced Properties Screen (see [Figure 7-9](#)).

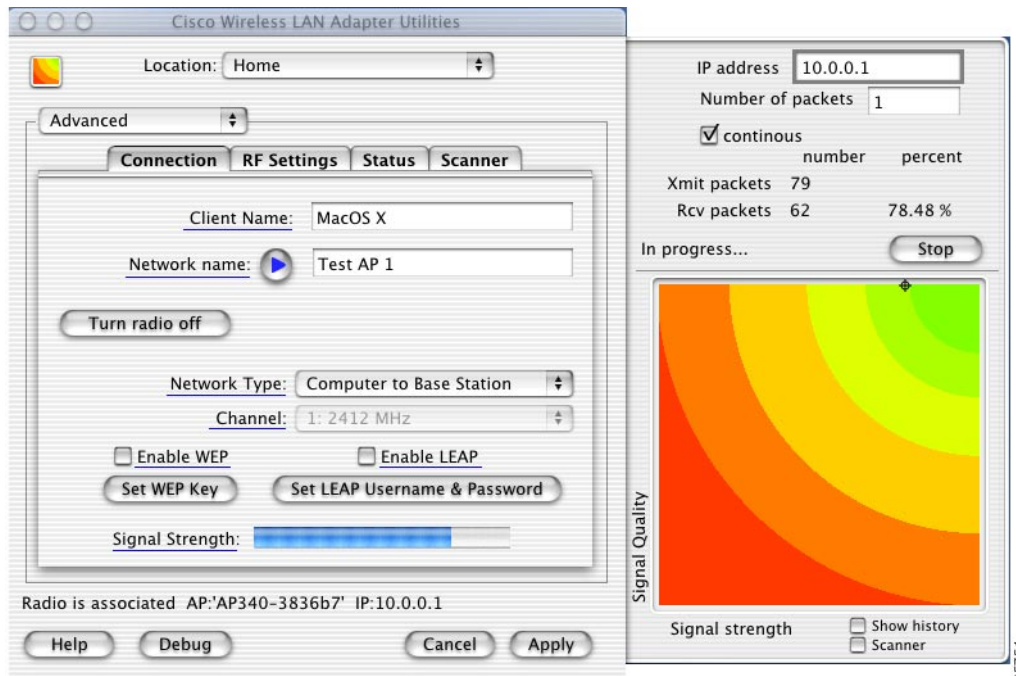
Figure 7-9 LSM Icon on Client Utility Advanced Properties Screen



When you click the LSM icon, the LSM screen typically appears on the right side of the client utility screen. If there is insufficient space on the right side of the client utility screen, the LSM screen appears on the left side.

The LSM screen is shown in [Figure 7-10](#).

Figure 7-10 LSM Screen



The LSM screen provides a graphical display of the following:

- **Signal quality**—The quality of the access point’s radio signal at the time packets are being received. It is displayed as a percentage along the vertical axis.
- **Signal strength**—The strength of the radio signal received from the associated access point. It is displayed as a percentage along the horizontal axis.

The combined result of the signal strength and signal quality is represented by a moving mark (see [Figure 7-10](#)). Where the mark falls on the graphical display determines the quality of the RF link between your client adapter and its associated access point. Differences in the quality of the RF link are indicated by the following colors: green (excellent), yellow (good), orange (fair), and red (poor).

This information can be used to determine the optimum number and placement of access points in your RF network. By using LSM to assess the RF link at various locations, you can avoid areas where performance is weak and eliminate the risk of losing the connection between your client adapter and the access point.

Selecting the Show History check box causes the graphical display to show a recent history of the RF performance between your client adapter and its associated access point. Black dots on the graphical display show the performance of the last 20 measurements.

Selecting the scanner check box causes the graphical display to show the signal strength of detected access points on a diagonal line. Each access point is identified by Network Name or SSID. If the Network Name is not available, the access point MAC address is displayed. The graphical scanner display provides a quick visual indication of the access point signals.

**Note**

When the scanner check box is checked, only access points configured for broadcast SSID are displayed. Typically, access points configured for security are not shown.

Running a Link Test

The client utility's link test tool is designed to allow you to quickly evaluate the operation of the RF link between your client adapter and the associated access point. The test can also be used to check the operation of the wired link connected to the access point. The link test sends out TCP/IP Ping packets to assess the operation of the link (RF link and wired link) between your client adapter and the destination device specified by the IP address. Initially, the IP address of the associated access point is automatically placed in the IP address field.

The link test does more than test the link between two network devices. It verifies that TCP/IP software and the proper drivers have been loaded and are operating properly.

The following prerequisites are required before you can run a link test:

- The TCP/IP protocol must be installed and operational on your Macintosh computer.
- Your Macintosh computer and the access point must have an IP address.

Follow the steps below to run a link test:

Step 1 Click the LSM icon on the upper left of the Client Utility Advanced Properties Screen (see [Figure 7-9](#)). The LSM screen appears (see [Figure 7-10](#)).

Step 2 In the IP Address field, you can enter a device IP address or use the IP address of the associated access point that is automatically placed in the field.

**Note**

You can specify the IP address of a device on the wired link connected to the access point. This allows the link test to check both the wireless and wired links.

- Step 3** You can set the link test to run until it has completed a specific number of packets or to continuously run until you stop it. Follow one of the steps below to determine how long the link test will run:
- Specify the number of packets (from 1 to 1000) that the link test sends by typing the number in the Number of Packets field. (The Number of Packets parameter is ignored if the Continuous check box is selected.)
 - Click the **Continuous** check box to allow the link test to run continuously.
- Step 4** Click the **Start** button to run the link test. While the test is running, statistics are displayed and updated periodically. For additional information, see [Table 7-6](#).
- Step 5** If you did not set the link test to run continuously, the test ends after the specified number of packets is sent, and the Stop button changes back to the Start button. To stop the link test at any time, click **Stop**.

[Table 7-6](#) interprets the statistics that are displayed on the LSM screen while the link test is running.

Table 7-6 *Link Test Statistics*

Link Test Statistic	Description
Transmitted Packets	The number of packets that have been transmitted successfully.
Received Packets	The number of packets that have been received successfully and the percentage of the total transmitted.

Determining Local Access Points

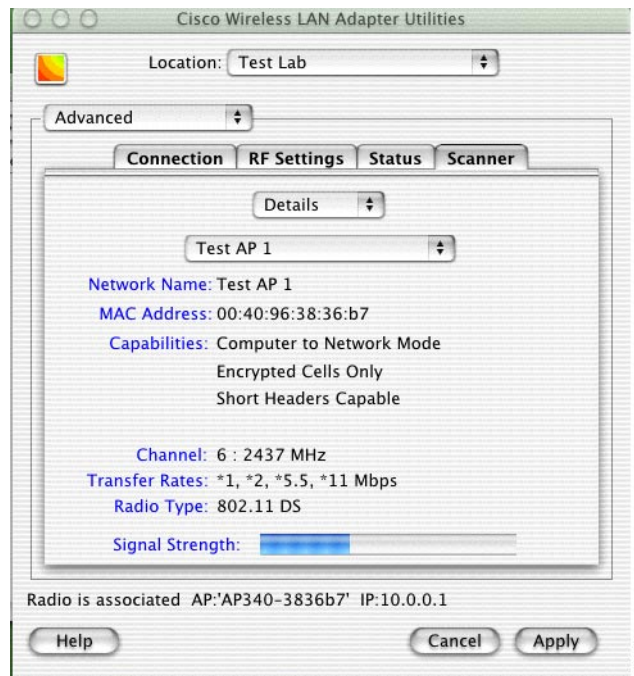
The client utility provides two methods used to detect local access points:

- Scanner Tab
- LSM Scanner

Scanner Tab

When you click the Scanner tab on the client utility advanced properties screen, the Scanner Details Screen is displayed (see [Figure 7-11](#)).

Figure 7-11 Scanner Details Screen



The scanner function displays information on the detected access points, which can be used to configure your client adapter to associate to an access point.



Note

The client utility scanner displays only local access points that are configured for broadcast SSID. Typically, broadcast SSID is deactivated on access points configured for security.

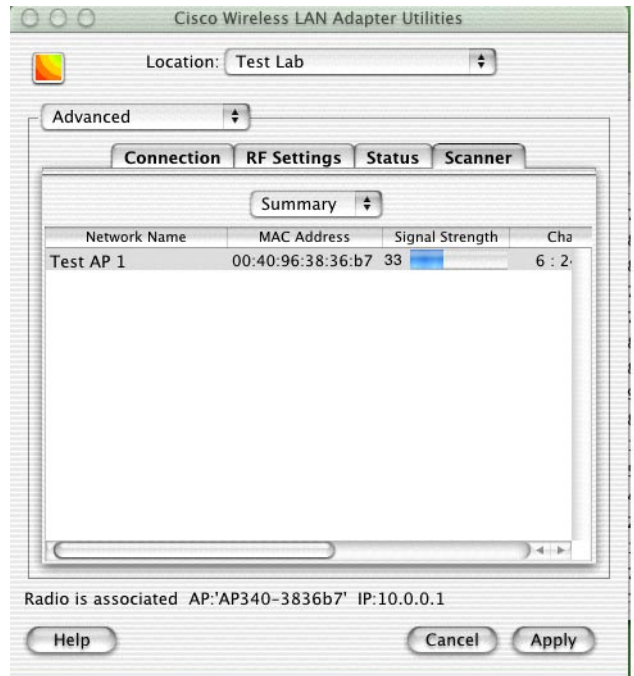
Table 7-7 lists and describes the parameters on the scanner details screen.

Table 7-7 Scanner Details Screen Parameters

Parameter	Description
Screen Format	Selects the scanner screen format. Two options are supported: Details or Summary. The <i>Details</i> option displays information on a single access point. The <i>Summary</i> option displays a tabular list of all detected access points (see Figure 7-12). Use the up and down arrows on the right of the field to select the screen format options. Range: Details or Summary Default: Details
Detected Access Points	Selects an access point from a drop-down list of detected access points. Use the up and down arrows on the right of the field to display the drop-down list of access points. Only available in the Details screen format.
Network Name	The network name or SSID of the access point.
MAC Address	The MAC address of the access point. Only available in the Details screen format.
Capabilities	The detected capabilities of the access point, such as network type, encrypted cell, and short header. Only available in the Details screen format.
Channel	The operating frequency and channel that the access point is using for communications.
Transfer Rates	The data rates supported by the access point.
Radio Type	The type of radio used by the access point.
Signal Strength	The signal strength of received signals from the access point. On the Details screen format, the longer the bar graph is, the stronger the signal.

When you select the scanner summary screen format option, the client utility provides scanner information in a list format (see [Figure 7-12](#)).

Figure 7-12 Scanner Summary Screen



Note

You can use the scroll bar at the bottom of the Scanner Summary Screen to view the other fields.

The scanner summary screen provides the following information fields:

- Network Name
- Mac Address
- Signal Strength
- Channel
- Data Rates
- Radio Type

See [Table 7-7](#) for a description of the parameters displayed on the Scanner Summary Screen.

LSM Scanner

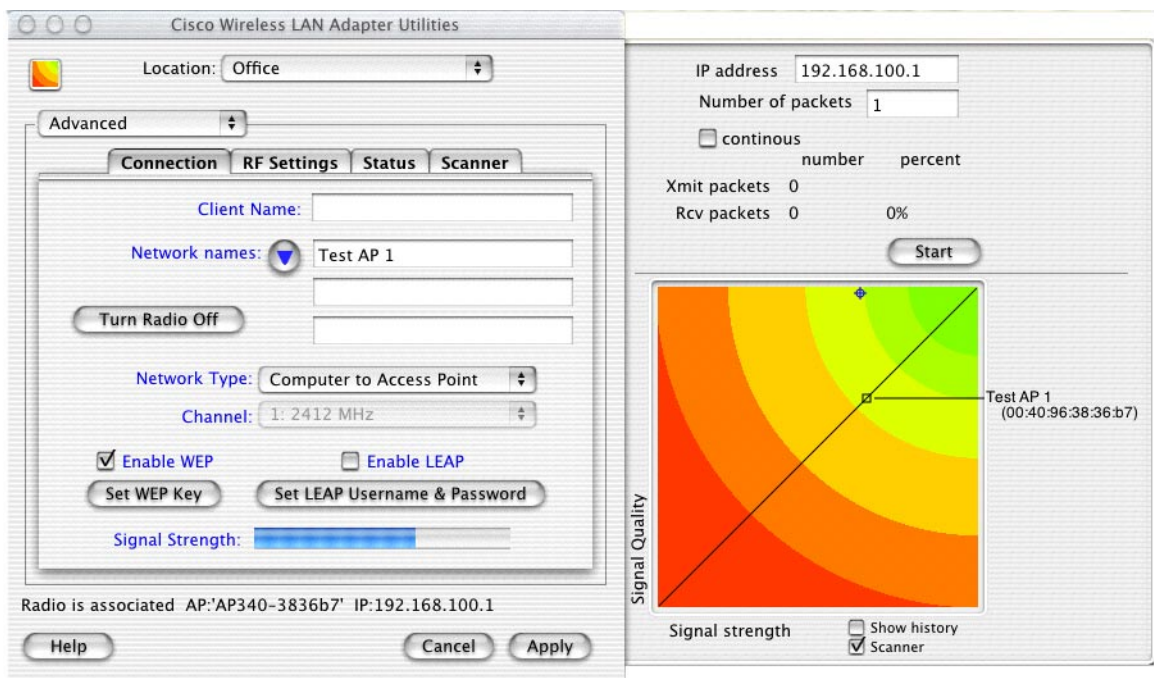
Selecting the scanner check box on the bottom of the LSM screen provides a graphical scanner display that shows the signal strength of detected access points on a diagonal line. Each access point is identified by network name or SSID. If the network name is not available, the access point MAC address is displayed. The graphical scanner display provides a quick visual indication of the access point signals (see [Figure 7-13](#)).



Note

The LSM scanner only displays access points configured for broadcast SSID. Typically, broadcast SSID is deactivated on access points that are configured for security.

Figure 7-13 LSM Scanner Screen





Routine Procedures

This chapter describes how to update or remove the driver and client utility and describes how to remove the client adapter.

The following topics are covered in this chapter:

- [Determining the Driver and Client Utility Versions, page 8-2](#)
- [Updating the Driver and Client Utility, page 8-2](#)
- [Removing the Driver and Client Utility, page 8-4](#)
- [Removing the Client Adapter, page 8-6](#)

Determining the Driver and Client Utility Versions

To determine the driver and client utility versions that your client adapter is currently using follow the procedures for your operating system:

- If you are using Mac OS 9.x, select **Get Info** from the File drop-down menu in the Macintosh client utility. The client utility and driver versions are displayed on the Info screen.
- If you are using Mac OS X, select **About Aironet Client Utility** from the Client Utility drop-down menu on the main menu bar. The Client Utility About screen displays the client utility and driver version number.

Updating the Driver and Client Utility

Follow the instructions below to update the version of the client utilities and the client adapter driver for both the Mac OS 9.x and the Mac OS X operating systems.



Note For Mac OS X, you must have administrator privileges to install an updated client utility and driver.

Step 1 Boot up your computer.

Step 2 To obtain the latest software package from the Cisco Software Center web site, follow these steps:

- Use your web browser to access the following URL:
<http://www.cisco.com/public/sw-center/sw-wireless.shtml>
- In the client adapters section, click on the link for the Macintosh operating system.
- Click on the latest software file (*MACOSInstallv2x.sit*) that supports both the Mac OS 9.x and the Mac OS X operating systems. The 2x identifies the software package version number.
- Read and accept the terms and conditions of the Software License Agreement.
- Select the Cisco server from which you wish to download the file.
- Save the file to your hard drive then exit the web browser.
- Double-click the **MACOSInstallv2x.sit** file to expand the file.

Step 3 Double-click **Cisco WLAN Install** to activate the installer.



Note You should keep the Cisco WLAN Install file. The file may be needed in the future to possibly uninstall your client utility and driver for a clean install.

Step 4 For Mac OS X, when the Authenticate screen appears, enter your password in the Password field. Your Macintosh user name appears in the Name field. Click **OK**.



Note To install the client utility on Mac OS X, you must have administrator privileges for the Macintosh.

- Step 5** When the Cisco Aironet Wireless LAN Adapter Software screen appears, click **Continue**.
- Step 6** Read the terms and conditions of the Software License Agreement and click **Accept** or **Decline**. If you decline the license agreement, the client utility installation ends.



Note You can print or save the software license agreement by clicking **Print** or **Save As**.

- Step 7** Read the Read Me screen information and click **Continue**.



Note You can print or save the read-me information by clicking **Print** or **Save As**.

The Cisco WLAN Installer detects your computer operating system and displays the appropriate install screen (see [Figure 8-1](#) for Mac OS 9.x or [Figure 8-2](#) for Mac OS X).

Figure 8-1 Mac OS 9.x Install Screen

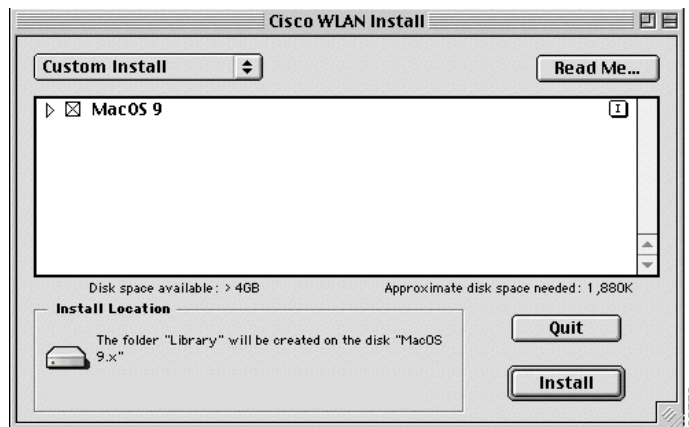
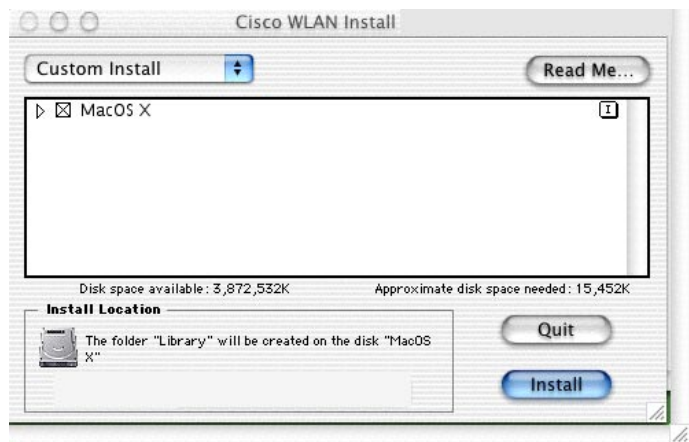






Figure 8-2 Mac OS X Install Screen



- Step 8** When the Cisco WLAN Install screen appears, perform the following operations:
- a. Expand the Mac OS software component list by clicking the right triangle on the left of Mac OS name.
-  **Note** Both the PCI and PC Card drivers are normally installed by the installer. You can deselect one of the drivers by clicking the selection box to remove the X; for example, you can deselect the PCI driver when using a PowerBook, or you can deselect the PC Card driver when using a PowerMac.
- b. Click **Install** to begin the installation process.
- Step 9** When a screen appears indicating that you must restart your computer after installing the software, click **Continue**.
-  **Note** You can click **Cancel** to terminate the installation process.
- Step 10** A message appears indicating “One moment please...” then a screen appears that shows the installation progress. After the files are copied to the designated folder on the Macintosh hard disk, a screen appears:
- Step 11** If a message appears indicating that the installation was successful, click **Restart** to restart your computer and finish the client utility installation.
-  **Note** The client utility, the help files, and the driver are installed by the installer.
- Step 12** If a message appears indicating that the installation is not necessary, click **Quit**. The installer has detected that your installed software is the same version as the software to be installed.

Removing the Driver and Client Utility

This section provides instructions for removing the driver and the client utility from your computer. The following procedure removes the driver and the client utility for both Mac OS 9.x and Mac OS X.

- Step 1** Locate the client utility installer (Cisco WLAN Install) on your hard drive.
- Step 2** Double-click **Cisco WLAN Install**.
- Step 3** For Mac OS X, when the Authenticate screen appears, enter your password in the Password field. Your Macintosh user name will appear in the Name field. Click **OK**.
-  **Note** To uninstall the client utility on Mac OS X, you must have administrator privileges for the Macintosh.
- Step 4** When the Cisco Aironet Wireless LAN Adapter Software screen appears, click **Continue**.
- Step 5** When the Software License Agreement appears, click **Accept**.

Step 6 When the Read the Read Me screen appears, click **Continue**.

The Cisco WLAN Installer detects your computer operating system and displays the appropriate install screen (see [Figure 8-3](#) for Mac OS 9.x or [Figure 8-4](#) for Mac OS X).

Figure 8-3 Mac OS 9.x Uninstall Screen

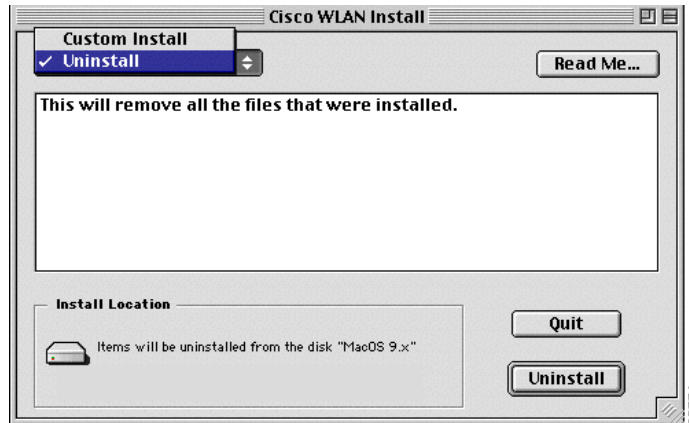


Figure 8-4 Mac OS X Uninstall Screen



Step 7 When the Cisco WLAN Install screen appears, perform the following operations:

- a. Select **Uninstall** by clicking the up and down arrows on the top left of the screen (see [Figure 8-4](#) for Mac OS 9.x or [Figure 8-4](#) for Mac OS X).
- b. Click **Uninstall** to begin the removal process.

Step 8 When a screen appears indicating that the removal cannot occur with other applications running, click **Continue**.

Step 9 When a message appears that indicates the removal was successful, click **OK**.

Step 10 When the Uninstall screen reappears, click **Quit**. The driver and client utility removal process is now complete.

Step 11 For Mac OS 9.x, remove the client adapter from the computer desktop by clicking on the **Cisco Wireless LAN Adapter** icon and dragging it to the trash.

- Step 12** If the uninstall process is not successful in Mac OS 9.x, manually remove the following files and folders by dragging them to the Trash icon:
- a. Located in the root folder
 - Remove the *Cisco pcm340 folder*
 - b. Located in the Extensions sub folder of the Systems folder:
 - Remove the *pcm340 file*
 - Remove the *pcm340Enabler file*
 - Remove the *pcm350Enabler file*
 - Remove the *pcm340PCI file*
 - Remove the *pcm350PCI file*
 - c. Located in the Preferences sub folder of the Systems folder:
 - Remove the *pcm340 preferences folder*
 - d. Located in the Help sub folder of the Systems folder
 - Remove the *pcm340PPC help folder*

**Note**

To remove your client adapter, follow the instructions in the [Removing the Client Adapter](#) section.

Removing the Client Adapter

Follow the instructions below whenever you need to remove the client adapter from your computer.

Removing a PC Card

To remove a PC card after it is successfully installed and configured (such as when your laptop is to be transported), completely shut down your computer and pull the card directly out of the PC card slot. You can remove the PC card while the system is running, provided the card is not being used (that is, the client utility is not running and the card is not selected in the AppleTalk and TCP/IP control panels).

When the PC card is reinserted and the computer is rebooted, your connection to the network should be re-established.

Removing a PCI Client Adapter

**Caution**

Static electricity can damage your computer and your client adapter. Before opening your computer or removing the adapter from the anti-static packaging, discharge static by touching the metal PCI port covers of your grounded computer (connected to a grounded power connector).

PCI client adapters are installed inside desktop computers. To remove the PCI client adapter, follow the instructions below:

Step 1 Completely shut down and power off your computer and all accessories.

Step 2 Disconnect the client adapter's antenna.

Step 3 Open or remove your computer cover.

**Note**

Refer to your Macintosh computer manual for instructions on opening or removing your computer cover and on locating the PCI expansion slots.

Step 4 Locate the PCI expansion slot that holds your client adapter.

Step 5 Pull up firmly on the client adapter to release it from the slot and carefully tilt the adapter to allow it to clear the opening in the back panel.

Step 6 Reinstall the expansion slot cover and replace or close the computer cover.



Troubleshooting

This chapter provides general information for diagnosing and correcting common problems encountered when installing or operating a Cisco Aironet Wireless LAN Adapter.

The following topics are covered in this section:

- [Accessing the Latest Troubleshooting Tips, page 9-2](#)
- [Interpreting the Indicator LEDs, page 9-2](#)
- [Problems after Installing the Driver, page 9-3](#)
- [Radio Not Found, page 9-3](#)
- [Client Adapter Recognition Problems, page 9-3](#)
- [Problems Associating to the Access Point, page 9-3](#)
- [Problems Authenticating, page 9-4](#)
- [Problems Connecting to the Network, page 9-4](#)
- [Running the Troubleshooting Tool on Mac OS X, page 9-5](#)

Accessing the Latest Troubleshooting Tips

This chapter provides basic troubleshooting tips for your client adapter. For more up-to-date and complex troubleshooting information, refer to the TAC web site at <http://www.cisco.com/tac>. Select **Wireless LAN** under “Top Issues.”

Interpreting the Indicator LEDs

The client adapter shows messages and error conditions through its two LEDs:

- **Link Integrity/Power LED (green)**—This LED lights when the client adapter is receiving power and blinks slowly when the adapter is linked with the network.
- **Link Activity LED (amber)**—This LED blinks quickly when the client adapter is receiving or transmitting data and blinks in a repeating pattern to indicate an error condition.

Table 9-1 interprets the LED operating messages.

Table 9-1 LED Operating Messages

Condition	Green LED	Amber LED	Description
Normal Operation	Blinking quickly	Blinking quickly	Power is on, self-test is OK, and client adapter is scanning for a network.
	Blinking slowly	Blinking quickly	Client adapter is associated to an access point.
	Continuously on or blinking slowly	Blinking	Client adapter is transmitting or receiving data while associated to an access point.
	Off	Blinking quickly	Client adapter is in power save mode.
	On continuously	Blinking quickly	Client adapter is in ad hoc mode.
Error Conditions	Off	Off	Client adapter is not receiving power or an error has occurred.
	Off	1 blink at 2-second rate	RAM failure. Refer to the “ Obtaining Technical Assistance ” section in the Preface for technical support information.
	Off	2 fast blinks, 2-second pause	Flash boot block checksum failure. Refer to the “ Obtaining Technical Assistance ” section in the Preface for technical support information.
	Off	3 fast blinks, 2-second pause	Firmware checksum failure. Reload the firmware.
	Off	4 fast blinks, 2-second pause	MAC address error (error reading MAC chip). Reload the firmware.
	Off	5 fast blinks, 2-second pause	PHY access error. Refer to the “ Obtaining Technical Assistance ” section in the Preface for technical support information.
	Off	6 fast blinks, 2-second pause	Incompatible firmware. Load the correct firmware version.

Problems after Installing the Driver

**Note**

If you experience problems during driver installation, you may want to restart the installation process. Go to the [“Removing the Driver and Client Utility” section on page 8-4](#) to start with a clean installation.

Follow the instructions in this section if you experience difficulty with your client adapter after installing the driver (for instance, your computer repeatedly freezes at the network login screen, the green LED does not blink to indicate that the adapter is active, etc.).

Radio Not Found

If your computer’s operating system is Mac OS X and a power-up client utility message indicates the radio cannot be found, verify that the *CiscoPCCardRadio.kext* driver or the *CiscoPCIRadio.kext* driver (depending on your client adapter) is installed in the */System/Library/Extensions* folder.

- If the driver is not found, re-install the package and restart your computer.
- If the driver is found, try removing and re-inserting the client adapter in your computer. Restart your computer.

Client Adapter Recognition Problems

If your computer’s operating system is Mac OS 9.x, verify that the driver (pcm3x0) and enablers (pcm3x0Enabler) are installed. They should be in the Extensions folder of the System folder.

- If you cannot find the driver, reinstall it and restart the computer.
- If the driver is properly installed, eject the client adapter and reinsert it.

Problems Associating to the Access Point

Follow the instructions below if your client adapter fails to associate to the access point:

- If possible, move your Macintosh a few feet closer to the access point and try again.
- Make sure the client adapter is securely inserted in your’s PC card slot or PCI slot.
- If you are using a PCI client adapter, make sure the antenna is securely attached.
- Make sure the access point is turned on and operating.
- Check that all parameters are set properly for both the client adapter and the access point. These include the network name or SSID, network type and channel, WEP activation, and LEAP activation.
- If the client adapter still fails to establish contact, refer to the [“Obtaining Technical Assistance” section on page xiv](#) for technical support information.

Problems Authenticating

Follow the instructions below if your client adapter fails to authenticate:

- If possible, move your Macintosh a few feet closer to the access point and try again.
- Make sure the client adapter is securely inserted in your's PC card slot or PCI slot.
- If you are using a PCI client adapter, make sure the antenna is securely attached.
- Make sure the access point is turned on and operating.
- Check that all parameters are set properly for both the client adapter and the access point. These include the network name or SSID, network type and channel, WEP activation, LEAP activation, WEP password, and LEAP username and password.
- If your client adapter is a 40-bit card and LEAP is enabled, the adapter can associate to but not authenticate to access points using 128-bit encryption. To authenticate to an access point using 128-bit encryption, you have two possible options:
 - Purchase a 128-bit client adapter. This is the most secure option.
 - Disable WEP for the client adapter and configure the adapter and the access point to associate to mixed cells. This option presents a security risk because your data is not encrypted as it is sent over the RF network.
- If the client adapter still fails to authenticate, refer to the [“Obtaining Technical Assistance” section on page xiv](#) for technical support information.

Problems Connecting to the Network

Follow the instructions below if your client adapter is unable to connect to the network:

- Verify that the client adapter is enabled for your Macintosh Network Preferences panel.
- Verify that the Macintosh Network TCP/IP settings are set properly for the client adapter.
- If the client adapter still fails to authenticate, refer to the [“Obtaining Technical Assistance” section on page xiv](#) for technical support information. Proxy server, network protocols, and further authentication information might be needed to connect to the network.

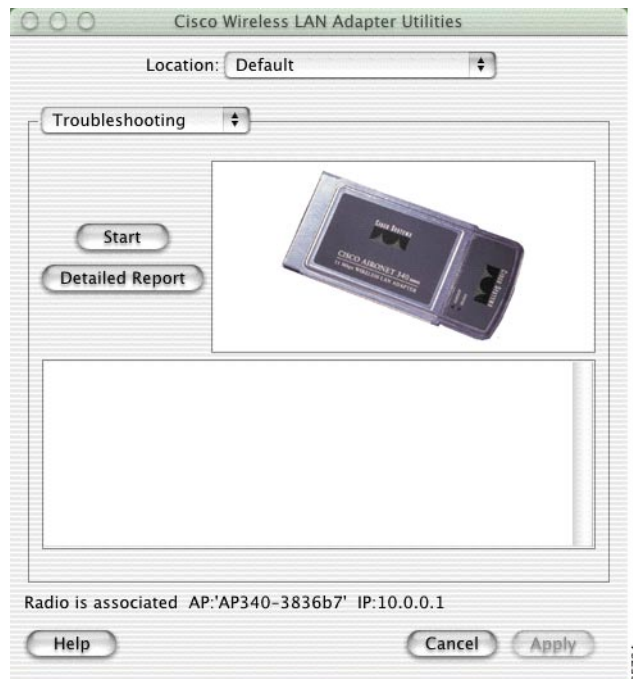
Running the Troubleshooting Tool on Mac OS X

On Mac OS X, the client utility provides a troubleshooting tool to assist you in identifying and resolving configuration and association problems with your client adapter.

To run the troubleshooting tool perform the following steps:

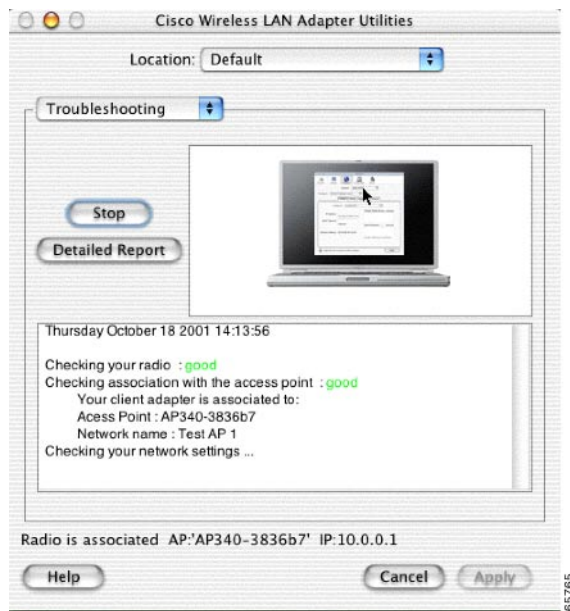
- Step 1** Click the up and down arrows to the right of the basic or advanced properties field.
- Step 2** Select **Troubleshooting** on the pull-down menu and the troubleshooting screen appears (see [Figure 9-1](#)).

Figure 9-1 Client Utility Troubleshooting Screen



- Step 3** Click **Start** to activate the troubleshooting tool. The troubleshooting tool performs a series of tests to check the operation of the client adapter and presents the results on the troubleshooting screen (see [Figure 9-2](#)).

Figure 9-2 Client Utility Troubleshooting Test Results Screen



The troubleshooting test results screen indicates the progress of various tests and their results. The troubleshooting tool displays *good* to indicate a test completed successfully, such as *Checking radio: good* or *Checking association with the access point: good*. If a test fails, the troubleshooting tool indicates *error* next to the test. You can scroll through the tests results by clicking the scroll bar on the right side of the screen.

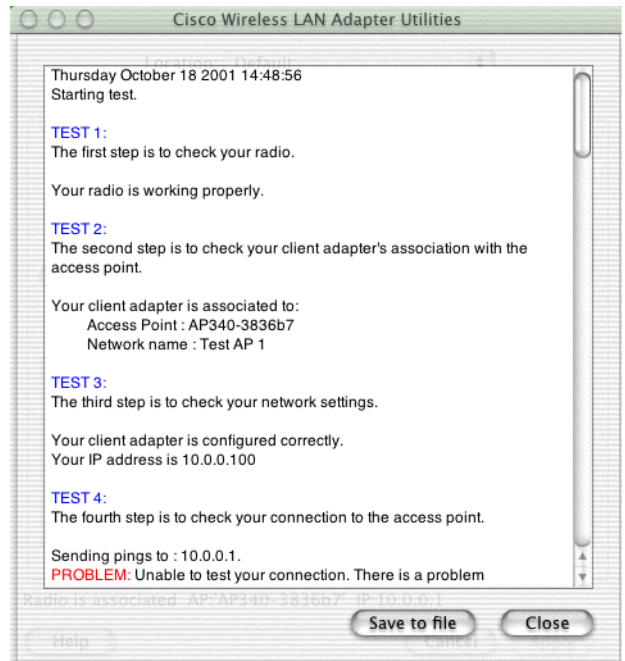


Note

You can stop the troubleshooting test at any time by clicking **Stop**.

- Step 4** If you want to view a detailed report of the troubleshooting test results, click **Detailed Report** and the detailed report screen appears (see [Figure 9-3](#)).

Figure 9-3 *Client Utility Troubleshooting Detailed Report Screen*



When a troubleshooting test fails, the troubleshooting tool lists possible repair options. You should carefully follow the repair suggestions and run the troubleshooting test again.



Note The detailed report contains valuable information that can be used by the technical support organization to analyze your problems. You can save the detailed report to a file on your hard disk by clicking **Save to File**.

- Step 5** Click **Close** when you have finished reviewing the test results.
- Step 6** When you have finished running the troubleshooting tests, click the up and down arrows to the right of the troubleshooting field and select basic or advanced properties.



Technical Specifications

This appendix provides technical specifications for the Cisco Aironet Wireless LAN Adapters.

The following topics are covered in this section:

- [Physical Specifications, page A-2](#)
- [Radio Specifications, page A-3](#)
- [Power Specifications, page A-5](#)
- [Safety and Regulatory Compliance, page A-5](#)

This section lists the technical specifications for the Cisco Aironet Wireless LAN Adapters.

**Note**

If a distinction is not made between series or client adapter type, the specification applies to all Cisco Aironet Wireless LAN Adapters (client adapters) in the 340 and 350 series.

Table A-1 contains the physical specifications for the client adapter.

Table A-1 Physical Specifications

Size	
PC card	4.5 in. L x 2.1 in. W x 0.2 in. H (11.3 cm L x 5.4 cm W x 0.5 cm H)
LM card	3.4 in. L x 2.1 in. W x 0.2 in. H (8.6 cm L x 5.4 cm W x 0.5 cm H)
PCI client adapter	5.8 in. L x 3.2 in. W x 0.5 in. H (14.7 cm L x 8.1 cm W x 1.3 cm H)
Weight	
PC card and LM card	1.3 oz (0.037 kg)
PCI client adapter	4.6 oz (0.13 kg)
Enclosure	
PC card	Extended Type II PC card
LM card	Standard Type II PC card with RF connectors
Connector	
PC card and LM card	68-pin PCMCIA
PCI client adapter	PCI card edge
Status indicators	
	Green and amber LEDs; see Chapter 9
Operating temperature	
350 series client adapters	-22°F to 158°F (-30°C to 70°C)
340 series client adapters	32°F to 158°F (0°C to 70°C)
Storage temperature	
	-40°F to 185°F (-40°C to 85°C)
Humidity (non-operational)	
	95% relative humidity
Altitude	
	Operational 9,843 ft (3000 m) @ room temperature for 2 hours Non-operational 15,000 ft (4572 m) @ room temperature for 20 hours
ESD	
	15 kV (human body model)

Table A-2 contains the radio specifications for the client adapters.

Table A-2 Radio Specifications

Type	Direct Sequence Spread Spectrum IEEE 802.11b compliant
Power output	<p>350 series client adapters</p> <ul style="list-style-type: none"> 100 mW (20 dBm) 50 mW (17 dBm) 30 mW (15 dBm) 20 mW (13 dBm) 5 mW (7 dBm) 1 mW (0 dBm) <p>340 series PC Card client adapters</p> <ul style="list-style-type: none"> 30 mW (15 dBm) 1 mW (0 dBm) <p>340 series LM card and PCI client adapter</p> <ul style="list-style-type: none"> 30 mW (15 dBm) 15 mW (12 dBm) 5 mW (7 dBm) 1 mW (0 dBm) <p>Note The maximum output power levels are controlled by your regulatory domain; check Appendix D, “Channels and Antenna Settings.”</p>
Operating frequency	2.400 to 2.497 GHz (depending on the regulatory domain in which the client adapter is used). Refer to Appendix D, “Channels and Antenna Settings.”
Usable channels	2412 to 2484 MHz in 5-MHz increments. Refer to Appendix D, “Channels and Antenna Settings.”
Interference rejection	-35 dBc adjacent channel rejection
Data rates	1, 2, 5.5, and 11 Mbps
Modulation	Binary Phase Shift Keying (BPSK) - 1 Mbps Quaternary Phase Shift Keying (QPSK) - 2 Mbps Complementary Code Keying (CCK) - 5.5 and 11 Mbps
Receiver sensitivity	
350 series client adapters	<ul style="list-style-type: none"> -94 dBm @ 1 Mbps -91 dBm @ 2 Mbps -89 dBm @ 5.5 Mbps -85 dBm @ 11 Mbps
340 series client adapters	<ul style="list-style-type: none"> -90 dBm @ 1 Mbps -88 dBm @ 2 Mbps -87 dBm @ 5.5 Mbps -83 dBm @ 11 Mbps
Receiver delay spread (multipath)	<ul style="list-style-type: none"> 500 ns @ 1 Mbps 400 ns @ 2 Mbps 300 ns @ 5.5 Mbps 140 ns @ 11 Mbps (350 series client adapters) 70 ns @ 11 Mbps (340 series client adapters)

Table A-2 Radio Specifications (continued)

Range	
350 series client adapters	<p>Outdoor</p> <p>2,000 ft (609.6 m) @ 1 Mbps 1,500 ft (457.2 m) @ 2 Mbps 1,000 ft (304.8 m) @ 5.5 Mbps 800 ft (243.8 m) @ 11 Mbps</p> <p>Indoor</p> <p>350 ft (106.7 m) @ 1 Mbps 250 ft (76.2 m) @ 2 Mbps 200 ft (61 m) @ 5.5 Mbps 150 ft (45.7 m) @ 11 Mbps</p> <p>Note The above range numbers assume the use of a snap-on antenna with the LM card.</p>
340 series client adapters	<p>Outdoor</p> <p>1,500 ft (457.2 m) @ 1 Mbps 1,200 ft (365.8 m) @ 2 Mbps 800 ft (243.8 m) @ 5.5 Mbps 400 ft (121.9 m) @ 11 Mbps</p> <p>Indoor</p> <p>300 ft (91.4 m) @ 1 Mbps 225 ft (68.6 m) @ 2 Mbps 150 ft (45.7 m) @ 5.5 Mbps 100 ft (30.5 m) @ 11 Mbps</p> <p>Note The above range numbers assume the use of a snap-on antenna with the LM card.</p>
Antenna	
PC card	Integrated diversity antenna
LM card	Two MMCX antenna connectors
PCI client adapter	RP-TNC connector

Table A-3 contains the power specifications for the client adapter.

Table A-3 Power Specifications

Operational voltage	5.0 V (+ or – 0.25 V)
Receive current steady state	
PC card and LM card	Typically 250 mA
PCI client adapter	Typically 350 mA
Transmit current steady state	
350 series PC card and LM card	Typically 450 mA @ 20 dBm
350 series PCI client adapter	Typically 550 mA @ 20 dBm
340 series PC card and LM card	Typically 350 mA @ 15 dBm
340 series PCI client adapter	Typically 450 mA @ 15 dBm
Sleep mode steady state	
350 series PC card and LM card	Typically 15 mA
350 series PCI client adapter	Typically 115 mA
340 series PC card and LM card	Typically 15 mA
340 series PCI client adapter	Typically 110 mA

Table A-4 contains the safety and regulatory compliance information for the client adapters.

Table A-4 Safety and Regulatory Compliance

Safety	Designed to meet: UL 1950 Third Ed. CSA 22.2 No. 950-95 IEC 60950 Second Ed., including Amendments 1-4 with all deviations EN 60950 Second Ed., including Amendments 1-4
EMI and susceptibility	FCC Part 15.107 & 15.109 Class B ICES-003 Class B (Canada) EN 55022 B AS/NZS 3548 Class B VCCI Class B EN 55024
Radio approvals	FCC Part 15.247 Canada RSS-139-1, RSS-210 Japan Telec 33A EN 300.328
RF exposure	OET-65C RSS-102 ANSI C95.1



Translated Safety Warnings

This appendix provides translations of the safety warnings that appear in this publication.

The following topics are covered in this section:

- [Explosive Device Proximity Warning, page B-2](#)
- [Warning for Laptop Users, page B-3](#)
- [Dipole Antenna Installation Warning, page B-5](#)

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 onbeschermd ontstekers of in een omgeving met explosieven indien het apparaat speciaal is aangepast om aan de eisen voor een dergelijk gebruik te voldoen.

Varoitus

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

Attention

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

Warnung

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

Avvertenza

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

Advarsel

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

Aviso

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

¡Advertencia!

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

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.

Warning for Laptop Users

**Warning**

In order to comply with RF exposure limits established in the ANSI C95.1 standards, it is recommended when using a laptop with a PC card client adapter that the adapter's integrated antenna is positioned more than 2 inches (5 cm) from your body or nearby persons during extended periods of transmitting or operating time. If the antenna is positioned less than 2 inches (5 cm) from the user, it is recommended that the user limit exposure time.

Waarschuwing

In het kader van een in de ANSI C95.1 norm vastgelegde limiet voor blootstelling aan straling veroorzaakt door radiofrequenties, dient u bij langdurig gebruik van een laptop met client adapter pc-kaart een afstand van meer dan 5 centimeter aan te houden tussen de geïntegreerde antenne van de adapter en uzelf en enige andere personen. Als deze afstand niet kan worden aangehouden, dient u de tijd dat het apparaat gebruikt wordt te beperken.

Varoitus

ANSI C95.1 -standardin radiotaajuuksille asettamien altistumisrajojen mukaisesti on suositeltavaa, että käytettäessä kannettavaa tietokonetta, jossa on PC-kortti-asiakas-adapteri, adapterin integroitu antenni on käännetty yli viisi cm pois vartalosta tai lähellä olevista henkilöistä pitkäaikaisten lähetys- tai käyttöjaksojen aikana. Jos antenni on käännetty alle viisi 5 cm käyttäjästä, on suositeltavaa, että käyttäjä rajoittaa altistumisaikaa.

Attention

Afin de respecter les limitations en matière d'exposition aux fréquences radioélectriques définies par les normes ANSI C95.1, il est recommandé aux utilisateurs d'ordinateurs portables dotés d'adaptateurs client pour carte PC ou aux personnes se trouvant à proximité de se placer à plus de 5 cm de l'antenne de l'adaptateur lors de longues périodes de transmission ou de fonctionnement. Si l'utilisateur se trouve à moins de 5 cm de l'antenne, il est préférable de limiter le temps d'exposition.

Warnung

In Übereinstimmung mit den in den Sicherheitsstandards ANSI C95.1 verzeichneten Höchstwerten für den Kontakt mit Radiofrequenz (RF) wird für die Benutzung eines Laptops mit PC-Adapterkarten für Clients empfohlen, bei längerer Inbetriebnahme oder Datenübertragung die integrierte Antenne des Adapters mindestens 5 cm vom Benutzer und anderen sich in der Nähe aufhaltenden Personen entfernt aufzustellen. Befindet sich die Antenne weniger als 5 cm vom Benutzer entfernt, sollte die Benutzungsdauer des Geräts eingeschränkt werden.

- Avvertenza** In conformità con i limiti sull'esposizione a frequenze radio stabiliti nelle direttive ANSI C95.1, quando si utilizza un computer portatile con una scheda PC dotata di adattatore client è consigliabile mantenere l'antenna integrata dell'adattatore a più di 5 cm di distanza durante periodi di esposizione prolungati. Se l'antenna è posizionata a meno di 5 cm di distanza dall'utente, è consigliabile limitare i tempi di esposizione alle frequenze.
- Advarsel** Du må overholde begrensningene for RF-eksponering som er fastsatt i ANSI C95.1-standardene. Derfor anbefaler vi, når du bruker en bærbar PC med et klientkort i PC-format, at kortets innebygde antenne plasseres mer enn 5 cm fra deg eller personer i nærheten under lengre perioder med overføring eller bruk. Hvis antennen er plassert mindre enn 5 cm fra brukeren, anbefaler vi at brukeren begrenser eksponeringstiden.
- Aviso** Para estar em conformidade com os limites de exposição RF estabelecidos nas normas ANSI C95.1 recomenda-se que, aquando da utilização de um laptop com um adaptador de cliente PC card, a antena integrada do adaptador esteja posicionada a mais de 5 cm do seu corpo ou de pessoas na vizinhança durante longos períodos de tempo de transmissão ou operação. Se a antena estiver posicionada a menos de 5 cm do utilizador, recomenda-se que o utilizador limite o tempo de exposição.
- ¡Advertencia!** Para cumplir los límites de exposición a radiofrecuencia (RF) que se establecen en la norma ANSI C95.1, al utilizar un equipo portátil con un adaptador cliente de tarjeta PC, sitúe la antena del adaptador al menos a 2 pulgadas(5 cm) del usuario o de las personas adyacentes durante periodos largos de transmisión o funcionamiento. Si la distancia es inferior a 2 pulgadas (5 cm), se recomienda limitar el tiempo de exposición.
- Varning!** För att följa de regler för radiosändare som utfärdats enligt ANSI-standard C95.1, rekommenderar vi att PC Card-adapterns inbyggda antenn befinner sig minst 5 cm från dig själv och andra personer när du använder en bärbar dator med PC Card-adapter under en längre tid. Om antennen befinner sig mindre än 5 cm från användaren, rekommenderar vi inte användning under längre tid.

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 frequência 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.



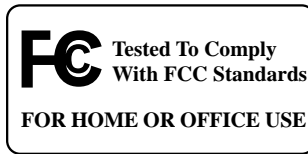
Declarations of Conformity and Regulatory Information

This appendix provides declarations of conformity and regulatory information for the Cisco Aironet Wireless LAN Adapters.

The following topics are covered in this section:

- [Manufacturers Federal Communication Commission Declaration of Conformity Statement, page C-2](#)
- [Department of Communications – Canada, page C-3](#)
- [European Community, Switzerland, Norway, Iceland, and Liechtenstein, page C-4](#)
- [Declaration of Conformity for RF Exposure, page C-5](#)
- [Guidelines for Operating Cisco Aironet Wireless LAN Adapters in Japan, page C-6](#)

Manufacturers Federal Communication Commission Declaration of Conformity Statement



Models: AIR-PCM341, AIR-PCM342, AIR-LMC341, AIR-LMC342, AIR-PCI341, AIR-PCI342, AIR-PCM351, AIR-PCM352, AIR-LMC351, AIR-LMC352, AIR-PCI351, AIR-PCI352

FCC Certification Number: LDK102038 (AIR-PCM34x),
LDK102035 (AIR-LMC34x and AIR-PCI34x)
LDK102040 (AIR-xxx35x)

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

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

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

The device is certified to the requirements of RSS-139-1 and 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 entsprechenden Vorgaben der Richtlinie 1999/5/EU.
Dansk:	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Direktiv 1999/5/EF.
Español:	Este equipo cumple con los requisitos esenciales así como con otras disposiciones de la Directiva 1999/5/EC.
Ελληνας:	Αυτός ο εξοπλισμός συμμορφώνεται με τις ουσιώδεις απαιτήσεις και τις λοιπές διατάξεις της Οδηγίας 1999/5/EK.
Français:	Cet appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes 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-direktiv 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.

The Declaration of Conformity related to this product can be found at the following URL:
<http://www.ciscofax.com>.

For the 340 series, the following standards were applied:

- Radio: ETS 300.328
- EMC: ETS 300.826
- Safety: EN 60950

The following CE mark is affixed to the 340 series equipment:



For the 350 series, 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 350 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 equivalent isotropic radiated power (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.

Guidelines for Operating Cisco Aironet Wireless LAN Adapters in Japan

This section provides guidelines for avoiding interference when operating Cisco Aironet Wireless LAN Adapters 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



Channels and Antenna Settings

This appendix lists the channels and the maximum power levels and antenna gains supported by the world's regulatory domains.

The following topics are covered in this appendix:

- [Channels, page D-2](#)
- [Maximum Power Levels and Antenna Gains, page D-3](#)

Channels

The channel identifiers, channel center frequencies, and regulatory domains of each 22-MHz-wide channel are shown in [Table D-1](#).

Table D-1 Channels

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



Note

Mexico is included in the Americas regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 13 can be used indoors and outdoors with up to 650mW EIRP. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

Maximum Power Levels and Antenna Gains

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-2](#) indicates the maximum power levels and antenna gains allowed for each regulatory domain.

Table D-2 Maximum Power Levels Per Antenna Gain

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)
Americas (-A) (4 watts EIRP maximum)	0	100
	2.2	100
	5.2	100
	6	100
	8.5	100
	12	100
	13.5	100
	21	20
EMEA (-E) (100 mW EIRP maximum)	0	100
	2.2	50
	5.2	30
	6	30
	8.5	5
	12	5
	13.5	5
	21	1
Japan (-J) (10 mW/MHz EIRP maximum)	0	50
	2.2	30
	5.2	30
	6	30
	8.5	n/a
	12	n/a
	13.5	5
	21	n/a

Table D-2 Maximum Power Levels Per Antenna Gain (continued)

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)
Israel (-I) (100 mW EIRP maximum)	0	100
	2.2	50
	5.2	30
	6	30
	8.5	5
	12	5
	13.5	5
	21	1
China (-C) (10 mW EIRP maximum)	0	5
	2.2	5
	5.2	n/a
	6	n/a
	8.5	n/a
	12	n/a
	13.5	n/a
	21	n/a

**Note**

Mexico is included in the Americas regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 13 can be used indoors and outdoors with up to 650mW EIRP. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.



Positioning Wireless Devices

This appendix describes the client utility site survey tool and provides guidelines for the use of this tool.

The following topics are covered in this section:

- [Overview, page E-2](#)
- [Site Survey, page E-2](#)

Overview

Determining the network location of your wireless products can be influenced by a number of factors. This section discusses those factors and provides guidelines and tools for achieving optimum placement.

The site survey test tools provided with the client utilities can help you to determine the best placement for access points and workstations within your wireless network. Refer to the *Cisco Aironet Access Point Hardware Installation Guide* for additional information on the placement of access points.

Site Survey

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

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

- **Data rates**—Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver threshold sensitivity occurs as the radio data increases.
- **Antenna type and placement**—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height.
- **Physical environment**—Clear or open areas provide better radio range than closed or filled areas. Also, the less cluttered the work environment, the greater the range.
- **Obstructions**—A physical obstruction such as metal shelving or a steel pillar can hinder performance of the client adapter. Avoid locating the workstation in a location where there is a metal barrier between the sending and receiving antennas.
- **Building materials**—Radio penetration is greatly influenced by the building material used in construction. For example, drywall construction allows greater range than concrete blocks. Metal or steel construction is a barrier to radio signals.

Performing a Site Survey

The pcm3x0PPC client utility's site survey tool for Mac OS 9.x operates at the RF level and is used to determine the best placement and coverage (overlap) for your network's access points. During the site survey, the current status of the network is read from the client adapter and displayed once per second so you can accurately gauge network performance. The feedback that you receive can help you to eliminate areas of low RF signal levels that can result in a loss of connection between the client adapter and its associated access point.

The site survey tool does not initiate any RF network traffic; it simply listens to the traffic that the client adapter hears and displays the results.

If you are using the Mac OS X operating system, you can use the Status screen, the Scanner screen, or the LSM screen on the client utility Advanced properties screen to perform a site survey.

Guidelines

The following guidelines should be kept in mind when preparing to perform a site survey:

- Perform the site survey when the RF link is functioning with all other systems and noise sources operational.
- Execute the site survey entirely from a mobile station.
- Set your client adapter's RF Transmit level at different settings to determine the minimum level required to cover the wireless cell.

Site Survey on Mac OS 9.x

Follow the steps below to activate the site survey tool and obtain current information about RF network traffic.

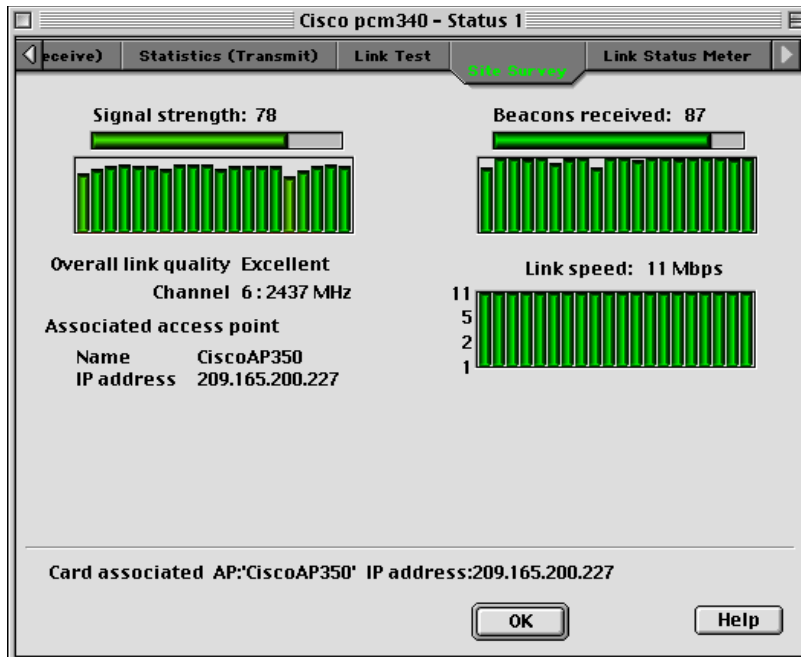
-
- Step 1** Select **Status** from the File pull-down menu (see [Figure E-1](#)) and click the **Site Survey** tab.

Figure E-1 File Pull-Down Menu



The Site Survey screen appears (see [Figure E-2](#)).

Figure E-2 Site Survey Screen



[Table E-1](#) interprets the information that is displayed on the Site Survey screen.

Table E-1 Site Survey Statistics

Statistic	Description
Signal Strength	<p>The signal strength for all received packets. The higher the value and the more green the bar graph is, the stronger the signal.</p> <p>The histogram below the bar graph provides a visual interpretation of the current signal strength. Differences in signal strength are indicated by the height of the vertical bars (the taller the bars, the stronger the signal).</p> <p>Range: 0 to 100%</p>
Beacons Received	<p>The percentage of beacon packets received versus those expected to be received. The higher the value and the more green the bar graph is, the better the quality of the signal.</p> <p>The histogram below the bar graph provides a visual interpretation of the current quality of the signal. Differences in signal quality are indicated by the height of the vertical bars (the taller the bars, the stronger the signal).</p> <p>Example: The access point sends out 10 beacons per second, so you would expect the client adapter to receive 50 beacon packets in 5 seconds. If it receives only 40 packets, the percentage of beacons received would be 80%.</p> <p>Range: 0 to 100%</p>

Table E-1 Site Survey Statistics (continued)

Statistic	Description
Overall Link Quality	The client adapter's ability to communicate with the access point. Value: Not Associated, Poor, Fair, Good, Excellent
Channel	The frequency that your client adapter is currently using as the channel for communications. Value: Dependent on regulatory domain
Link Speed	The rate at which your client adapter is receiving packets from its associated access point. The Link Speed histogram provides a visual interpretation of the current rate at which your client adapter is receiving packets. Differences in link speed are indicated by the height of the vertical bars (the taller the bars, the greater the data rate). Value: 1, 2, 5.5, or 11 Mbps
Name	The access point to which your client adapter is associated. It is shown only if the access point was configured with a name and you are in infrastructure mode.
IP Address	The IP address of the access point to which your client adapter is associated. It is shown only if the access point was configured with an IP address and you are in infrastructure mode.

Step 2 Click **OK** to exit the site survey application.

Site Survey on Mac OS X

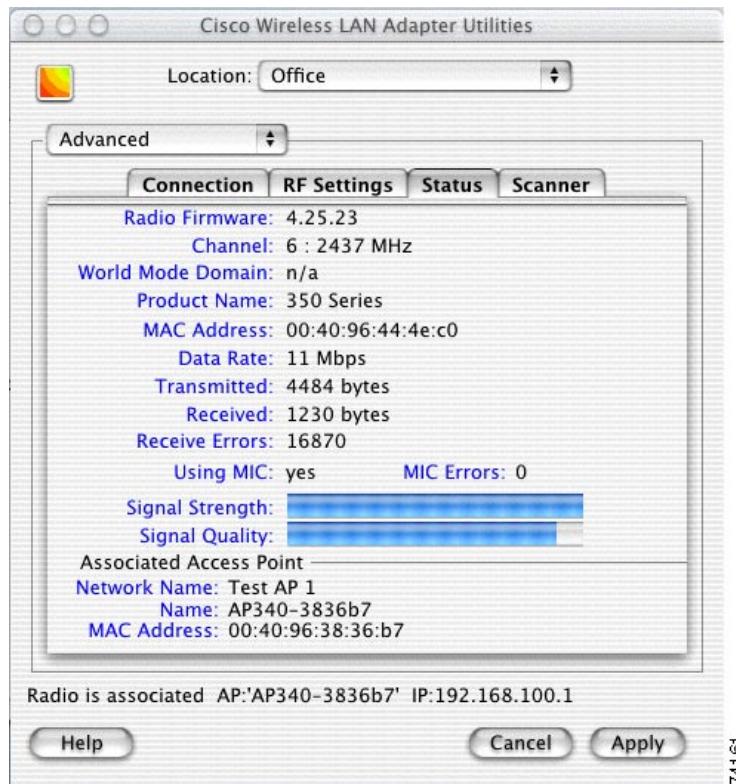
The client utility supports several tools that can be used to display information to perform a site survey:

- Advanced parameters status screen—provides signal strength, signal quality, and data rate of the access point signal.
- Advanced parameters scanner screen—allows you to select a specific access point from a list of detected access points configured for broadcast SSID and provides the signal strength and the transfer rates supported by the selected access point.
- LSM scanner tool—provides a graphical display that shows both signal strength and signal quality of the detected access points configured for broadcast SSID.

Follow the steps below to obtain information about the wireless network traffic using the status screen:

- Step 1** Click the Status tab on the client utility advanced properties screen and the Status Screen is displayed (see [Figure E-3](#)).

Figure E-3 Status Screen



The status screen indicates the network name, MAC address, data rate, signal quality, and signal strength of the signal from the access point.

- Step 2** Monitor the signal strength and signal quality as you walk around the wireless cell area.

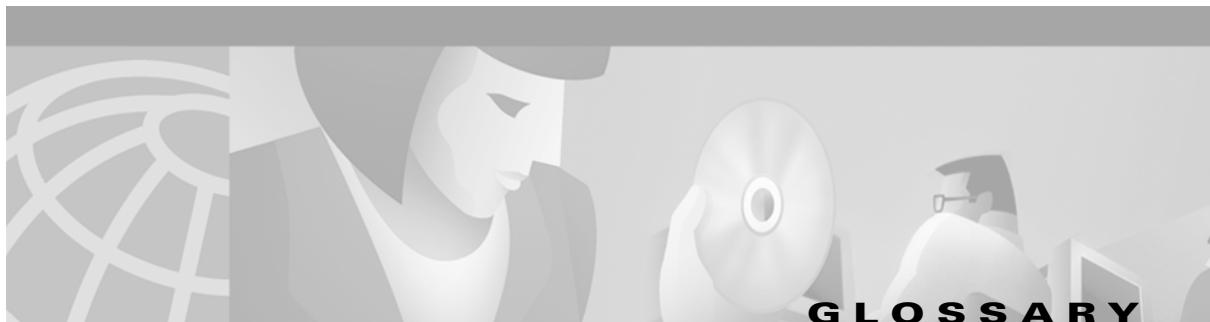
[Table E-2](#) describes the parameters on the status screen.

Table E-2 Client Adapter Status Screen Parameters

Parameter	Description
Firmware Version	The version of the radio firmware that is currently running on your client adapter.
Channel	Specifies which frequency channel your client adapter is using to communicate with the access point.
World Mode Domain	When world mode is enabled and your client adapter has associated to an access point, this is the channel set adopted by the adapter from the access point.
Product Name	Identifies the type of client adapter you are using. Value: 340 Series, 350 Series, or 4800 Series
MAC Address	The MAC address assigned to your client adapter at the factory
Data Rate	The rate at which your client adapter is currently transmitting data packets.
Transmitted	The number of packets that have been transmitted successfully.
Received	The number of packets that have been received successfully.
Receive Errors	The total number of errors on receive packets.
Using MIC	Indicates whether your client adapter is using message integrity check (MIC) to protect bit-flip attacks on encrypted packets. During a bit-flip attack, an intruder intercepts an encrypted message, alters it slightly, and retransmits it, and the receiver accepts the retransmitted message as legitimate. Client adapters using driver version 1.0.3 and firmware version 4.25.2x or greater support MIC; however, MIC can be used only if it is also enabled on the access point. Note If the access point is using MIC, your client adapter's driver and firmware must support MIC; otherwise, the client cannot associate. Value: Yes—client adapter radio is MIC capable, MIC is enabled on the access point, and MIC is being used. No—client adapter radio is MIC capable, MIC is enabled on the access point, but MIC is not being used. N/A—client adapter radio is not MIC capable. Disabled—client adapter radio is MIC capable, but MIC is disabled.
MIC Errors	Indicates the total number of MIC errors that have occurred.
Signal Strength	The signal strength for received packets. The longer the bar graph is, the stronger the signal.
Signal Quality	The signal quality for received packets. The longer the bar graph is, the better the signal quality.
Network Name	The network name or SSID of your wireless network.

Table E-2 Client Adapter Status (continued)Screen Parameters (continued)

Parameter	Description
Name	The name of the access point to which your client adapter is associated. It is shown only if the access point was configured with a name and you are in infrastructure mode.
MAC Address	The MAC address of the access point or wireless device to which your client adapter is associated.



GLOSSARY

- 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.
- 802.11b** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 5.5- and 11-Mbps wireless LANs.

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.
- 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 802.11-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 802.11-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 360 degrees both vertically and horizontally in a perfect sphere.

M

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

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 802.11-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

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

W

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

Workstation A computing device with an installed client adapter.



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