



Cisco Aironet Wireless LAN Adapter Installation and Configuration Guide

MPI-350

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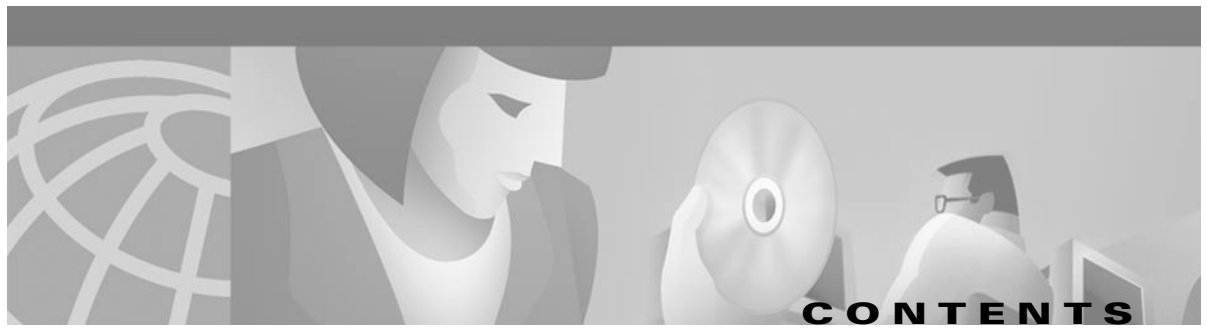
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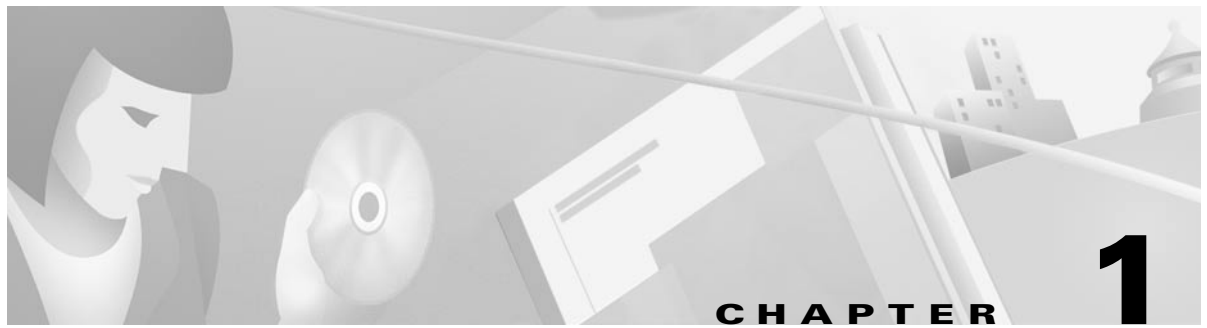
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GLOSSARY



Overview of the Client Utilities for Windows

This chapter describes the utilities that can be used with a Cisco Aironet Mini PCI wireless LAN adapter and the Windows 98, Windows NT, Windows 2000, Windows Me, and Windows XP operating systems.

The following topics are covered in this chapter:

- Introduction to the Client Utilities, page 1-2
- Installing the Client Utilities, page 1-2
- Verifying Installation, page 1-4
- Opening the Client Utilities, page 1-4
- Using the Client Utilities, page 1-4

Introduction to the Client Utilities

If your computer's operating system is Windows 98, Windows NT, Windows 2000, Windows Millennium Edition (Me), or Windows XP, the following utilities are available for use with your client adapter:

- **Aironet Client Utility (ACU)** – Loads new firmware, enables security features, configures the client adapter, and performs user-level diagnostics
- **Link Status Meter (LSM)** – Graphically monitors the signal quality and signal strength between the client adapter and an associated access point
- **Client Encryption Manager (CEM)** – Configures a Wired Equivalent Privacy (WEP) key for the client adapter

The client utilities are contained on the Cisco Aironet Series Wireless LAN Adapters CD that shipped with the client adapter. If your computer does not have a CD-ROM drive, you can download the utilities from Cisco's web site at <http://www.cisco.com/public/sw-center/sw-wireless.shtml>. Under "Wireless Software Products - Cisco Aironet Drivers and Utilities," select your computer's operating system and the appropriate utility.

Installing the Client Utilities

**Note**

The Client utilities should have been installed by the factory. If not, this section provides instructions for installing the client utilities.

You can install the Aironet Client Utility (ACU), Link Status Meter (LSM), and Client Encryption Manager (CEM) utilities. ACU allows you to configure the client adapter, enable server-based authentication, and enable the Wired Encryption Privacy (WEP) feature (See Chapter 4); LSM provides troubleshooting and status information (See Chapter 3); and CEM enables you to set one or more WEP keys for your client adapter (See Chapter 4).

After you have installed the appropriate driver for your computer's operating system, follow the steps below to install the Aironet Client Utility (ACU).

-
- Step 1** Close any Windows programs that are running.
 - Step 2** Insert the CD into your computer's CD-ROM drive.
 - Step 3** Select **Start > Run**, enter the following path (where *D* is the letter of your CD-ROM drive): **D:\Utilities\ACU\setup.exe**, and click **OK**. The Aironet Client Utility Setup screen appears.
 - Step 4** When the Welcome screen appears, click **Next**.

Step 5 In the Select Options screen, select any of the following options and click **Next**:

Option	Description
LEAP	Enables you to create a profile in ACU that uses LEAP authentication. If this option is not selected now and you later want to use LEAP, you must run this installation again, select Modify , and select this option. Default: Deselected Note Refer to Chapter X for information on using LEAP.
Create ACU Icon on your Desktop	Causes the installation program to add an ACU icon to your computer's desktop to provide quick access to the utility. Default: Selected

Step 6 In the Choose Destination Location screen, perform one of the following:

- If you want the ACU program files to be installed in the default location (C:\Program Files\Cisco Aironet, if C:\Program Files is the default Windows program file folder), click **Next**.
- If you want to specify a different destination location for the ACU program files, click **Browse**, select a location, and click **Next**.

Step 7 In the Select Program Folder screen, specify a program folder name for ACU by selecting from the list of existing folders (the default name is Cisco Aironet) or typing in a new folder name; then click **Next**.

A status screen displays the progress of the installation. Then one of two Setup Complete screens displays, depending on whether Windows needs to be restarted to complete the installation.

Step 8 Perform one of the following:

- If your computer does not need to be rebooted, select either of the following options and click **Finish**:

Option	Description
View the README.TXT file	Opens a read-me file containing information about ACU.
Launch the Aironet Client Utility	Opens ACU so you can configure your client adapter.

- If your computer needs to be rebooted, select **Yes, I want to restart my computer now** or **No, I will restart my computer later**, remove the CD if installed from your computer's CD-ROM drive, and click **Finish**.



Note Cisco recommends that you reboot your computer now.

Step 9 The driver and client utility installation is complete. The client adapter has been installed and configured for basic operation. Go to the Verifying Installation section to determine if your client adapter has associated to an access point.

Verifying Installation

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

- Double-click the **ACU** icon on your desktop. If the installation was successful, the bottom left corner of the Aironet Client Utility screen indicates that your client adapter is associated to its access point.

To verify that your client adapter is authenticated and has received a session-based WEP key and you enabled LEAP or EAP on your client adapter), check the system tray on your desktop. The WepStat icon, which looks like two connected computers, should appear in the system tray and indicate that LEAP or EAP is authenticated and WEP is enabled. In addition, LEAP or EAP and Enable WEP should be selected in the Network Security screen in ACU.



Note

To install or use the client utilities on Windows NT or Windows 2000 systems, you must log onto the system as a user with administrative privileges. The utilities do not install or operate correctly for users not logged in with administrative rights.

Opening the Client Utilities

Follow these instructions to open the client utilities.

- To open one of the utilities from your desktop, double-click the corresponding icon, if it has not been removed.
- To open one of the utilities from the Windows Start menu, select **Programs; Cisco Systems, Inc.;** and the desired utility (such as ACU).
- To open one of the utilities from a DOS window, change to the **C:\Cisco\Aironet Client Utility** directory (or to the directory in which you installed the utilities). Type **windgs** to open ACU, type **linkscope** to open LSM, or type **wepkey** to open CEM.

Using the Client Utilities

The following table directs you to the chapters in this publication that provide information on using the client utilities for Windows.

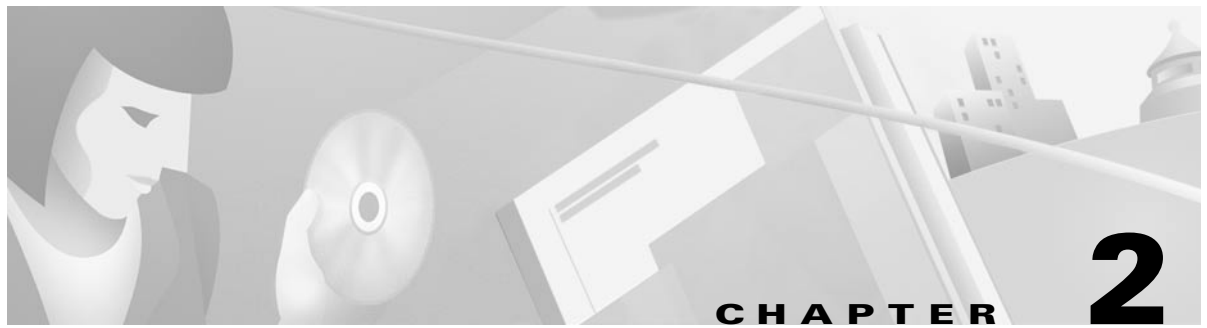
Client Utility	Location
Aironet Client Utility (ACU)	Chapter 2
Link Status Meter (LSM)	Chapter 3
Client Encryption Manager (CEM)	Chapter 4

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 each of the buttons.

Table 1-1 Buttons on the Client Utility Screens

Button	Description
Cancel	Exits the screen without saving any changes
OK	Saves any changes and exits the screen
Apply	Saves any changes but does not exit the screen
Pause	Freezes the information on the screen and prevents it from being updated
Continue	Allows the information on the screen to be updated after the Pause button is selected
Reset	Temporarily clears any values and resets them to 0
Start	Initiates a test
Stop	Stops a test that is running
Defaults	Displays the default value of each parameter
Help	Provides information on the screen and its parameters



Using the Aironet Client Utility

This chapter explains how to use the Aironet Client Utility (ACU) to load new firmware, enable security features, configure your client adapter, and perform user-level diagnostics.

The following topics are covered in this chapter:

- Overview, page 2-2
- Getting Started, page 2-2
- Controlling ACU Operation, page 2-3
- Loading New Firmware, page 2-5
- Enabling the Client Adapter's Security Features, page 2-7
- Configuring Your Client Adapter, page 2-8
- Performing Diagnostics, page 2-32
- Turning Your Client Adapter's Radio On or Off, page 2-58
- Ascertaining the ACU Version, page 2-59
- Getting Help, page 2-60
- Exiting the ACU, page 2-60

Overview

The Aironet Client Utility (ACU) can be used to perform a variety of functions. First, it enables you to upgrade your client adapter's firmware if necessary.

Second, it enables you 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, control the adapter's operation within an infrastructure or ad hoc (or peer-to-peer) network, and control the level of security provided to your network.

Finally, the ACU can be used to perform user-level diagnostics on your client adapter. You can view the current status of the adapter as well as statistics indicating how data is being transmitted and received. In addition, you can perform an RF link test or a site survey to assess the performance of the RF link at various places in your area and to determine network coverage.

Getting Started

To open the ACU, double-click the **ACU** icon on your desktop. The Aironet Client Utility screen appears (see Figure 2-1).



Note

The screens and windows shown represent typical ACU screens and windows. The screens and windows you see on your computer may vary.

Figure 2-1 Aironet Client Utility Screen



Controlling ACU Operation

You can set parameters that control the ACU operation. To do so, select **Preferences** from the Options pull-down menu (see Figure 2-2).

Figure 2-2 Options Pull-Down Menu



The Aironet Client Utility Preferences screen appears (see Figure 2-3).

Figure 2-3 Aironet Client Utility Preferences Screen

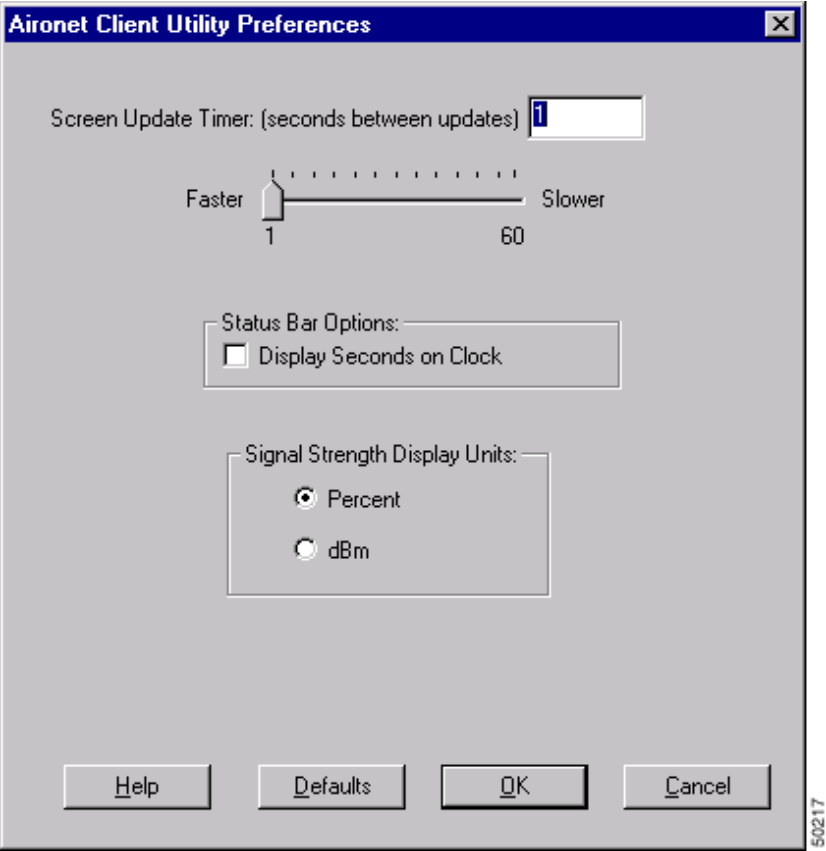



Table 2-1 lists and describes the parameters that control the ACU operation. Follow the instructions in the table to initially set or change any parameters.

Table 2-1 Parameters Affecting ACU Operation

Parameter	Description						
Screen Update Timer (seconds between updates)	Specifies how often the Status and Statistics screens are updated. You can type a number in the edit box or use the slider to change this value. Range: 1 to 60 seconds between updates (in 1-second increments) Default: 1 second between updates						
Display Seconds on Clock	Selecting this box causes the clock in the bottom right corner of the Aironet Client Utility screen (see Figure 2-1 on page 2-2) to include seconds. Default: Deselected						
Signal Strength Display Units	Specifies the units used to display signal strength on the Status, Linktest, and Site Survey screens. Default: Percent						
	<table><tr><th>Units</th><th>Description</th></tr><tr><td>Percent</td><td>Displays the signal strength as a percentage</td></tr><tr><td>dBm</td><td>Displays the signal strength in decibels with respect to milliwatts</td></tr></table>	Units	Description	Percent	Displays the signal strength as a percentage	dBm	Displays the signal strength in decibels with respect to milliwatts
	Units	Description					
	Percent	Displays the signal strength as a percentage					
	dBm	Displays the signal strength in decibels with respect to milliwatts					
							
Note	dBm can be selected only if your client adapter's firmware is version 3.92 or higher.						

Click **OK** at the bottom of the Aironet Client Utility Preferences screen to save any changes you have made.

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 2-32 for instructions on accessing this screen.

You can find the latest firmware version at <http://www.cisco.com/public/sw-center/sw-wireless.shtml>. Under "Wireless Software Products," select your client adapter's series (such as Cisco Aironet 350 Series) and copy the firmware image for radios to a floppy disk or to a directory on your computer's hard drive. Follow the instructions for your specific operating system to load the new firmware into your client adapter.



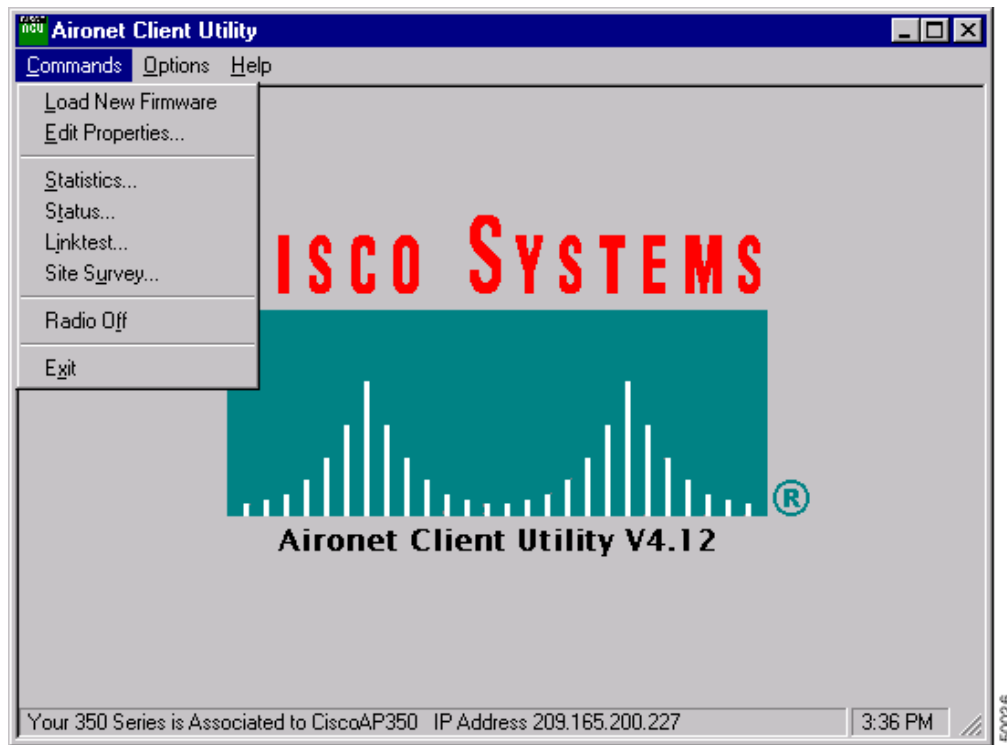
Caution

If a power failure occurs while you are loading new firmware, your client adapter may become inoperable.

Follow these steps to load new firmware.

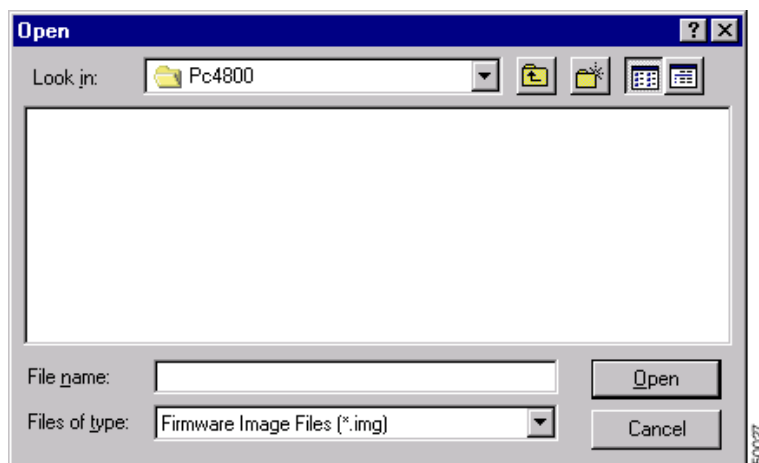
- Step 1** Make sure the client adapter is installed in your computer and is operational.
- Step 2** Select **Load New Firmware** from the Commands pull-down menu (see Figure 2-4).

Figure 2-4 Commands Pull-Down Menu



The Open window appears (see Figure 2-5).

Figure 2-5 Open Window



- Step 3** Find the location of the new firmware in the Look in box.
- Step 4** Click on the firmware image file (*.img) so that it appears in the File name box at the bottom of the Open window.

- Step 5** Click the **Open** button. The selected image is loaded into the client adapter's Flash memory.
-

Enabling the Client Adapter's Security Features

The client adapter supports two principal security features to protect your data as it is transmitted through your wireless network: Wired Equivalent Privacy (WEP) keys and Extensible Authentication Protocol (EAP) or LEAP (also referred to as *EAP - Cisco Wireless*).

WEP

The Client Encryption Manager (CEM) utility enables you to set up to four encryption keys, called *WEP keys*, for your client adapter. *WEP* is an optional IEEE 802.11 feature that provides your client adapter and other devices on your wireless network with data confidentiality equivalent to that of a wired LAN. It involves packet-by-packet data encryption by the transmitting device and decryption by the receiving device.

To enable WEP for your client adapter, follow the steps below.

-
- Step 1** Enter a new WEP key or select an existing WEP key using CEM, following the instructions in Chapter 4.
- Step 2** Enable WEP by selecting the Enable WEP checkbox in the Network Security screen in the ACU (see the Enable WEP parameter in Table 2-7).
-

EAP and LEAP

EAP is an optional IEEE 802.1x security feature that is ideal for organizations with a large user base and access to an EAP-enabled Remote Authentication Dial-In User Service (RADIUS) server, such as Cisco Secure ACS 2.6. The RADIUS server uses EAP to provide server-based authentication for clients.

Server-based authentication can be enabled for your client adapter in one of two ways:

- Through a host device and code built into its operating system (referred to as *EAP*)
- Through your client adapter's firmware and Cisco software (referred to as *LEAP*)

This method provides authentication service to client adapter whose host devices are not running an operating system with built-in EAP support. The term *LEAP* is used to distinguish authentication provided by the client firmware from authentication provided by a host and its operating system.

The Aironet Client Utility setup program, which installs the client utilities, is used to enable LEAP or EAP. After LEAP or EAP is enabled and the computer is rebooted, the client adapter authenticates to the RADIUS server using the username and password entered by the user at the network logon. The username and password entered in this screen are used by the client adapter to authenticate to the RADIUS server and must be re-entered at the start of each new session.

Configuring Your Client Adapter

The ACU 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
 - **Network security parameters** – Control the level of security provided to your wireless 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 2-2 enables you to quickly locate the instructions for modifying the client adapter's parameters.

Table 2-2 Locating Configuration Instructions

Parameter Category	Page Number
Enterprise	2-9
System	2-9
RF network	2-13
Advanced infrastructure	2-17
Advanced ad hoc	2-20
Network security	2-23
Home networking	2-26

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 2-27.

Setting System Parameters

The System Parameters screen (see Figure 2-6) 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 Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **System Parameters** tab.

Figure 2-6 System Parameters Screen

350 Series Properties

Advanced (Infrastructure) | Network Security | Home Networking

System Parameters | RF Network

Client Name:

SSID1:

SSID2:

SSID3:

Power Save Mode:

- ☒ CAM (Constantly Awake Mode)
- ☐ Max PSP (Max Power Savings)
- ☐ Fast PSP (Power Save Mode)

Network Type:

- ☐ Ad Hoc
- ☒ Infrastructure

Default Profile

- ☒ Use Enterprise Configuration
- ☐ Use Home Network Configuration

☐ Enable Auto Configuration Switching

Table 2-3 lists and describes the client adapter’s system parameters. Follow the instructions in the table to initially set or change any parameters.



Note You should have set the client name and SSID when you installed the driver.

Table 2-3 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></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></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 will not be able to 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>
	<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 greater.</p>

Table 2-3 System Parameters (continued)

Parameter	Description	
Power Save Mode	Sets your client adapter to its optimum power consumption setting. Default: CAM (Constantly Awake Mode)	
	Power Save Mode	Description
	CAM (Constantly 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.
	Max PSP (Max Power Savings)	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).
	Fast PSP (Power Save Mode)	Switches between a PSP mode and CAM, 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. Is recommended when power consumption is a concern but you need greater throughput than that allowed by Max PSP

Table 2-3 System Parameters (continued)

Parameter	Description	
Network Type	Specifies the type of network in which your client adapter is installed. Default: Infrastructure	
	Network Type	Description
	Ad Hoc	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	Used to set up a connection to a wired Ethernet network (through an access point)
Current Profile or Default Profile	<p>Specifies which network configuration (enterprise or home) your client adapter is to use. If your driver supports automatic configuration switching, this parameter is entitled <i>Default Profile</i>; otherwise, it is entitled <i>Current Profile</i>.</p> <p>Default: Use Enterprise Configuration</p> <div>Note Select Use Enterprise Configuration if your client adapter is to be used in an enterprise network. If you are planning to use your client adapter in a home network, go to the “Specifying a Home Network Configuration” section on page 2-31.</div>	
Enable Auto Configuration Switching	<p>Selecting this checkbox enables the client adapter to switch between an enterprise and home network configuration (which you select through the Default Profile parameter above) when it travels out of range and loses association.</p> <p>Default: Deselected</p> <div>Note This parameter is supported only by the Windows operating systems and driver version 6.60 or greater.</div>	

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

Setting RF Network Parameters

The RF Network screen (see Figure 2-7) 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 Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **RF Network** tab.

Figure 2-7 RF Network Screen

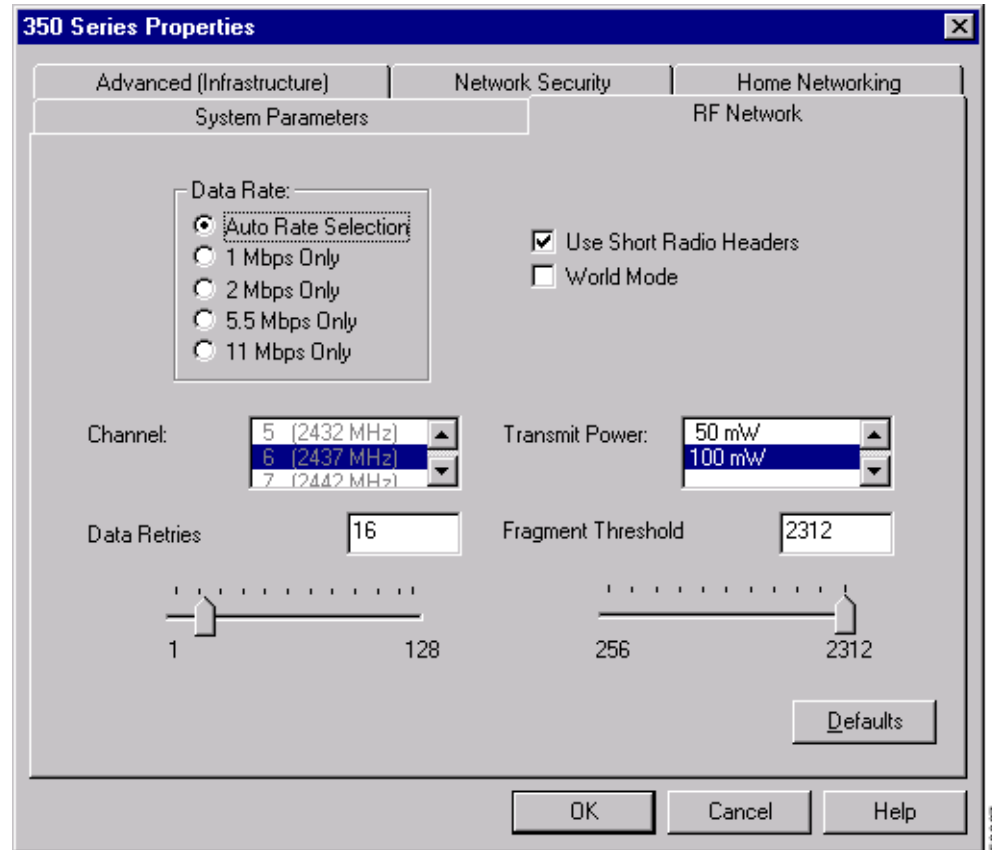


Table 2-4 lists and describes the client adapter's RF network parameters. Follow the instructions in the table to initially set or change any parameters.

Table 2-4 RF Network Parameters



Parameter	Description												
Data Rate	<p>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)</p> <p>Auto Rate Selection is recommended for infrastructure mode; setting a specific data rate is recommended for ad hoc mode.</p> <p>Default: Auto Rate Selection</p> <table> <tr> <th>Data Rate</th><th>Description</th></tr> <tr> <td>Auto Rate Selection</td><td>Uses the 11-Mbps data rate when possible but drops to lower rates when necessary</td></tr> <tr> <td>1 Mbps Only</td><td>Offers the greatest range but the lowest throughput</td></tr> <tr> <td>2 Mbps Only</td><td>Offers less range but greater throughput than the 1 Mbps Only option</td></tr> <tr> <td>5.5 Mbps Only</td><td>Offers less range but greater throughput than the 2 Mbps Only option</td></tr> <tr> <td>11 Mbps Only</td><td>Offers the greatest throughput but the lowest range</td></tr> </table> <p> Note Your client adapter's data rate must be set to Auto Rate Selection or must match the data rate of the access points (in infrastructure mode) or the other clients you wish to communicate with (in ad hoc mode). Otherwise, your client adapter may not be able to associate to them.</p>	Data Rate	Description	Auto Rate Selection	Uses the 11-Mbps data rate when possible but drops to lower rates when necessary	1 Mbps Only	Offers the greatest range but the lowest throughput	2 Mbps Only	Offers less range but greater throughput than the 1 Mbps Only option	5.5 Mbps Only	Offers less range but greater throughput than the 2 Mbps Only option	11 Mbps Only	Offers the greatest throughput but the lowest range
Data Rate	Description												
Auto Rate Selection	Uses the 11-Mbps data rate when possible but drops to lower rates when necessary												
1 Mbps Only	Offers the greatest range but the lowest throughput												
2 Mbps Only	Offers less range but greater throughput than the 1 Mbps Only option												
5.5 Mbps Only	Offers less range but greater throughput than the 2 Mbps Only option												
11 Mbps Only	Offers the greatest throughput but the lowest range												
Use Short Radio Headers	<p>Selecting this checkbox sets your client adapter to use 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: Deselected</p>												
World Mode	<p>Selecting this checkbox 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>												

Table 2-4 RF Network Parameters (continued)




Parameter	Description
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</p> <p>Default: Dependent on regulatory domain Example: 6 (2437 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, 20, 30, 50, or 100 mW</p> <p>Default: The maximum 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 2-4 RF Network Parameters (continued)

Parameter	Description
Data Retries	<p>Defines the number of times a packet will be 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>
Fragment Threshold	<p>Defines the threshold above which an RF data packet will be 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>

Click **OK** at the bottom of the RF Network 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 Table 2-3.

The Advanced (Infrastructure) screen (see Figure 2-8) enables you to set parameters that control how the client adapter operates within an infrastructure network. To access this screen, select **Edit Properties** from the Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **Advanced (Infrastructure)** tab.

Figure 2-8 Advanced (Infrastructure) Screen

350 Series Properties

System Parameters | RF Network | Home Networking

Advanced (Infrastructure) | Network Security | Home Networking

Antenna Mode (Receive):

- ☒ Diversity (Both)
- ☐ Right Antenna Only
- ☐ Left Antenna Only

Antenna Mode (Transmit):

- ☒ Diversity (Both)
- ☐ Right Antenna Only
- ☐ Left Antenna Only

Specified Access Point 1:

Specified Access Point 2:

Specified Access Point 3:

Specified Access Point 4:

RTS Threshold: (Slider from 0 to 2312)

RTS Retry Limit: (Slider from 1 to 128)

Table 2-5 lists and describes the client adapter's advanced infrastructure parameters. Follow the instructions in the table to initially set or change any parameters.

Table 2-5 Advanced (Infrastructure) Parameters




Parameter	Description
Antenna Mode (Receive)	<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 diversity mode. Diversity mode allows the card to use the better signal from its two antenna ports. <p>Range: Diversity (Both), Right Antenna Only, Left Antenna Only</p> <p>Default: Diversity (Both)</p>
Antenna Mode (Transmit)	<p>Specifies the antenna that your client adapter uses to transmit data. See the Antenna Mode (Receive) 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 with 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> <div>  <p>Note This parameter should be used only for access points that are in repeater mode. For normal operation, leave these fields blank because specifying an access point slows down the roaming process.</p> </div>

Table 2-5 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 will resend 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>

Click **OK** at the bottom of the Advanced (Infrastructure) 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 Table 2-3.

The Advanced (Ad Hoc) screen (see Figure 2-9) 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 Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **Advanced (Ad Hoc)** tab.

Figure 2-9 Advanced (Ad Hoc) Screen

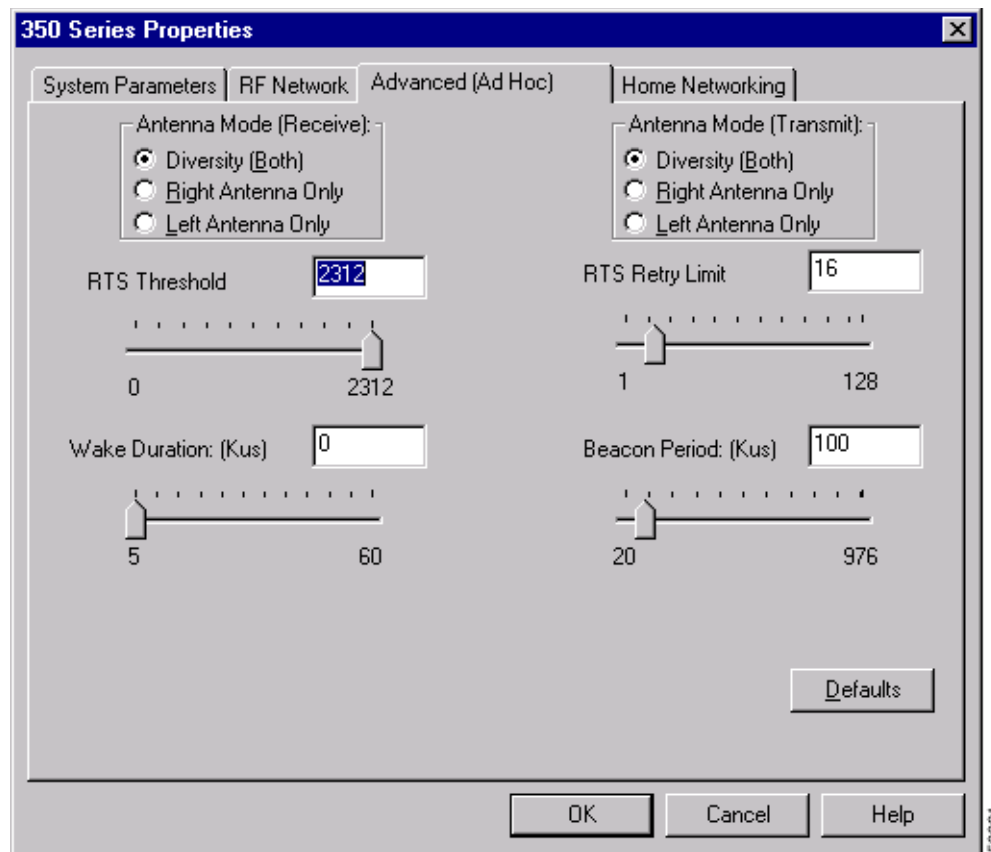


Table 2-6 lists and describes the client adapter's advanced ad hoc parameters. Follow the instructions in the table to initially set or change any parameters.

Table 2-6 Advanced (Ad Hoc) Parameters




Parameter	Description
Antenna Mode (Receive)	<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 diversity mode. Diversity mode allows the card to use the better signal from its two antenna ports. <p>Range: Diversity (Both), Right Antenna Only, Left Antenna Only</p> <p>Default: Diversity (Both)</p>
Antenna Mode (Transmit)	<p>Specifies the antenna that your client adapter uses to transmit data. See the Antenna Mode (Receive) parameter above for information on the options available for your client adapter.</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> <div>  <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p> </div>
RTS Retry Limit	<p>Specifies the number of times the client adapter will resend 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> <div>  <p>Note Refer to the IEEE 802.11 Standard for more information on the RTS/CTS mechanism.</p> </div>

Table 2-6 Advanced (Ad Hoc) Parameters (continued)

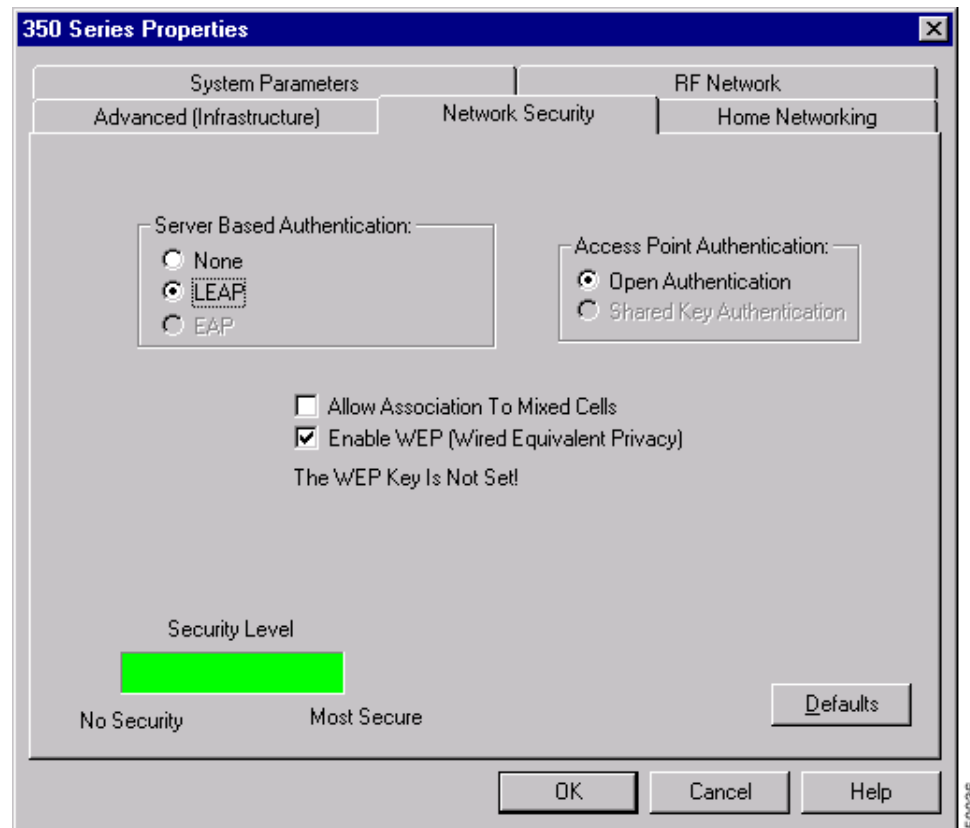
Parameter	Description
Wake Duration (Kμs)	<p>Specifies the amount of time following a beacon that the client adapter stays awake to receive announcement traffic indication message (ATIM) packets, which are sent to the adapter to keep it awake until the next beacon</p> <p>This parameter is used only in Power Save Mode (Max PSP or Fast PSP). Refer to the Power Save Mode parameter in Table 2-3.</p> <p>Range: 5 to 60 Kμs</p> <p>Default: 5 Kμs</p> <div>  <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> </div>
Beacon Period (Kμs)	<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>

Click **OK** at the bottom of the Advanced (Ad Hoc) screen to save any changes you have made.

Setting Network Security Parameters

The Network Security screen (see Figure 2-10) enables you to set parameters that offer varying degrees of security for the data that is passed throughout your wireless network. To access this screen, select **Edit Properties** from the Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **Network Security** tab.

Figure 2-10 Network Security Screen



The Security Level bar graph at the bottom of the screen indicates your network's level of security based on the parameters that are selected. The bar graph is solid green when the network is most secure (for example, when LEAP or EAP is enabled for your client adapter and a session-based WEP key is assigned to the adapter by a RADIUS server). The graph appears red when the network has some security features but is not the most secure and appears solid black when no security features are enabled.

Table 2-7 lists and describes the client adapter's network security parameters. Follow the instructions in the table to initially set or change any parameters.

Table 2-7 Network Security Parameters

Parameter	Description	
Server Based Authentication	Disables or enables LEAP (also referred to as <i>EAP - Cisco Wireless</i>) or the Extensible Authentication Protocol (EAP) for your client adapter after LEAP or EAP has been enabled initially through the Aironet Client Utility setup program. Refer to the “EAP and LEAP” section on page 2-7 for more information on server-based authentication. Default: Disable	
	Server Based Authentication Option	Description
	None	Disables LEAP or EAP for your client adapter
	LEAP	Enables LEAP for your client adapter
	EAP	Enables EAP for your client adapter. If your operating system does not have built-in EAP support, this option is not available.

Table 2-7 Network Security Parameters (continued)




Parameter	Description						
Access Point Authentication	<p>Defines how your client adapter will attempt to authenticate to an access point</p> <p>Default: Open Authentication</p> <table> <tr> <th>Authentication</th><th>Description</th></tr> <tr> <td>Open Authentication</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 Authentication</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> </table>	Authentication	Description	Open Authentication	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point	Shared Key Authentication	<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 Authentication	Allows your client adapter, regardless of its WEP settings, to authenticate and attempt to communicate with an access point						
Shared Key Authentication	<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>						
							
Note	If LEAP or EAP is enabled on your client adapter, Open Authentication is the only available option.						
							
Note	The Shared Key Authentication option is available only if the client adapter has been assigned a WEP key in CEM and WEP is enabled. Refer to the Cross ref here for instructions on setting a WEP key and the Enable WEP parameter in Table 2-7 for instructions on enabling WEP.						

Table 2-7 Network Security Parameters (continued)

Parameter	Description
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 checkbox, even if your client adapter is not using WEP. If this setting is not enabled, your client adapter will not be able to establish a connection with the access point.</p> <p>Default: Deselected</p> <div>  <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> </div>
Enable WEP	<p>Enables or disables WEP for your client adapter. This parameter can be used in two ways:</p> <ul style="list-style-type: none"> • If you set a WEP key using CEM, you must select this checkbox to enable WEP for your client adapter. Refer to the Cross ref here for instructions on setting a WEP key. • If LEAP or EAP has been enabled for your client adapter and the adapter has been authenticated to an EAP-enabled RADIUS server, this checkbox is selected automatically to indicate that the adapter has been assigned a session-based WEP key. See the Server Based Authentication parameter in Table 2-7. <p>Default: Deselected</p>

Click **OK** at the bottom of the Network Security 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 2-9.

The Home Networking screen (see Figure 2-11) 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 Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **Home Networking** tab.

Figure 2-11 Home Networking Screen

350 Series Properties

System Parameters | RF Network

Advanced (Infrastructure) | Network Security | **Home Networking**

Computer Name:

SSID:

WEP Encryption Key:

WEP Encryption Key Entry Method:

☒ Hexadecimal (0-9, A-F)

☐ ASCII Text

☐ Enable Encryption (WEP)

Data Rate:

☒ Auto (Recommended)

☐ 1 Mbps Only

☐ 2 Mbps Only

☐ 5.5 Mbps Only

☐ 11 Mbps Only

Network Type:

☒ No Base Station (AdHoc)

☐ Base Station (Infrastructure)

Radio Channel:

Table 2-8 lists and describes the client adapter’s home networking parameters. Follow the instructions in the table to initially set or change any parameters.



Note

To ensure that your client adapter has the same settings as all of the other computers on your home network, you can load the settings from a 3.5-inch floppy disk and you created a home network configuration disk when you set up your home network. See the “Loading Settings from a Floppy Disk” section on page 2-31 for instructions.

Table 2-8 Home Networking Parameters




Parameter	Description						
Computer Name	<p>The client name for the home network. It is a logical name for your workstation. It enables 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></p> <p>Note Each computer on the home network must have a unique computer name.</p>						
SSID	<p>The service set identifier (SSID) enables you to access the home network.</p> <p>Range: Up to 32 characters (case sensitive)</p> <p></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>						
WEP Encryption Key Entry Method	<p>Specifies whether the WEP key is entered in hexadecimal characters or ASCII text</p> <p>Default: Hexadecimal</p> <table border="1"> <thead> <tr> <th>WEP Encryption Key Entry Method</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Hexadecimal</td><td> <p>Specifies that the WEP key be entered in hexadecimal characters, which include 0-9 A-F, and a-f</p> <p>Example:ACB224CAF0</p> </td></tr> <tr> <td>ASCII Text</td><td> <p>Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks</p> <p>Example:ZZ18YXPRA3</p> </td></tr> </tbody> </table>	WEP Encryption Key Entry Method	Description	Hexadecimal	<p>Specifies that the WEP key be entered in hexadecimal characters, which include 0-9 A-F, and a-f</p> <p>Example:ACB224CAF0</p>	ASCII Text	<p>Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks</p> <p>Example:ZZ18YXPRA3</p>
WEP Encryption Key Entry Method	Description						
Hexadecimal	<p>Specifies that the WEP key be entered in hexadecimal characters, which include 0-9 A-F, and a-f</p> <p>Example:ACB224CAF0</p>						
ASCII Text	<p>Specifies that the WEP key be entered in ASCII text, which includes alpha characters, numbers, and punctuation marks</p> <p>Example:ZZ18YXPRA3</p>						
WEP Encryption Key	<p>The WEP key for the home network. Refer to Cross ref here for information on WEP keys.</p> <p>Range: Up to 13 characters (case sensitive in ASCII format)</p> <p></p> <p>Note Only one WEP key can be set in a home network, and each device on the network must use the same key.</p>						
Enable Encryption (WEP)	<p>Selecting this checkbox enables WEP for your client adapter. This checkbox is inaccessible until you set an encryption key using the WEP Encryption Key parameter.</p> <p>Default: Deselected</p>						

Table 2-8 Home Networking Parameters




Parameter	Description												
Data Rate	<p>Specifies the rate at which you want your client adapter to transmit or receive packets to or from other devices on the home network</p> <p>Default: Auto</p> <table> <tr> <th>Data Rate</th><th>Description</th></tr> <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 Only</td><td>Offers the greatest range but the lowest throughput</td></tr> <tr> <td>2 Mbps Only</td><td>Offers less range but greater throughput than the 1 Mbps Only option</td></tr> <tr> <td>5.5 Mbps Only</td><td>Offers less range but greater throughput than the 2 Mbps Only option</td></tr> <tr> <td>11 Mbps Only</td><td>Offers the greatest throughput but the lowest range</td></tr> </table> <p> Note If the Network Type parameter is set to Base Station, the 1, 2, 5.5, and 11 Mbps options cannot be selected.</p> <p> Note If the Network Type parameter is set to No Base Station, your client adapter's data rate must match the data rate of the other devices on the home network. Otherwise, your client adapter may not be able to associate to them.</p>	Data Rate	Description	Auto	Uses the 11-Mbps data rate when possible but drops to lower rates when necessary	1 Mbps Only	Offers the greatest range but the lowest throughput	2 Mbps Only	Offers less range but greater throughput than the 1 Mbps Only option	5.5 Mbps Only	Offers less range but greater throughput than the 2 Mbps Only option	11 Mbps Only	Offers the greatest throughput but the lowest range
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5.5 Mbps Only	Offers less range but greater throughput than the 2 Mbps Only option												
11 Mbps Only	Offers the greatest throughput but the lowest range												

Table 2-8 Home Networking Parameters

Parameter	Description						
Network Type	<p>Specifies the type of network in which your client adapter is installed</p> <p>Default: Base Station</p> <table> <tr> <th>Network Type</th><th>Description</th></tr> <tr> <td>No Base Station (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>Base Station (Infrastructure)</td><td>Used to set up a connection to a wired Ethernet network (through a base station)</td></tr> </table>	Network Type	Description	No Base Station (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.	Base Station (Infrastructure)	Used to set up a connection to a wired Ethernet network (through a base station)
Network Type	Description						
No Base Station (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.						
Base Station (Infrastructure)	Used to set up a connection to a wired Ethernet network (through a base station)						
Radio 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"> • 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>Default: Dependent on regulatory domain Example: 6 (2437 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 **OK** at the bottom of the Home Networking screen to save any changes you have made.

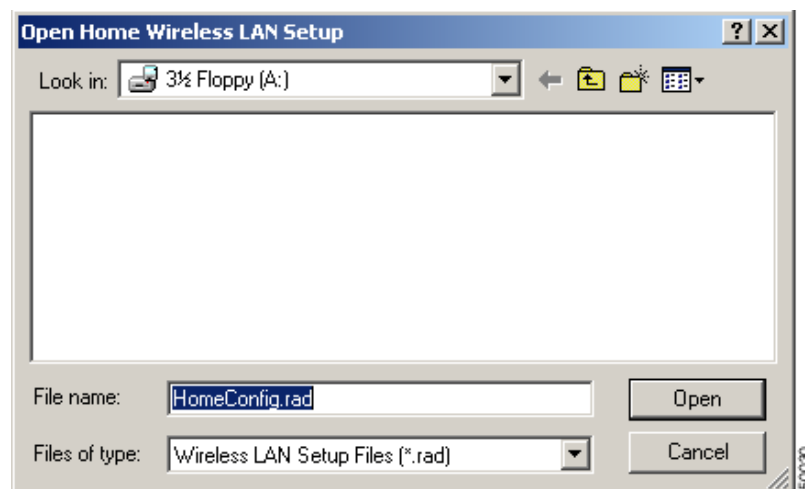
Go to the “Specifying a Home Network Configuration” section on page 2-31 for instructions on activating a home network configuration.

Loading Settings from a Floppy Disk

Follow the instructions below if you wish to copy the settings of any other computers on your home network to your client adapter by using a home network configuration disk, which was created using the Base Station Client Utility (BSCU).

-
- Step 1** Insert the home network configuration disk (a 3.5-inch diskette) into your computer's A: drive.
- Step 2** In the Home Networking screen, click **Load From Floppy Drive**. The Open Home Wireless LAN Setup screen appears (see Figure 2-12).

Figure 2-12 Open Home Wireless LAN Setup Screen



- Step 3** Find the A: drive in the Look in box.
- Step 4** Click the setup file (*.rad) so that it appears in the File name box at the bottom of the Open Home Wireless LAN Setup screen.
- Step 5** Click the **Open** button. The selected file is saved to the system.
- Step 6** Go to the "Specifying a Home Network Configuration" section on page 2-31 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 Commands pull-down menu (see Figure 2-4 on page 2-6) and click the **System Parameters** tab. The System Parameters screen appears (see Figure 2-6 on page 2-9).
- Step 2** Select **Use Home Network Configuration** under Current Profile or Default Profile.
- Step 3** Click **OK** to save this setting.
-

Performing Diagnostics

In addition to enabling you to configure your client adapter for use in various types of networks, the ACU provides tools that enable you to assess the performance of the client adapter and other devices on the wireless network. The ACU's 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
- Run an RF link test to assess the performance of the RF link between your client adapter and its associated access point.
- Perform a site survey to determine the required number and placement of access points within your network

Table 2-9 enables you to quickly locate the instructions for using each of the diagnostic tools.

Table 2-9 *Locating Diagnostic Instructions*

Diagnostic Tool	Page Number
Status	2-32
Statistics	2-39
RF link test	2-42
Site survey	2-48

Viewing the Current Status of Your Client Adapter

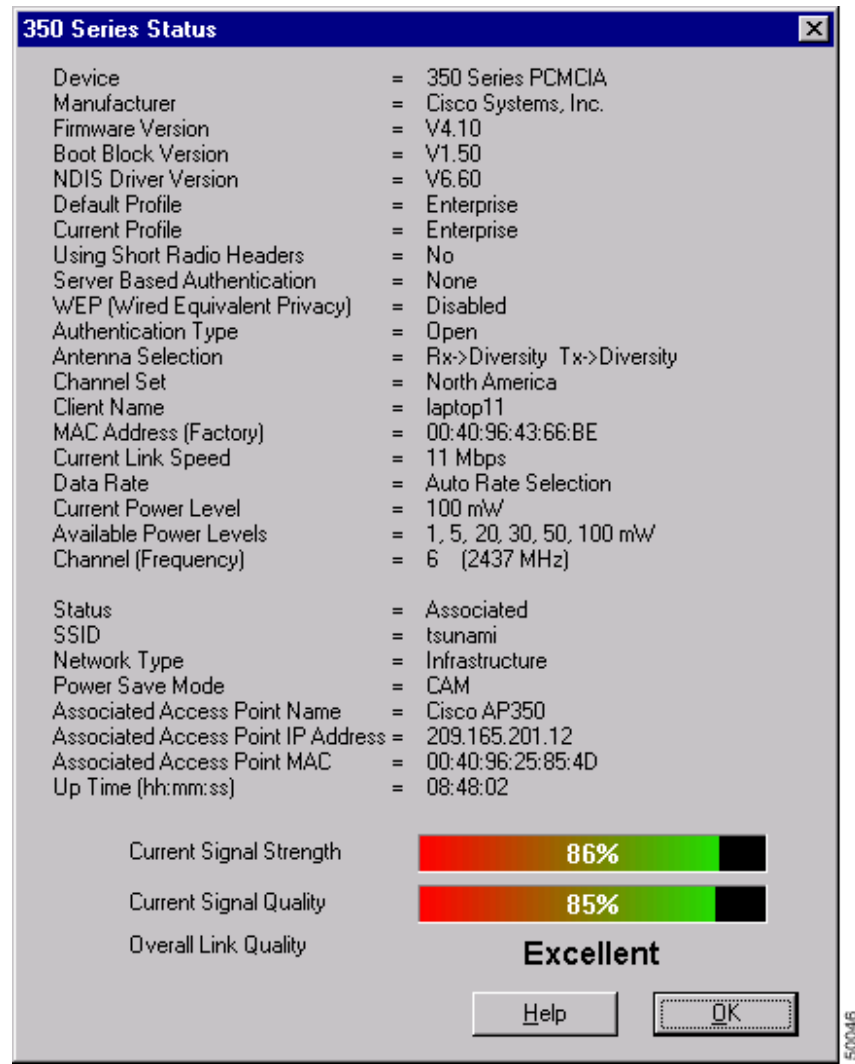
The ACU enables you to view the current status of your client adapter as well as many of the settings that have been configured for the adapter.

To view your client adapter's status and settings, select **Status** from the Commands pull-down menu (see Figure 2-4 on page 2-6). The Status screen appears. Figure 2-13 shows the Status screen with the signal strength values displayed as percentages, and Figure 2-14 shows the bottom of the same screen with the signal strength values displayed in decibels with respect to milliwatts (dBm).



Note

Refer to the Signal Strength Display Units parameter in Table 2-1 for information on selecting how signal strength is displayed.

Figure 2-13 Status Screen (with Signal Strength as a Percentage)**Figure 2-14 Bottom of Status Screen (with Signal Strength in dBm)**

The status of the client adapter is continually updated at the rate specified by the Screen Update Timer. Instructions for changing the Screen Update Timer setting are provided in Table 2-1 on page 2-5.

Table 2-10 describes each client adapter setting for which a status is displayed.

Table 2-10 Client Adapter Status




Client Adapter Setting	Description
Device	A description of your client adapter
Manufacturer	The manufacturer of your client adapter
Firmware Version	The version of the firmware that is currently running on your client adapter
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.
NDIS Driver Version	The version of the NDIS device driver that is currently installed on your computer
Default Profile	<p>The network configuration for which your client adapter is configured</p> <p>Value: Enterprise or Home</p> <p></p> <p>Note See the Current Profile or Default Profile parameter in Table 2-3 for information on setting the network configuration.</p>
Current Profile	<p>The network configuration your client adapter is currently using (if your driver supports automatic configuration switching) or the network configuration for which your client adapter is configured (if your driver does not support automatic configuration switching).</p> <p>Value: Enterprise or Home</p> <p></p> <p>Note See the Current Profile or Default Profile parameter in Table 2-3 and the Enable Auto Configuration Switching parameter in Table 2-3 for information on setting the network configuration.</p>
Using Short Radio Headers	<p>Indicates whether your client adapter is set up to use short radio headers</p> <p>Value: Yes or No</p> <p></p> <p>Note Refer to the Use Short Radio Headers parameter in Table 2-4 for information on using short radio headers.</p>

Table 2-10 Client Adapter Status (continued)







Client Adapter Setting	Description
Server Based Authentication	<p>Indicates whether LEAP or EAP is enabled for your client adapter</p> <p>Value: Disabled, LEAP, or EAP</p> <p></p> <p>Note Refer to the Server Based Authentication parameter in Table 2-7 for information on LEAP and EAP.</p>
WEP (Wired Equivalent Privacy)	<p>Your client adapter's current WEP status</p> <p>Value: Enabled, Not Enabled, or Need Firmware Upgrade</p> <p></p> <p>Note Refer to the Enable WEP parameter in Table 2-7 for instructions on enabling WEP.</p>
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 or Shared Key</p> <p></p> <p>Note Refer to the access point Authentication parameter in Table 2-7 for information on setting the authentication type.</p>
Antenna Selection	<p>The antenna mode that your client adapter is currently using</p> <p>Value: Diversity, Right Only, Left Only (Right Only is the only option available for PCI client adapters)</p> <p></p> <p>Note Refer to the Antenna Mode (Receive) and Antenna Mode (Transmit) parameters in Table 2-5 and Table 2-6 for information on setting the antenna mode.</p>
Channel Set	<p>The regulatory domain for which your client adapter is currently configured, such as North America. (For the Japan channel set, the Call ID is also displayed.) This value is not user selectable.</p> <p></p> <p>Note Refer to Appendix A 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></p> <p>Note Refer to the Client Name parameter in Table 2-3 for information on setting the client name.</p>

Table 2-10 Client Adapter Status (continued)





Client Adapter Setting	Description
MAC Address	The MAC address assigned to your client adapter at the factory
Current Link Speed	The rate at which your client adapter is currently transmitting data packets Value: 1, 2, 5.5, or 11 Mbps
Data Rate	The rate at which your client adapter has been configured to transmit or receive data packets Value: 1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps, or Auto Rate Selection  Note Refer to the Data Rate parameter in Table 2-4 for information on setting the client adapter's data rate.
Current Power Level	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. Value: 1, 5, 20, 30, 50, or 100 mW  Note Refer to the Transmit Power parameter in Table 2-4 for information on setting the client adapter's power level.
Available Power Levels	The power levels at which your client adapter is capable of transmitting. The maximum level is dependent upon the radio installed in your client adapter and your country's regulatory agency. Value: 1, 5, 20, 30, 50, or 100 mW  Note Refer to the Transmit Power parameter in Table 2-4 for information on the client adapter's available power levels.
Channel (Frequency)	The frequency that your client adapter is currently using as the channel for communications Value: Dependent on regulatory domain  Note Refer to the Channel parameter in Table 2-4 for information on selecting the frequency for your client adapter.
Status	The operational mode of your client adapter Value: Error, Configured, Associated, Not Associated, or Ad Hoc Mode

Table 2-10 Client Adapter Status (continued)




Client Adapter Setting	Description
SSID	<p>The SSID that your client adapter is currently using</p> <p> Note Refer to the SSID1 parameter in Table 2-3 for information on the client adapter's SSID.</p>
Network Type	<p>The type of network in which your client adapter is being used</p> <p>Value: Infrastructure or Ad Hoc</p> <p> Note Refer to the Network Type parameter in Table 2-3 and Table 2-8 for information on setting the network type.</p>
Power Save Mode	<p>The client adapter's current power consumption setting</p> <p>Value: CAM, Max PSP, or Fast PSP</p> <p> Note Refer to the Power Save Mode parameter in Table 2-3 for information on setting the client adapter's power save mode.</p>
Associated Access Point 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.
Associated Access Point 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.
Associated Access Point 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.
Beacon Period	<p>Specifies the duration between beacon packets, which are used to help clients find each other in ad hoc mode</p> <p>Range: Approximately 20 to 999 milliseconds (ms)</p>
Up Time (hh:mm:ss)	The amount of time (in hours:minutes:seconds) that the client adapter has been receiving power. If the adapter has been running for more than 24 hours, the time is displayed in days, hours:minutes:seconds.
Current 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>Range: 0 to 100% or -95 to -45 dBm</p>

Table 2-10 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 more 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> <p> Note This setting appears only if your client adapter's firmware version is less than 4.05, and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Current Signal Quality	<p>The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal.</p> <p>Range: 0 to 100%</p> <p> Note This setting appears only if your client adapter's firmware version is 4.05 or greater, and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Current Noise Level	<p>The level of background radio frequency energy in the 2.4-GHz band. The lower the value and the more green the bar graph is, the less background noise present.</p> <p>Range: -100 to -45 dBm</p> <p> Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>

Table 2-10 Client Adapter Status (continued)

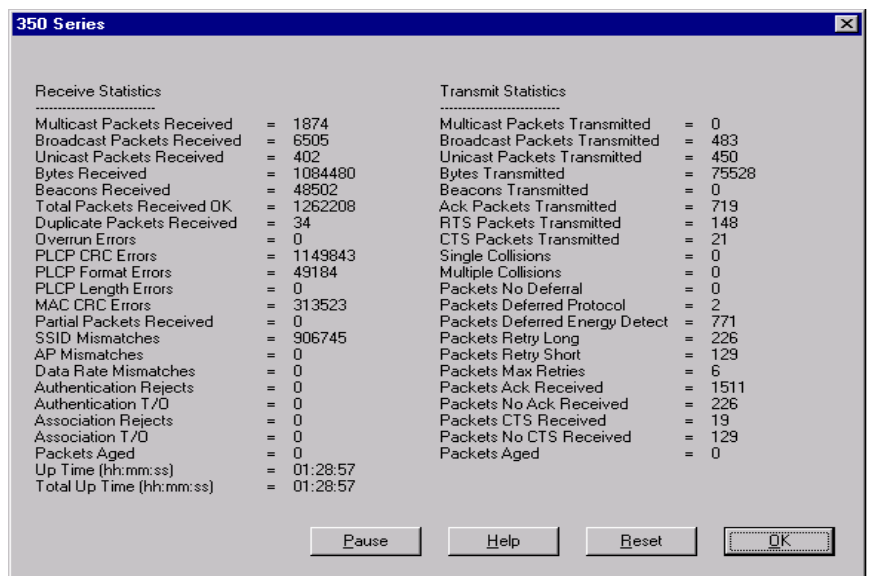
Client Adapter Setting	Description
Overall Link Quality	<p>The client adapter's ability to communicate with the access point, which is determined by the combined result of the adapter's signal strength and signal quality</p> <p>Value: Not Associated, Poor, Fair, Good, Excellent</p> <p></p> <p>Note This setting appears only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Signal To Noise Ratio	<p>The difference between the signal strength and the current noise level. The higher the value, the better the client adapter's ability to communicate with the access point.</p> <p>Range: 0 to 55 dB</p> <p></p> <p>Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>

Viewing Statistics for Your Client Adapter

The ACU enables you to view statistics that indicate how data is being received and transmitted by your client adapter.

To view your client adapter's statistics, select **Statistics** from the Commands pull-down menu (see Figure 2-4 on page 2-6). The Statistics screen appears (see Figure 2-15).

Figure 2-15 Statistics Screen



The statistics are calculated as soon as your client adapter is started or the Reset button is selected and are continually updated at the rate specified by the Screen Update Timer. Instructions for changing the Screen Update Timer setting are provided in Table 2-1 on page 2-5.

Table 2-11 describes each statistic that is displayed for your client adapter.

Table 2-11 Client Adapter Statistics


Statistic	Description
Receive Statistics	
Multicast Packets Received	The number of multicast packets that were received successfully
Broadcast Packets Received	The number of broadcast packets that were received successfully
Unicast Packets Received	The number of unicast packets that were received successfully
Bytes Received	The number of bytes of data that were received successfully
Beacons Received	The number of beacon packets that were received successfully
Total Packets Received OK	The number of all packets that were received successfully
Duplicate Packets Received	The number of duplicate packets that were received successfully
Overrun Errors	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 Errors	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 Errors	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
PLCP Length Errors	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 Errors	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 Packets Received	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 2-5 for information on specifying access points.

Table 2-11 Client Adapter Statistics (continued)


Statistic	Description
Data Rate Mismatches	<p>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</p> <p> Note Refer to the Data Rate parameter in Table 2-4 for information on supported data rates.</p>
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 the Reset button was selected. If the client adapter has been running for more than 24 hours, the time is displayed in days, hours:minutes:seconds.
Total Up Time (hh:mm:ss)	The amount of time (in hours:minutes:seconds) that the client adapter has been receiving power. The total up time continues to increment even if the Reset button is selected. If the adapter has been running for more than 24 hours, the time is displayed in days, hours:minutes:seconds.
Transmit Statistics	
Multicast Packets Transmitted	The number of multicast packets that were transmitted successfully
Broadcast Packets Transmitted	The number of broadcast packets that were transmitted successfully
Unicast Packets Transmitted	The number of unicast packets that were transmitted successfully
Bytes Transmitted	The number of bytes of data that were transmitted successfully
Beacons Transmitted	The number of beacon packets that were transmitted successfully (in ad hoc mode only)
Ack Packets Transmitted	The number of acknowledgment (Ack) packets that were transmitted in response to successfully received unicast packets
RTS Packets Transmitted	The number of request-to-send (RTS) packets that were transmitted successfully

Table 2-11 Client Adapter Statistics (continued)

Statistic	Description
CTS Packets Transmitted	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
Packets No Deferral	The number of packets that were able to be transmitted immediately without being delayed due to energy detect or protocol deferral
Packets 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)
Packets Deferred Energy Detect	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).
Packets Retry Long	The number of normal data packets that were retransmitted
Packets Retry Short	The number of request-to-send (RTS) packets that were retransmitted
Packets Max Retries	The number of packets that failed to be transmitted successfully after exhausting the maximum number of retries
Packets Ack Received	The number of transmitted packets that had their corresponding acknowledgment (Ack) packet received successfully
Packets No Ack Received	The number of transmitted packets that did not have their corresponding Ack packet received successfully
Packets CTS Received	The number of clear-to-send (CTS) packets that were received in response to an RTS packet
Packets No CTS Received	The number of packets for which no CTS packet was received in response to a RTS packet
Packets Aged	The number of packets that were discarded by the client adapter because they were not transmitted successfully within 5 seconds

Running an RF Link Test

The ACU'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 section of the ACU (see the Data Rate parameter in Table 2-4). 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.

**Note**

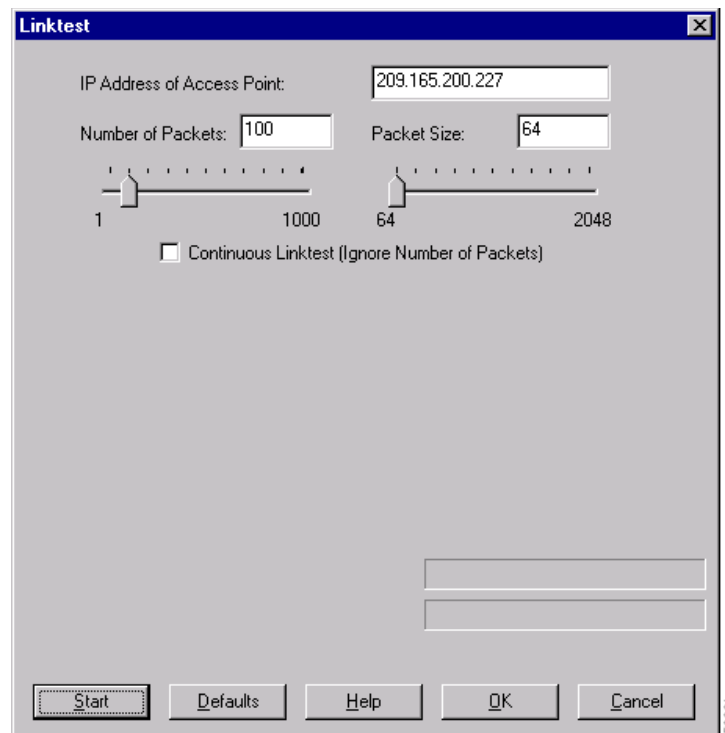
See the Help section of your Windows operating system for information on installing and setting up TCP/IP.

- An IP address must be configured for the access point (or other computer in ad hoc mode).

Follow the steps below to run an RF link test.

- Step 1** Select **Linktest** from the Commands pull-down menu (see Figure 2-4 on page 2-6). The Linktest screen appears (see Figure 2-16).

Figure 2-16 Linktest Screen



- Step 2** In the IP Address of the 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:

- Select the number of packets that the link test should attempt to send. You can type a number in the Number of Packets field or use the slider to select this value. (The Number of Packets parameter is ignored if the Continuous Linktest checkbox is selected.)

Range: 1 to 1000

Default: 4

- Select the Continuous Linktest checkbox to allow the link test to run continuously.

Default: Deselected

Step 4 Select the size of the data packet that is to be sent to the access point. You can type a number in the Packet Size field or use the slider to select this value.

Range: 64 to 2048

Default: 100



Note

The Windows TCP/IP stack will fragment (split up) packets that are greater than 512 bytes. Therefore, the number of transmitted packets will not match the number of received packets (even if none are lost) if the packet size is greater than 512 bytes.

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

Figure 2-17 shows the Linktest screen with the signal strength values displayed as percentages, and Figure 2-18 shows the bottom of the same screen with the signal strength values displayed in dBm.

Figure 2-17 Linktest Screen (with Test Running and Signal Strength as a Percentage)

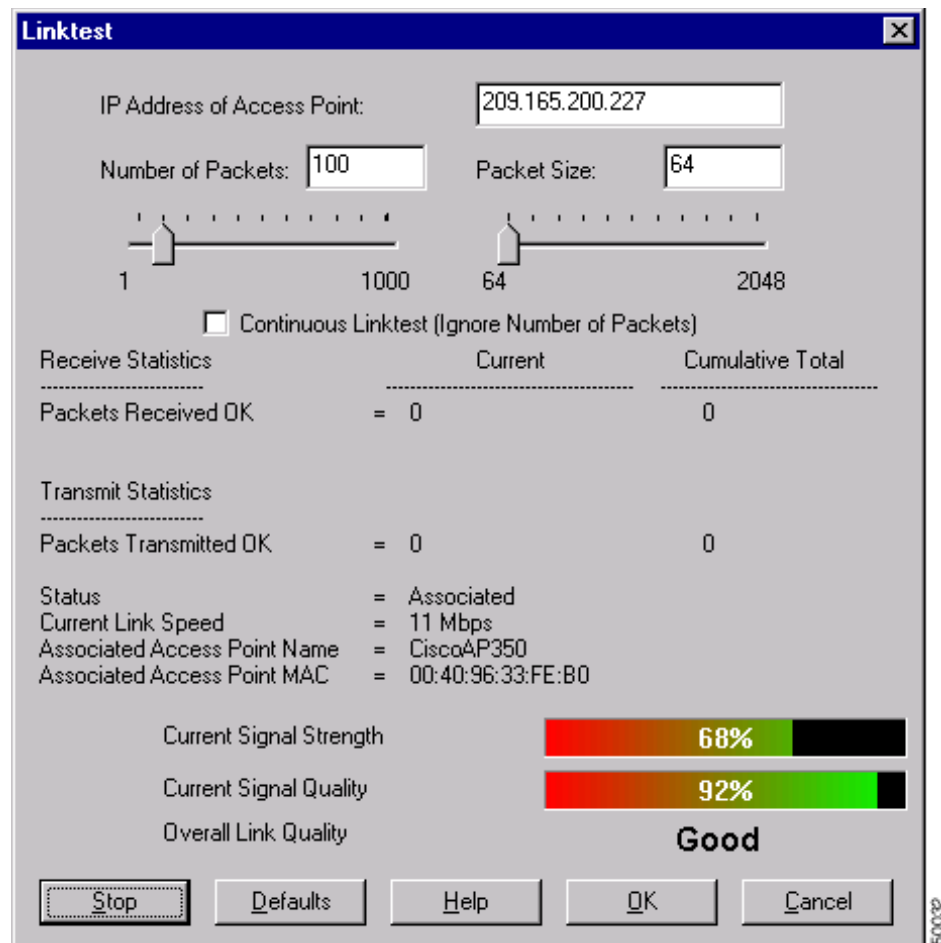


Figure 2-18 Bottom of Linktest Screen (with Test Running and Signal Strength in dBm)



Table 2-12 interprets the statistics that are displayed on the Linktest screen while the link test is running.

Table 2-12 Linktest Statistics






Linktest Statistic	Description
Packets Received OK	The number of packets of the specified size that have been received successfully
Packets Transmitted OK	The number of packets of the specified size that have been transmitted successfully
Status	The operational mode of your client adapter Value: Error, Configured, Associated, Not Associated, or Ad Hoc Mode
Current Link Speed	The rate at which your client adapter is currently transmitting data packets Value: 1, 2, 5.5, or 11 Mbps
Associated Access Point 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.
Associated Access Point 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.
Current 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% or -95 to -45 dBm
Current 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>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> <p> Note This setting appears only if your client adapter's firmware version is less than 4.05, and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Current Signal Quality	<p>The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal.</p> <p>Range: 0 to 100%</p> <p> Note This setting appears only if your client adapter's firmware version is 4.05 or greater and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>

Table 2-12 Linktest Statistics (continued)

Linktest Statistic	Description
Current Noise Level	<p>The level of background radio frequency energy in the 2.4-GHz band. The lower the value and the more green the bar graph is, the less background noise present.</p> <p>Range: –100 to –45 dBm</p> <p></p> <p>Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</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> <p></p> <p>Note This setting appears only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Signal To Noise Ratio	<p>The difference between the signal strength and the current noise level. The higher the value, the better the client adapter's ability to communicate with the access point.</p> <p>Range: 0 to 55 dB</p> <p></p> <p>Note This setting appears only if you selected signal strength to be displayed in dBm. See the "Signal Strength Display Units" parameter in Table 2-1 for information.</p>

- 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**, **OK**, or **Cancel**.

Performing a Site Survey

The ACU's site survey tool 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 four times 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 can be operated in two modes:

- **Passive Mode** – This is the default site survey mode. It does not initiate any RF network traffic; it simply listens to the traffic that the client adapter hears and displays the results. Follow the instructions in the “Using Passive Mode” section below to activate the passive mode.
- **Active Mode** – This mode causes the client adapter to actively send or receive low-level RF packets to or from its associated access point and provides information on the success rate. It also enables you to set parameters governing how the site survey is performed (such as the data rate). Follow the instructions in the “Using Active Mode” section on page 2-52 to activate the active mode.

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 the mobile station.
- When using the active mode, conduct the site survey with all variables set to operational values.

Using Passive Mode

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

-
- Step 1** Select **Site Survey** from the Commands pull-down menu (see Figure 2-4 on page 2-6). The Site Survey - Passive Mode screen appears.

Figure 2-19 shows the Site Survey - Passive Mode screen with the signal strength values displayed as percentages, and Figure 2-20 shows the top of the same screen with the signal strength values displayed in dBm.

Figure 2-19 Site Survey - Passive Mode Screen (with Signal Strength as a Percentage)

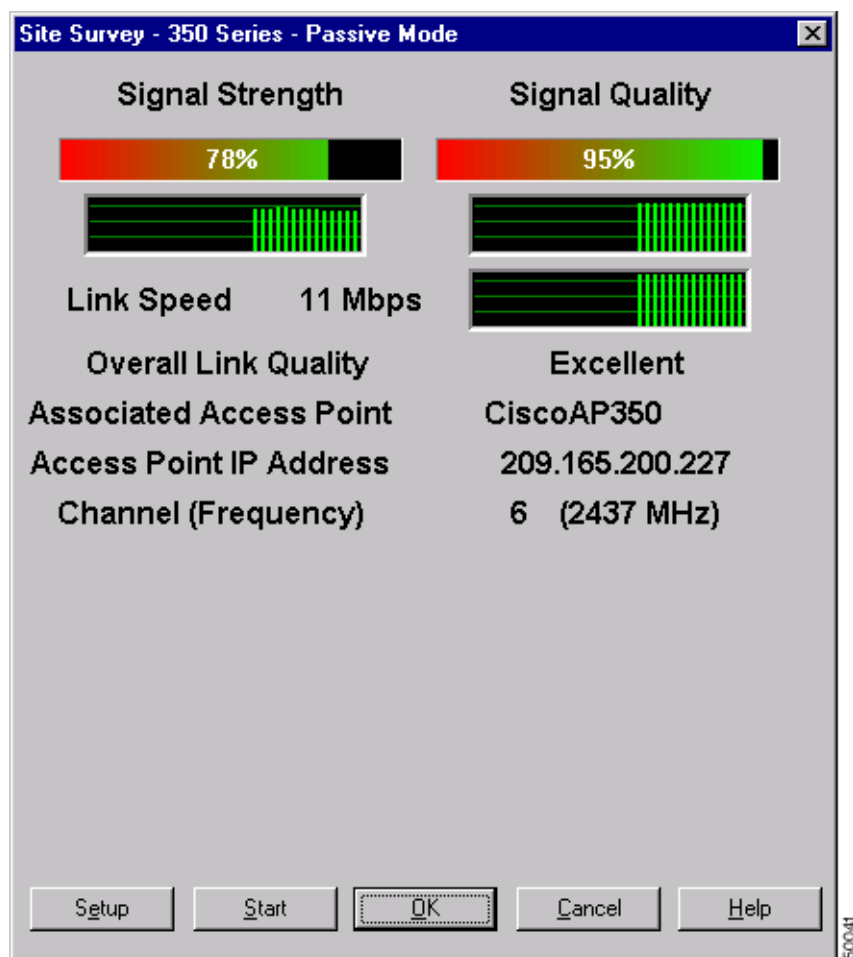


Figure 2-20 Top of Site Survey - Passive Mode Screen (with Signal Strength in dBm)

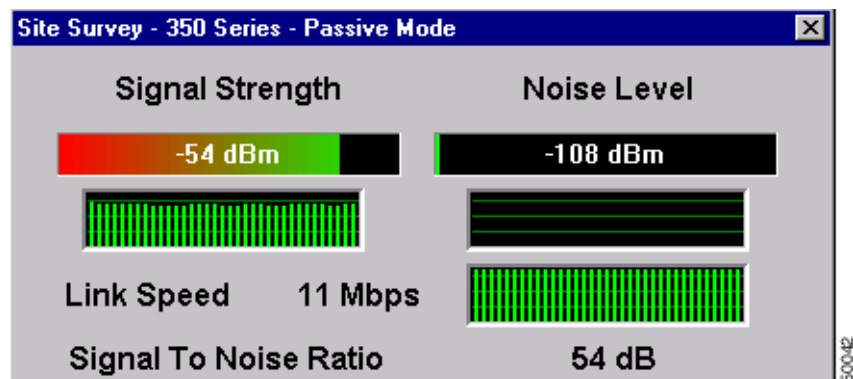


Table 2-13 interprets the information that is displayed on the Site Survey - Passive Mode screen.

Table 2-13 Site Survey Passive Mode 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 following colors: green (strongest), yellow (middle of the range), and red (weakest).</p> <p>Range: 0 to 100% or -95 to -45 dBm</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 following colors: green (highest quality), yellow (middle of the range), and red (lowest quality).</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> <div>  <p>Note This setting appears only if your client adapter's firmware version is less than 4.05 and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>
Signal Quality	<p>The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal.</p> <p>The histogram below the bar graph provides a visual interpretation of the current signal quality. Differences in signal quality are indicated by the following colors: green (highest quality), yellow (average), and red (lowest quality).</p> <p>Range: 0 to 100%</p> <div>  <p>Note This setting appears only if your client adapter's firmware version is 4.05 or greater and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>

Table 2-13 Site Survey Passive Mode Statistics (continued)




Statistic	Description
Noise Level	<p>The level of background radio frequency energy in the 2.4-GHz band. The lower the value and the more green the bar graph is, the less background noise present.</p> <p>The histogram below the bar graph provides a visual interpretation of the current level of background noise. Differences in background noise level are indicated by the following colors: green (low noise), yellow (middle of the range), and red (high noise).</p> <p>Range: -100 to -45 dBm</p> <div>  <p>Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>
Link Speed	<p>The rate at which your client adapter is receiving packets from its associated access point</p> <p>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 following colors: green (fastest), yellow (middle of the range), and red (slowest).</p> <p>Value: 1, 2, 5.5, or 11 Mbps</p>
Overall Link Quality	<p>The client adapter's ability to communicate with the access point</p> <p>Value: Not Associated, Poor, Fair, Good, Excellent</p> <div>  <p>Note This setting appears only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>
Signal To Noise Ratio	<p>The difference between the signal strength and the noise level. The higher the value, the better the client adapter's ability to communicate with the access point.</p> <p>Range: 0 to 55 dB</p> <div>  <p>Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>
Associated Access Point	<p>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>

Table 2-13 Site Survey Passive Mode Statistics (continued)

Statistic	Description
Access Point 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.
Channel (Frequency)	The frequency that your client adapter is currently using as the channel for communications Value: Dependent on regulatory domain

- Step 2** If you want to activate the site survey active mode, go to the “Using Active Mode” section below. Otherwise, click **OK** or **Cancel** to exit the site survey application.

Using Active Mode

Follow the steps below to activate the site survey active mode and obtain current information about your client adapter’s ability to transmit and receive RF packets.

- Step 1** From the Site Survey - Passive Mode screen (see Figure 2-19 on page 2-49), click the **Setup** button. The Site Survey Active Mode Setup screen appears (see Figure 2-21).

Figure 2-21 Site Survey Active Mode Setup Screen

Table 2-14 lists and describes the parameters that affect how the site survey is performed. Follow the instructions in the table to set any parameters.

Table 2-14 Site Survey Active Mode Parameters


Parameter	Description						
Destination MAC Address	<p>The MAC address of the access point (in infrastructure mode) or other clients (in ad hoc mode) that will be used in the test</p> <p>Default: The MAC address of the access point (in infrastructure mode) to which your client adapter is associated</p> <p> Note During the test, the client adapter will not roam to other access points so that the size of a single cell can be determined.</p>						
Continuous Link Test	<p>Selecting this checkbox causes the test to run until you click OK or Stop. The test loops repeatedly for the number of packets specified in the Number of Packets field.</p> <p>Default: Deselected</p>						
Destination Is Another Cisco/Aironet Device	<p>Selecting this checkbox indicates that the device you named in the Destination MAC Address field is a Cisco Aironet access point (in infrastructure mode) or client (in ad hoc mode).</p> <p>If this checkbox is not selected, the test sends out loopback packets, which originate from and return to your client adapter.</p> <p>Default: Deselected</p>						
Number of Packets	<p>The number of packets that will be sent during the test</p> <p>Range: 1 to 999</p> <p>Default: 100</p>						
Packet Size	<p>The size of the packets that will be sent during the test. Select a size that will be typical during normal system use.</p> <p>Range: 30 to 1450</p> <p>Default: 512</p>						
Data Retries	<p>The number of times a transmission will be retried if an acknowledgment (Ack) is not returned by the destination device</p> <p>Default: None</p> <table border="1"> <thead> <tr> <th>Retry Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>None</td><td>No retries will occur.</td></tr> <tr> <td>Default Retries</td><td>The firmware's default value for retries will be used.</td></tr> </tbody> </table>	Retry Value	Description	None	No retries will occur.	Default Retries	The firmware's default value for retries will be used.
Retry Value	Description						
None	No retries will occur.						
Default Retries	The firmware's default value for retries will be used.						
Data Rate	<p>The bit rate at which packets will be transmitted. Rate shifting will not occur during the test.</p> <p>Value: 1, 2, 5.5, or 11 Mbps</p> <p>Default: 11 Mbps</p>						

Table 2-14 Site Survey Active Mode Parameters (continued)

Parameter	Description						
Delay Between Packets	The delay (in milliseconds) between successive transmissions Range: 1 to 2048 ms Default: 50 ms						
Packet Tx Type	The packet type that will be transmitted during the test Default: Unicast						
	<table> <tr> <th>Packet Type</th><th>Description</th></tr> <tr> <td>Unicast</td><td>When unicast packets are used, the system expects an Ack back from the destination, and retries can occur.</td></tr> <tr> <td>Multicast</td><td>When multicast packets are used, no packet retries occur during the test.</td></tr> </table>	Packet Type	Description	Unicast	When unicast packets are used, the system expects an Ack back from the destination, and retries can occur.	Multicast	When multicast packets are used, no packet retries occur during the test.
Packet Type	Description						
Unicast	When unicast packets are used, the system expects an Ack back from the destination, and retries can occur.						
Multicast	When multicast packets are used, no packet retries occur during the test.						
Percent Success Threshold	The percentage of packets that are not lost This parameter controls the red line on the Percent Successful histogram. Percentages greater than or equal to this value are displayed as green bars; percentages below this value are displayed as yellow bars. Range: 0 to 100% Default: 75						

Step 2 After setting any parameters, click **OK** to save the settings. The Site Survey - Passive Mode screen appears (see Figure 2-19 on page 2-49).

Step 3 Click the **Start** button to run the site survey test. The Site Survey - Active Mode screen appears. Figure 2-22 shows the Site Survey - Active Mode screen with the signal strength values displayed as percentages, and Figure 2-23 shows the top of the same screen with the signal strength values displayed in dBm.

Figure 2-22 Site Survey - Active Mode Screen (with Signal Strength as a Percentage)

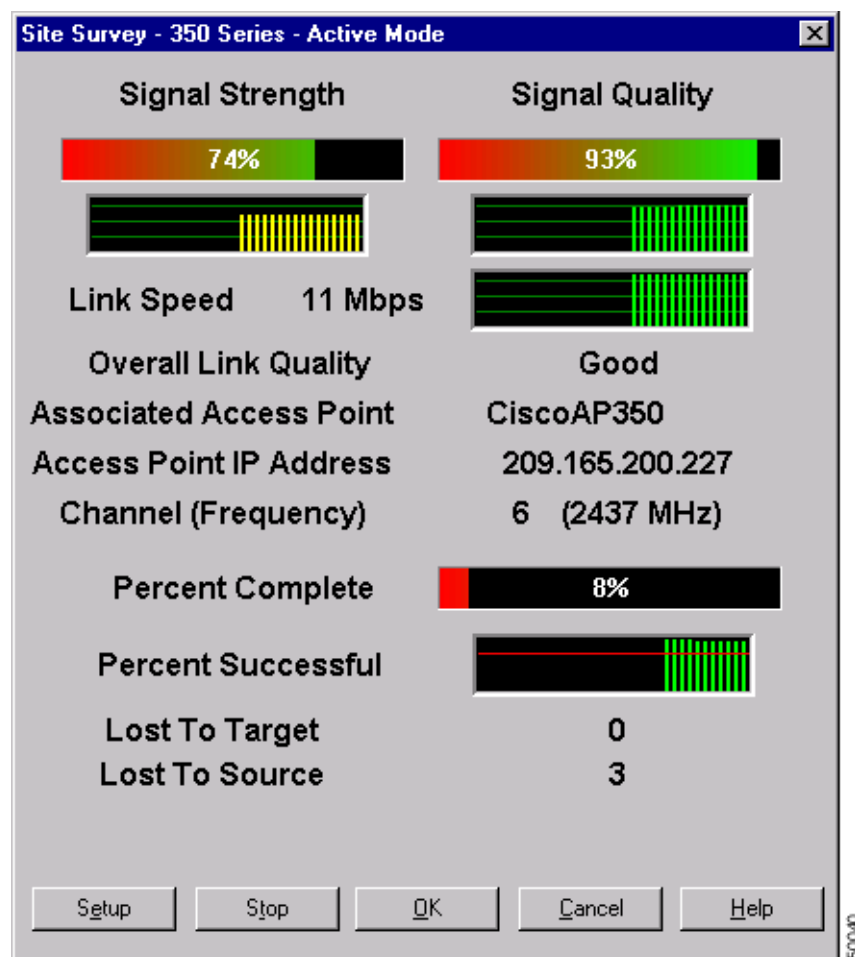


Figure 2-23 Top of Site Survey - Active Mode Screen (with Signal Strength in dBm)

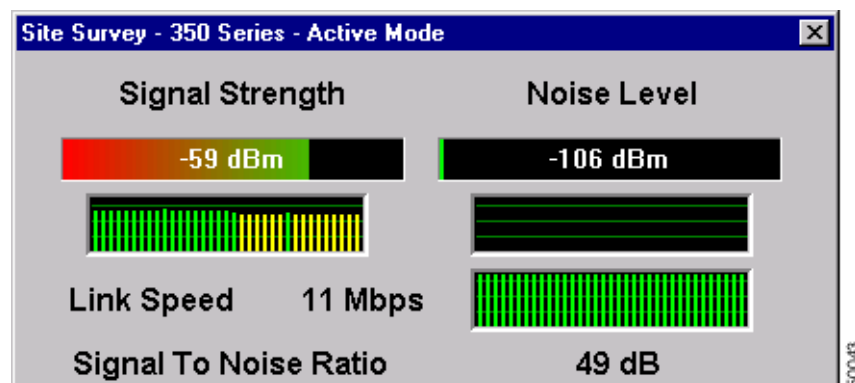


Table 2-15 interprets the information that is displayed on the Site Survey - Active Mode screen while the site survey test is running.

Table 2-15 Site Survey Active Mode 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 following colors: green (strongest), yellow (middle of the range), and red (weakest).</p> <p>Range: 0 to 100% or -95 to -45 dBm</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 following colors: green (highest quality), yellow (middle of the range), and red (lowest quality).</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> <div>  <p>Note This setting appears only if your client adapter's firmware version is less than 4.05 and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>
Signal Quality	<p>The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal.</p> <p>The histogram below the bar graph provides a visual interpretation of the current signal quality. Differences in signal quality are indicated by the following colors: green (highest quality), yellow (average), and red (lowest quality).</p> <p>Range: 0 to 100%</p> <div>  <p>Note This setting appears only if your client adapter's firmware version is 4.05 or greater and you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information.</p> </div>

Table 2-15 Site Survey Active Mode Statistics





Statistic	Description
Noise Level	<p>The level of background radio frequency energy in the 2.4-GHz band. The lower the value and the more green the bar graph is, the less background noise present.</p> <p>The histogram below the bar graph provides a visual interpretation of the current level of background noise. Differences in background noise level are indicated by the following colors: green (low noise), yellow (middle of the range), and red (high noise).</p> <p>Range: -100 to -45 dBm</p> <p> Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1.</p>
Link Speed	<p>The rate at which your client adapter is transmitting or receiving packets to or from its associated access point</p> <p>The Link Speed histogram provides a visual interpretation of the current rate at which your client adapter is transmitting or receiving packets. Differences in link speed are indicated by the following colors: green (fastest), yellow (middle of the range), and red (slowest).</p> <p>Value: 1, 2, 5.5, or 11 Mbps</p>
Overall Link Quality	<p>The client adapter's ability to communicate with the access point</p> <p>Value: Not Associated, Poor, Fair, Good, Excellent</p> <p> Note This setting appears only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 2-1 for information</p>
Signal To Noise Ratio	<p>The difference between the signal strength and the noise level. The higher the value, the better the client adapter's ability to communicate with the access point.</p> <p>Range: 0 to 55 dB</p> <p> Note This setting appears only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 2-1 for information.</p>
Associated Access Point	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.
Access Point 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.

Table 2-15 Site Survey Active Mode Statistics

Statistic	Description
Channel (Frequency)	The frequency that your client adapter is currently using as the channel for communications Value: Dependent on regulatory domain
Percent Complete	The percentage of packets that have been transmitted based on the number specified in the Number of Packets field
Percent Successful	The percentage of packets that were transmitted successfully The Percent Successful histogram provides a visual interpretation of the percentage of packets that are not lost. The value you set for the Percent Success Threshold is indicated by the red line. Percentages greater than or equal to this value are displayed as green bars; percentages below this value are displayed as yellow bars.
	 Note Refer to the Percent Success Threshold parameter in Table 2-14 for more information.
Lost To Target	The number of packets that were not transmitted successfully to the access point
Lost To Source	The number of packets that were not received successfully from the access point

- Step 4** When you click the **Stop** button or the Percent Complete reaches 100%, the active mode changes back to the passive mode.
- Step 5** Click **OK** or **Cancel** to exit the site survey application.

Turning Your Client Adapter's Radio On or Off

Your client adapter's 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's 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 the operation of certain devices.

If the radio is not turned off, it periodically sends out beacons 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.

- If your client adapter's radio is on, selecting **Radio Off** from the Commands pull-down menu (see Figure 2-4 on page 2-6) turns the radio off.

- If your client adapter's radio is off, selecting **Radio On** from the Commands pull-down menu (see Figure 2-4 on page 2-6) turns the radio on.

Ascertaining the ACU Version

To determine which version of the ACU you are running, select **About Aironet Client Utility** from the Help pull-down menu (see Figure 2-24).

Figure 2-24 Help Pull-Down Menu



The About Aironet Client Utility screen appears (see Figure 2-25).

Figure 2-25 About Aironet Client Utility Screen



Getting Help

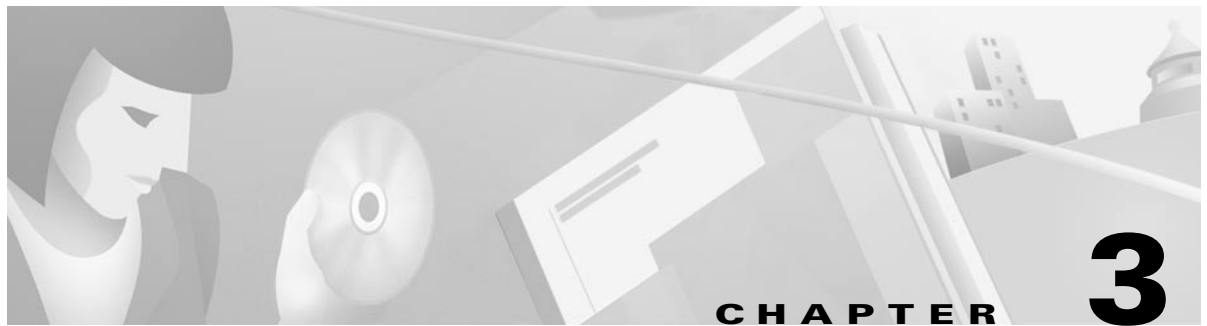
To access information about the ACU, press **F1** or select **Contents** from the Help pull-down menu (see Figure 2-24 on page 2-59). An overview of the ACU is displayed.

From the Overview of the Aironet Client Utility screen, you can access additional information.

- To access information on specific menu options, click **Contents**; double-click **Aironet Client Utility Commands**, the desired menu (such as Options Menu), and the desired topic (such as Preferences).
- To access information on specific parameters, click **Contents**; double-click **Configurable Parameters**, the client adapter, a parameter category (such as System Parameters), and the desired parameter (such as SSID).
- To access information on specific diagnostic topics, click **Contents**; double-click **Run Time Diagnostic Information**, a diagnostic category (such as Running a Linktest), and the desired topic (such as Packet Size).
- To search for a specific topic, click **Index**, select an index entry, and click **Display**.
- To search for a specific word or phrase, click **Contents** or **Index**, click the **Find** tab, and follow the instructions in the Find Setup Wizard window.

Exiting the ACU

To exit the ACU, select **Exit** from the Commands pull-down menu (see Figure 2-4 on page 2-6).



Using the Link Status Meter

This chapter explains how to use the Link Status Meter (LSM) utility to determine the performance of the RF link between your client adapter and its associated access point.

The following topics are covered in this chapter:

- Getting Started, page 3-2
- LSM Graphical Display, page 3-3
- Controlling LSM Operation, page 3-4
- Ascertaining the LSM Version, page 3-7
- Getting Help, page 3-8
- Exiting the LSM, page 3-8

Getting Started

To open the LSM, double-click the **LSM** icon on your desktop. The Link Status Meter screen appears (see Figure 3-1).

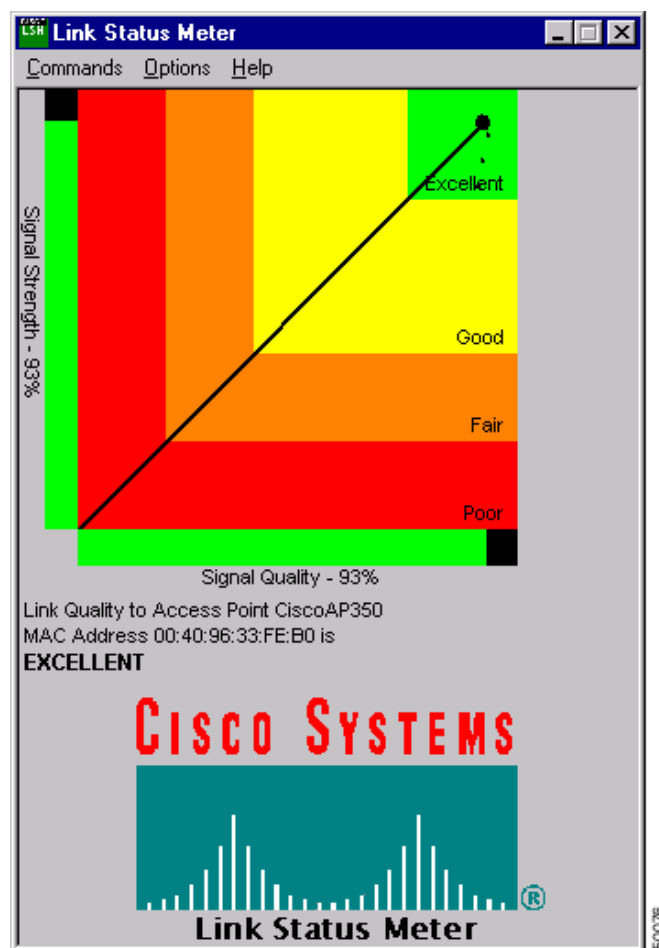
**Note**

The screens and windows shown represent typical LSM screens and windows. The screens and windows you see on your computer may vary.

**Note**

For instructions on opening the LSM from the Windows Start menu or a DOS window, refer to the “Opening the Client Utilities” section on page 1-4.

Figure 3-1 Link Status Meter Screen



LSM Graphical Display

**Note**

Data pertaining to the performance of the RF link can be accessed from the ACU and the LSM; however, they are displayed differently by each utility. These data are represented by histograms in the ACU and are depicted graphically in the LSM.

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 diagonal line (see Figure 3-1 on page 3-2). Where the line falls on the graphical display determines whether the RF link between your client adapter and its associated access point is poor, fair, good, or excellent.

This information can be used to determine the optimum number and placement of access points in your RF network. By using the 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.

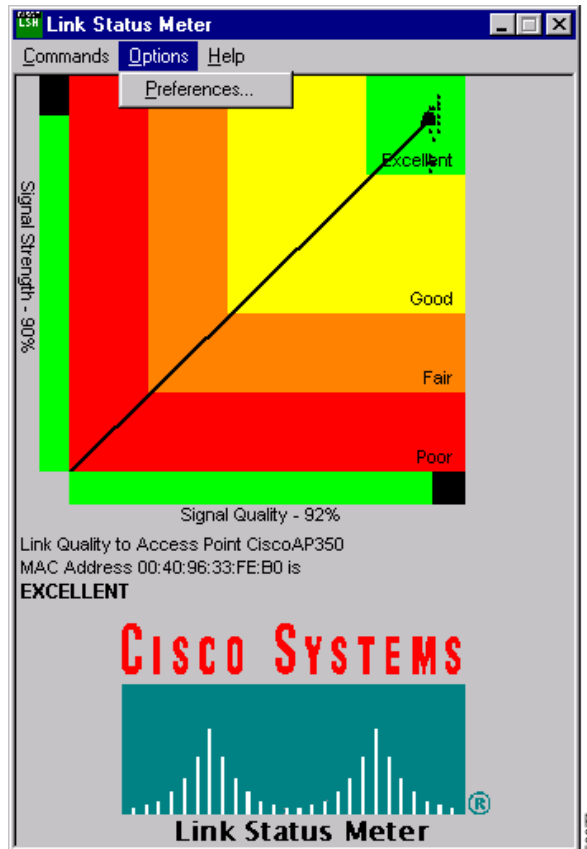
**Note**

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

Controlling LSM Operation

You can set parameters that control the LSM operation. To do so, select **Preferences** from the Options pull-down menu (see Figure 3-2).

Figure 3-2 Options Pull-Down Menu



The Link Status Meter Preferences screen appears (see Figure 3-3).

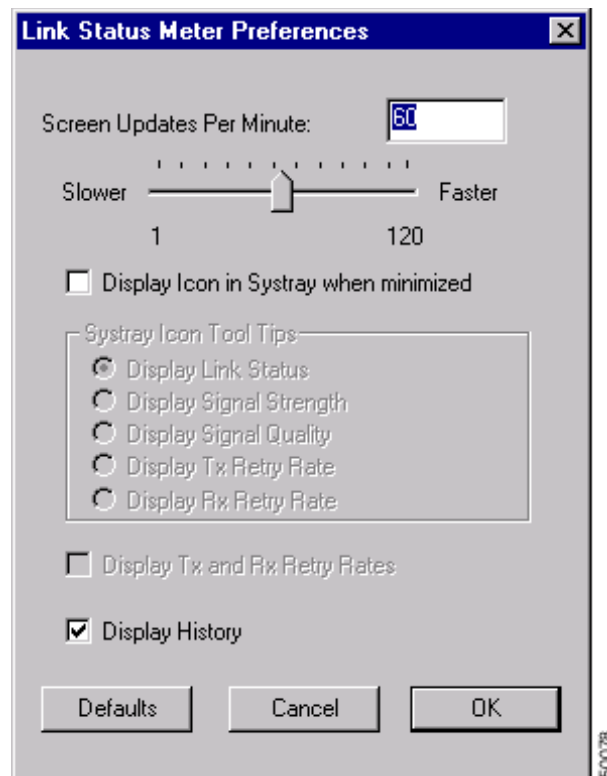
Figure 3-3 Link Status Meter Preferences Screen

Table 3-1 lists and describes the parameters that control LSM operation. Follow the instructions in the table to set any parameters.

Table 3-1 Parameters Affecting LSM Operation

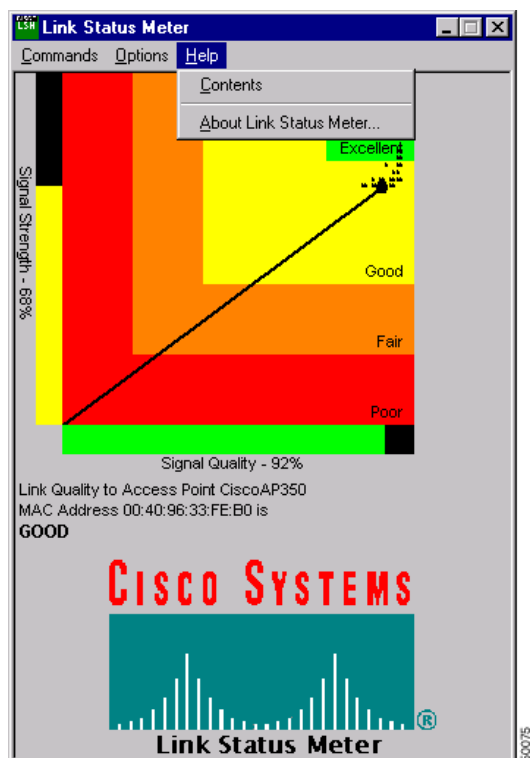
Parameter	Description								
Screen Updates Per Minute	<p>Specifies how often the LSM graphical display is updated.</p> <p>Range: 1 to 120 updates per minute (once a minute to twice a second)</p> <p>Default: 60 (once per second)</p>								
Display Icon in Systray when minimized	<p>Selecting this checkbox causes an LSM icon to be displayed in the bottom right corner of your desktop when the LSM is minimized.</p> <p>Default: Selected; Display Link Status icon tool tip</p> <p>You can select the information that displays when your cursor is positioned over the icon. The following table lists and describes your options.</p> <table> <tr> <th>Systray Icon Tool Tips</th><th>Description</th></tr> <tr> <td>Display Link Status</td><td> <p>Indicates the client adapter's ability to communicate with the access point</p> <p>Range: Not Associated, Poor, Fair, Good, Excellent</p> </td></tr> <tr> <td>Display Signal Strength</td><td> <p>Indicates the signal strength for received packets</p> <p>Range: 0 to 100%</p> </td></tr> <tr> <td>Display Signal Quality</td><td> <p>Indicates the signal quality for received packets</p> <p>Range: 0 to 100%</p> </td></tr> </table>	Systray Icon Tool Tips	Description	Display Link Status	<p>Indicates the client adapter's ability to communicate with the access point</p> <p>Range: Not Associated, Poor, Fair, Good, Excellent</p>	Display Signal Strength	<p>Indicates the signal strength for received packets</p> <p>Range: 0 to 100%</p>	Display Signal Quality	<p>Indicates the signal quality for received packets</p> <p>Range: 0 to 100%</p>
Systray Icon Tool Tips	Description								
Display Link Status	<p>Indicates the client adapter's ability to communicate with the access point</p> <p>Range: Not Associated, Poor, Fair, Good, Excellent</p>								
Display Signal Strength	<p>Indicates the signal strength for received packets</p> <p>Range: 0 to 100%</p>								
Display Signal Quality	<p>Indicates the signal quality for received packets</p> <p>Range: 0 to 100%</p>								
Display History	<p>Selecting this checkbox causes the LSM 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.</p> <p>Default: Selected</p>								

Click **OK** at the bottom of the Link Status Meter Preferences screen to save any changes you have made.

Ascertaining the LSM Version

To determine which version of the LSM you are running, select **About Link Status Meter** from the Help pull-down menu (see Figure 3-4).

Figure 3-4 Help Pull-Down Menu



The About Link Status Meter screen appears (see Figure 3-5).

Figure 3-5 About Link Status Meter Screen



Getting Help

To access information about the LSM, press **F1** or select **Contents** from the Help pull-down menu (see Figure 3-4 on page 3-7). An overview of the LSM is displayed.

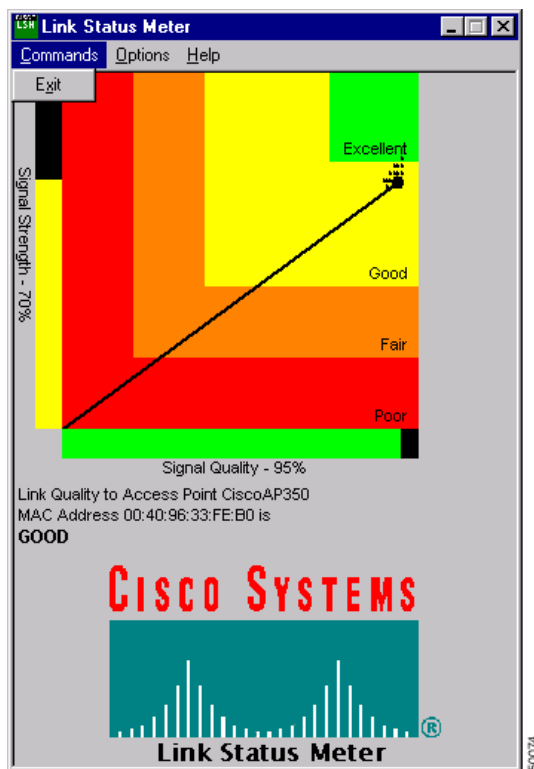
From the Overview of Link Status Meter screen, you can access additional information.

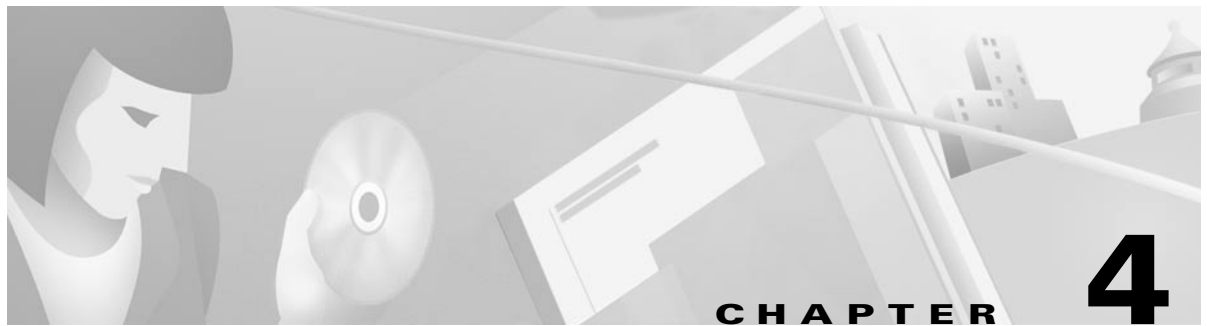
- To access information on specific menu options, click **Contents**; double-click **Link Status Meter Commands**, the desired menu (such as Options Menu), and the desired topic (such as Display History).
- To search for a specific topic, click **Index**, select an index entry, and click **Display**.
- To search for a specific word or phrase, click **Contents** or **Index**, click the **Find** tab, and follow the instructions in the Find Setup Wizard window.

Exiting the LSM

To exit the LSM, select **Exit** from the Commands pull-down menu (see Figure 3-6).

Figure 3-6 Commands Pull-Down Menu





Using the Client Encryption Manager

This chapter explains how to use the Client Encryption Manager (CEM) utility to set a Wired Equivalent Privacy (WEP) key for your client adapter.

The following topics are covered in this chapter:

- Overview, page 4-2
- Getting Started, page 4-2
- Changing the Password, page 4-3
- Entering a New WEP Key, page 4-5
- Selecting an Existing WEP Key, page 4-6
- Enabling WEP, page 4-7
- Ascertaining the CEM Version, page 4-7
- Getting Help, page 4-8
- Exiting the CEM, page 4-8

Overview

The Client Encryption Manager (CEM) utility enables you to set up to four encryption keys, called *Wired Equivalent Privacy (WEP) keys*, for your client adapter. WEP is an optional IEEE 802.11 feature that provides your client adapter and other devices on your wireless network with data confidentiality equivalent to that of a wired LAN. It involves packet-by-packet data encryption by the transmitting device and decryption by the receiving device.

Each device within your wireless network is assigned a key that encrypts data before it is transmitted. If a device receives a packet that is not encrypted with the appropriate key, the device discards the packet and never delivers it to the intended receiver.

WEP keys are either 40- or 128-bit hexadecimal values. 128-bit WEP keys contain more characters than 40-bit keys and, therefore, offer a greater level of security. WEP keys are write-only and cannot be read back from the client adapter. Refer to the “Entering a New WEP Key” section on page 4-5 for guidelines on creating WEP keys.


Note

The client adapter’s WEP key must match the WEP key used by the access points or clients with which you are planning to communicate because it can communicate only with devices that have a matching WEP key.

Getting Started

- Step 1** To open the CEM, double-click the **CEM** icon on your desktop. The login screen appears (see Figure 4-1).


Note

The screens and windows shown represent typical CEM screens and windows. The screens and windows you see on your computer may vary.

Figure 4-1 CEM Login Screen



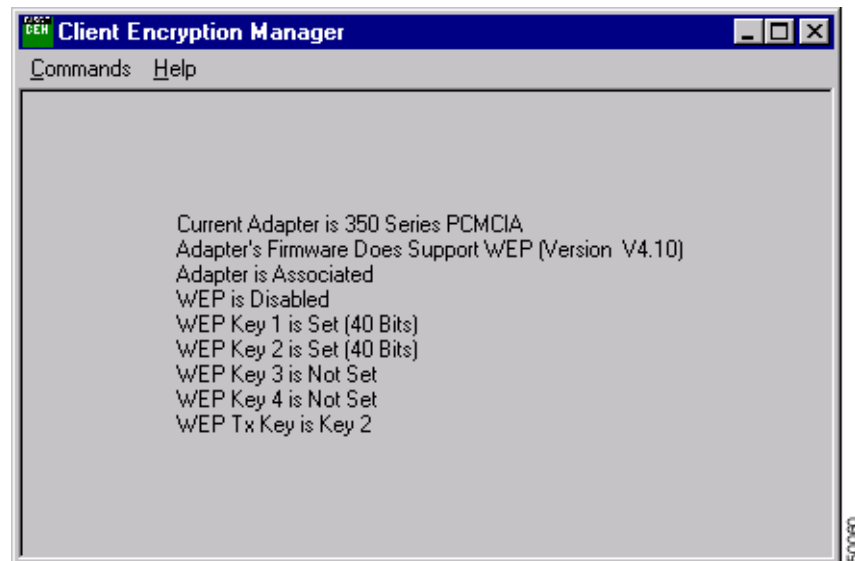
Step 2 Enter the correct password in the Password field and click **OK**.



Note Passwords are case sensitive and can contain up to 256 characters. The default password is **Cisco** (uppercase *C* followed by lowercase *isco*).

The Client Encryption Manager screen appears (see Figure 4-2).

Figure 4-2 *Client Encryption Manager Screen*



The Client Encryption Manager screen provides the following information:

- A description of your client adapter
- Whether your client adapter's firmware supports WEP
- Whether your client adapter is associated to an access point
- Whether WEP is enabled
- Whether WEP keys 1 through 4 have been set and, if so, their WEP key size
- The WEP key that has been selected to transmit data packets

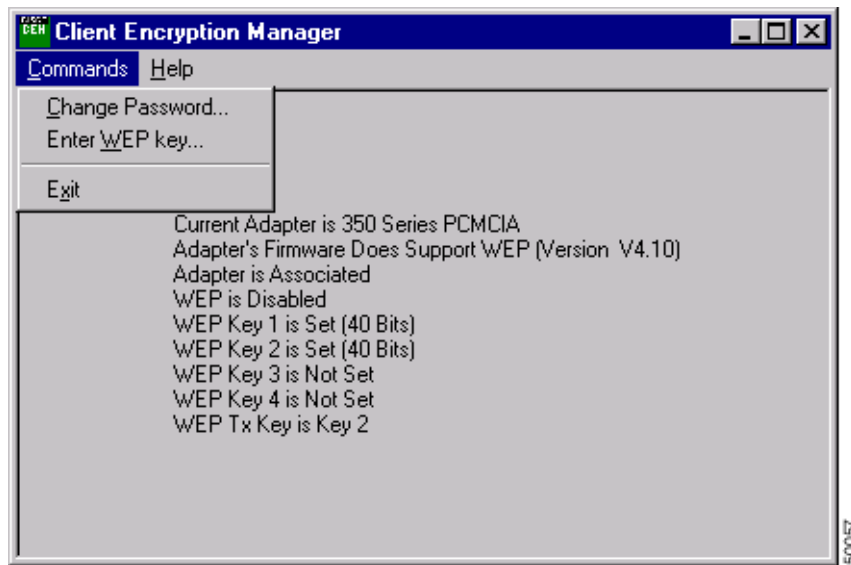
Changing the Password

Follow the instructions below to change the current password.



Note It is recommended that you change the default password before using the CEM for the first time.

Step 1 Select **Change Password** from the Commands pull-down menu (see Figure 4-3).

Figure 4-3 Commands Pull-Down Menu

The Change Client Encryption Manager Password screen appears (see Figure 4-4).

Figure 4-4 Change Client Encryption Manager Password Screen

Step 2 Enter the current password in the Existing Password field.

Step 3 Enter a new password in the New Password field.



Note Passwords are case sensitive and can contain up to 256 characters.

Step 4 Re-enter the new password in the Confirm New Password field.

Step 5 Click **OK**.

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 4-6.

- Step 1** Select **Enter WEP key** from the Commands pull-down menu (see Figure 4-3 on page 4-4). The Enter WEP Key(s) screen appears (see Figure 4-5).

Figure 4-5 Enter WEP Key(s) Screen

This screen allows you to create up to four WEP keys.

- Step 2** For the WEP key that you are creating (1, 2, 3, or 4), select a WEP Key Size of 40 or 128 on the right side of the screen. 128-bit client adapter can use 40- or 128-bit keys, but 40-bit adapters can use only 40-bit keys.



Note Use of 128-bit WEP is subject to U.S. export restrictions.

- 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 you are 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 the following hexadecimal characters: 0-9, A-F, and a-f.
 - WEP keys must contain the following number of characters:

Selecting an Existing WEP Key

- 10 characters for 40-bit WEP keys
- 26 characters for 128-bit WEP keys



Note After you create a WEP key, you can write over it, but you cannot edit or delete it.

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 **Persistent** under WEP Key Type 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.



Note If you select **Temporary**, the WEP key will be lost when power is removed from your client adapter.

Step 6 Click **Apply** or **OK**.

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 **Enter WEP key** from the Commands pull-down menu (see Figure 4-3 on page 4-4). The Enter WEP Key(s) screen appears (see Figure 4-6).

Figure 4-6 Enter WEP Key(s) Screen

Already Set ?	Transmit Key	WEP Key	WEP Key Size
			40 128
<input checked="" type="checkbox"/>	<input type="radio"/>		<input type="radio"/> <input checked="" type="radio"/>
<input checked="" type="checkbox"/>	<input checked="" type="radio"/>		<input type="radio"/> <input checked="" type="radio"/>
<input type="checkbox"/>	<input type="radio"/>		<input checked="" type="radio"/> <input type="radio"/>
<input type="checkbox"/>	<input type="radio"/>		<input checked="" type="radio"/> <input type="radio"/>

WEP Key Type:

☐ Temporary ☒ Persistent

OK Cancel

A checkmark appears in the Already Set? box for all existing WEP keys.

**Note**

To protect WEP key security, the codes for existing WEP keys do not appear on the screen. Also, you can write over existing keys, but you cannot edit or delete them.

Step 2 Click **Transmit Key** next to the key you want to use to transmit packets.

Step 3 Click **Apply** or **OK**.

Enabling WEP

**Note**

Entering a WEP key does not enable WEP.

After you have selected a WEP key, you must access the Aironet Client Utility (ACU) to enable WEP. See *Enabling the Client Adapter's Security Features*, page 2-7 for instructions on enabling WEP.

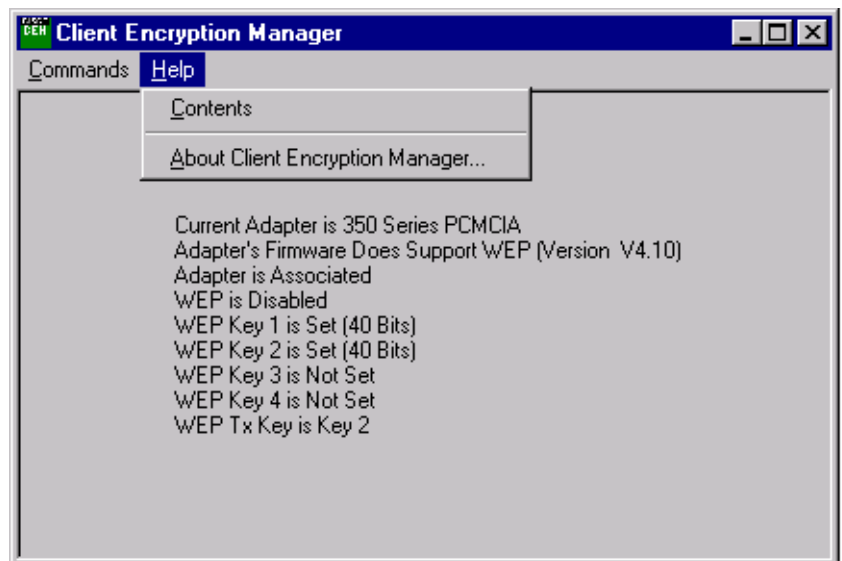
Ascertaining the CEM Version

**Note**

The About Client Encryption Manager option is available only for the Windows operating systems.

To determine which version of the CEM you are running, select **About Client Encryption Manager** from the Help pull-down menu (see Figure 4-7).

Figure 4-7 Help Pull-Down Menu



The About Client Encryption Manager screen appears (see Figure 4-8).

Figure 4-8 About Client Encryption Manager Screen



Getting Help

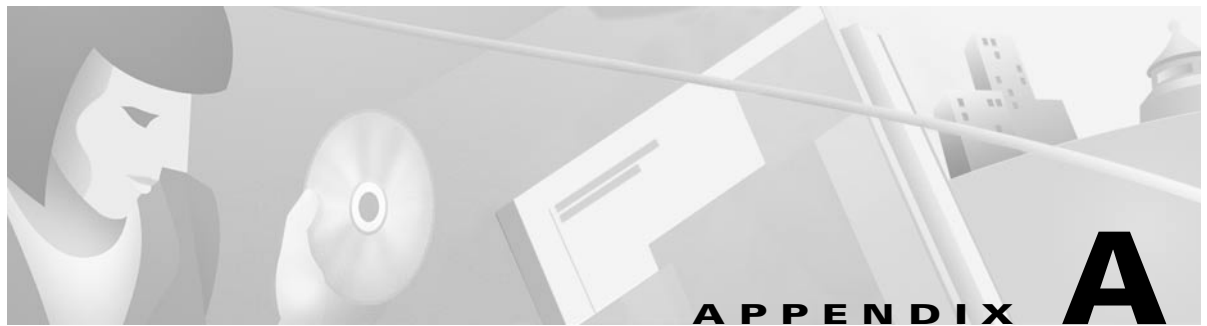
To access information about the CEM, press **F1** or select **Contents** from the Help pull-down menu (see Figure 4-7 on page 4-7). An overview of the CEM is displayed.

From the Welcome to the Client Encryption Manager screen, you can access additional information.

- To access information on specific menu options, click **Help Topics** and the **Contents** tab; double-click **Client Encryption Manager** and the desired menu (such as Change Password).
- To search for a specific topic, click **Help Topics** and the **Index** tab, select an index entry, and click **Display**.
- To search for a specific word or phrase, click **Help Topics** and the **Find** tab; follow the instructions in the Find Setup Wizard window.

Exiting the CEM

To exit the CEM, select **Exit** from the Commands pull-down menu (see Figure 4-3 on page 4-4).



Channels

This appendix lists the channels supported by the world's regulatory domains and the countries that comprise each domain.

The following topic is covered in this appendix:

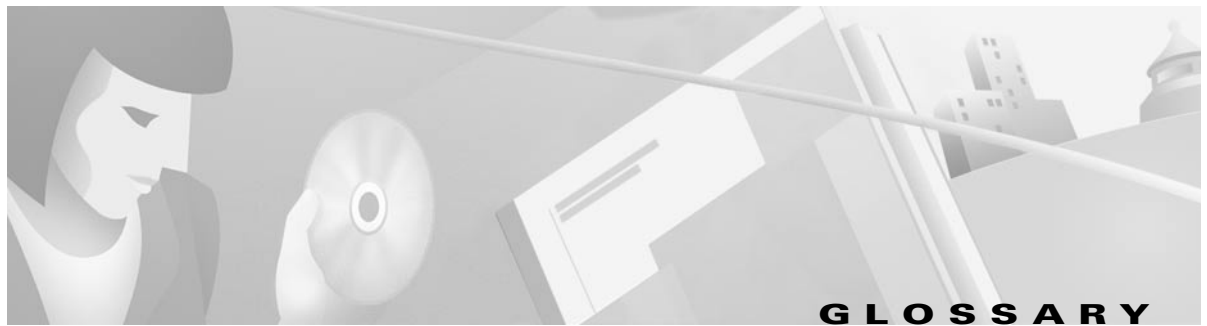
- Channels (see Table A-1)

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

Table A-1 Channels

Channel Identifier	Center Frequency	Regulatory Domains					
		North America and ANZ	ETSI	Mexico	France/Singapore	Japan	Israel
1	2412 MHz	X	X	-	-	X	-
2	2417 MHz	X	X	-	-	X	-
3	2422 MHz	X	X	-	-	X	X
4	2427 MHz	X	X	-	-	X	X
5	2432 MHz	X	X	-	-	X	X
6	2437 MHz	X	X	-	-	X	X
7	2442 MHz	X	X	-	-	X	X
8	2447 MHz	X	X	-	-	X	X
9	2452 MHz	X	X	-	-	X	X
10	2457 MHz	X	X	X	X	X	-
11	2462 MHz	X	X	X	X	X	-
12	2467 MHz	-	X	-	X	X	-
13	2472 MHz	-	X	-	X	X	-
14	2484 MHz	-	-	-	-	X	-





- 802.11** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 1- and 2-megabit-per-second wireless LANs.
- 802.11b** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 5.5- and 11-megabit-per-second wireless LANs.

A

- Access Point** A wireless LAN data transceiver that uses radio waves to connect a wired network with wireless client 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

- Bandwidth** Specifies the amount of the frequency spectrum that is usable for data transfer. It identifies the maximum data rate that a signal can attain on the medium without encountering significant power loss.
- 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.

C

- CCK** Complementary code keying. A modulation technique used by IEEE 802.11-compliant wireless LANs for transmission at 5.5 and 11 Mbps.
- 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.
- Cyclic Redundancy Check (CRC)** A method of checking for errors in a received packet.

D

Data Rates	The range of data transmission rates supported by a device. Data rates are measured in megabits per second (Mbps).
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.
Domain Name Server	A network server that translates text names to IP addresses.
Domain Name System (DNS)	Provides names for computers using alphanumeric characters instead of numbers like IP addresses use. Maintains a database of the 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.
Duplicate Packets	Packets that were received twice because an acknowledgement got lost and the sender retransmitted the packet.

E

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 and kept in a computer's semi-permanent memory.
Fragmentation Threshold	The size at which packets will be fragmented and transmitted a piece at a time instead of all at once. The setting must be within the range of 64 to 2312 bytes.

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.

M

MAC Address	The media access control (MAC) address is a unique serial number assigned to a networking device by the manufacturer.
Modulation	Any of several techniques for combining user information with a transmitter's carrier signal.
Multicast Packets	The number of packets received that were sent as a transmission to a set of nodes.
Multipath	The echoes created as a radio signal bounces off of physical objects.

O

Overrun Packets	Packets that were discarded because the access point had a temporary overload of packets to handle.
------------------------	---

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

Radio Channel	The frequency at which the radio operates.
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.
RTS Threshold	The packet size at which the access point will issue a request to send before sending the packet.

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. A unique identifier that stations must use to be able to communicate with an access point. The SSID can be any alphanumeric entry up to a maximum of 32 characters.

T

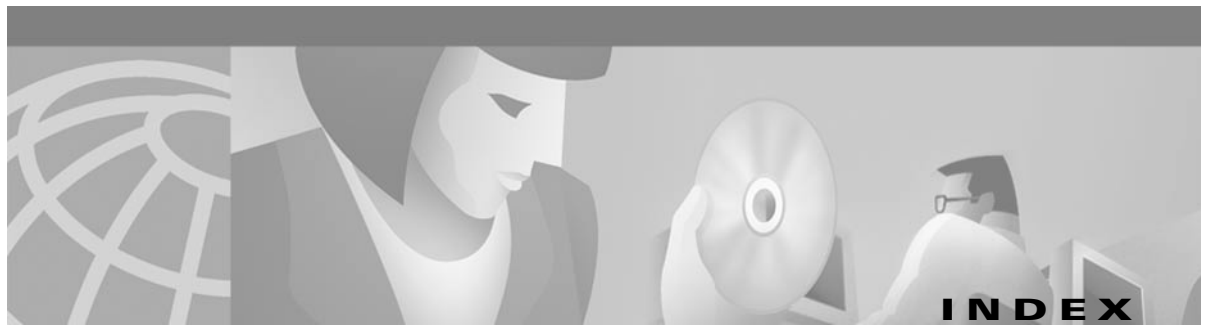
- Transmit Power** The power level of radio transmission.

U

- Unicast Packets** Packets transmitted in point-to-point communication.

W

- WEP** Wired Equivalent Privacy. An optional security mechanism defined within the 802.11 standard designed to make the link integrity of the wireless medium equal to that of a cable.
- Workstation** A computing device with an installed client adapter.



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