



Performing Diagnostics

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

The following topics are covered in this chapter:

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

Diagnostic Tools for Mac OS 9.x

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

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

Viewing the Current Status of Your Client Adapter

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

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



Note

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

Figure 7-1 File Pull-Down Menu

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

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

Figure 7-2 Status Screen

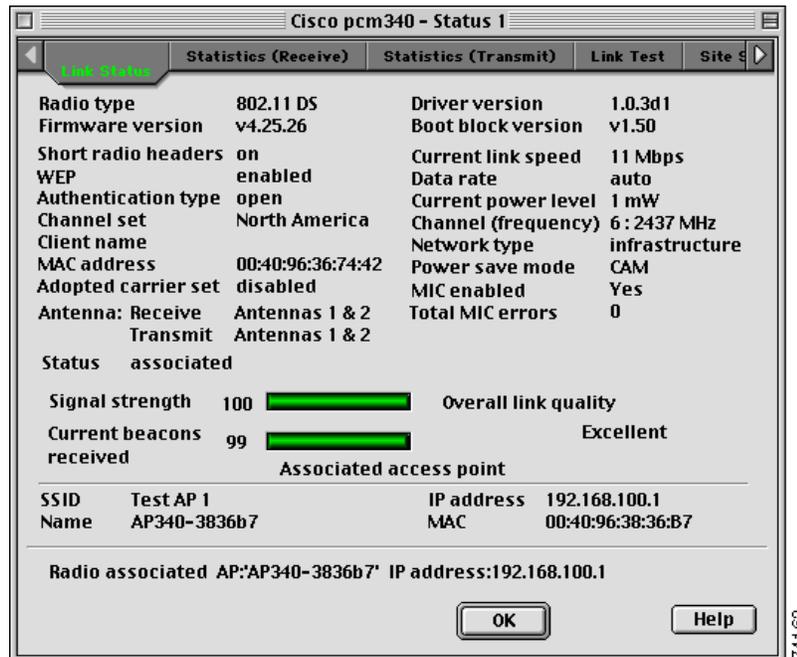


Table 7-1 describes each client adapter setting for which a status is displayed.

Table 7-1 Client Adapter Status

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

Table 7-1 Client Adapter Status (continued)

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

Table 7-1 Client Adapter Status (continued)

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

Table 7-1 Client Adapter Status (continued)

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

Viewing Statistics for Your Client Adapter

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

Viewing Receive Statistics

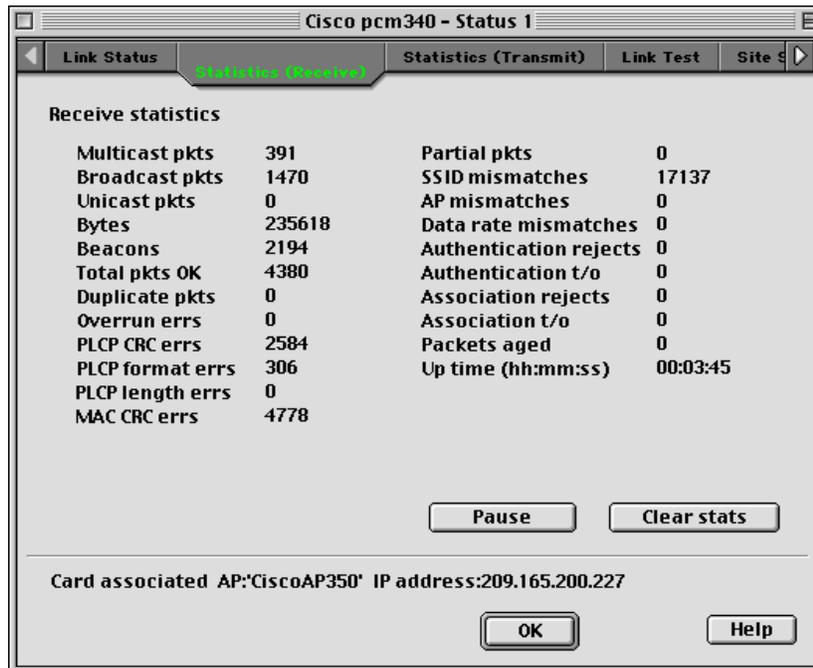
To view your client adapter's receive statistics, select **Status** from the File pull-down menu (see [Figure 7-2 on page 7-3](#)) and the **Statistics (Receive)** tab. The Receive Statistics screen appears (see [Figure 7-3](#)).



Note

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

Figure 7-3 Receive Statistics Screen



The statistics are calculated as soon as your client adapter is started or the Clear Stats button is selected. [Table 7-2](#) describes each receive statistic that is displayed for your client adapter.

Table 7-2 Client Adapter Receive Statistics

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

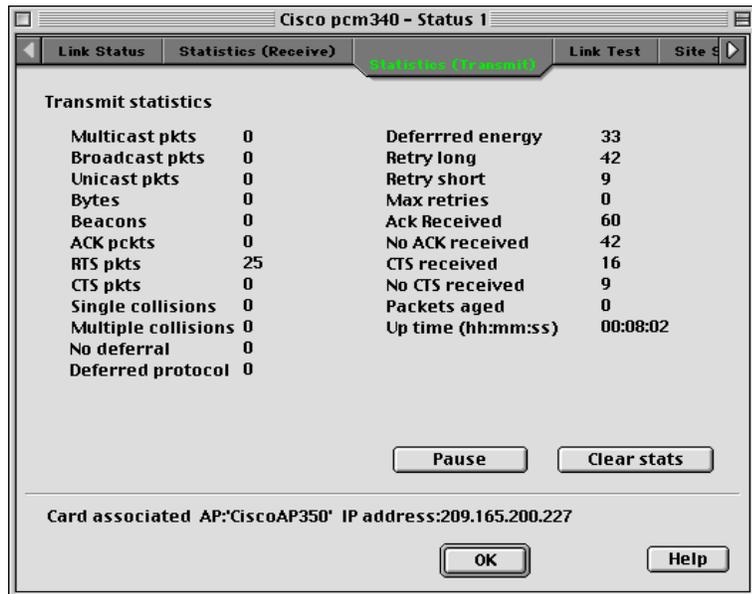
Table 7-2 Client Adapter Receive Statistics (continued)

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

Viewing Transmit Statistics

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

Figure 7-4 Transmit Statistics Screen



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

Table 7-3 Client Adapter Transmit Statistics

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

Table 7-3 Client Adapter Transmit Statistics (continued)

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

Assessing the RF Link

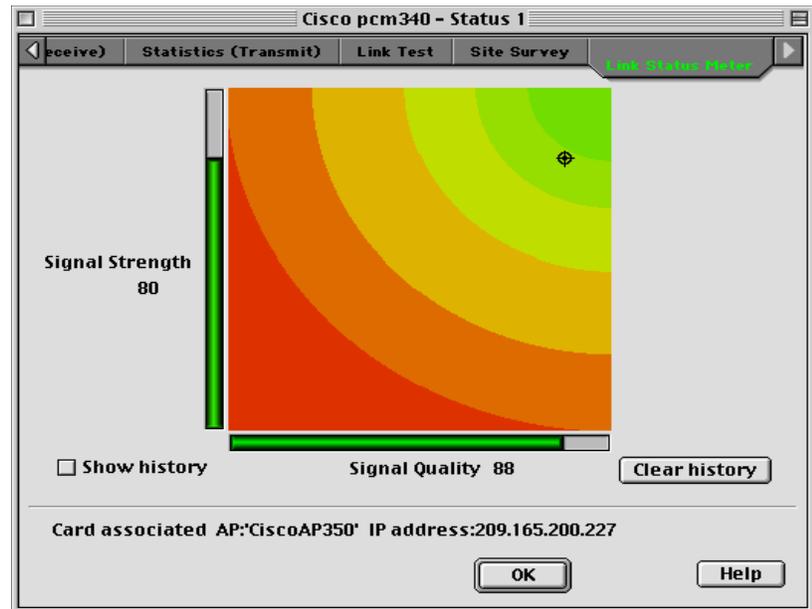
You can determine the performance of the RF link between your client adapter and its associated access point in two different ways:

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

Viewing the Link Status Meter

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

Figure 7-5 Link Status Meter Screen



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

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

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

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

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



Note

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

Running an RF Link Test

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

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



Note

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

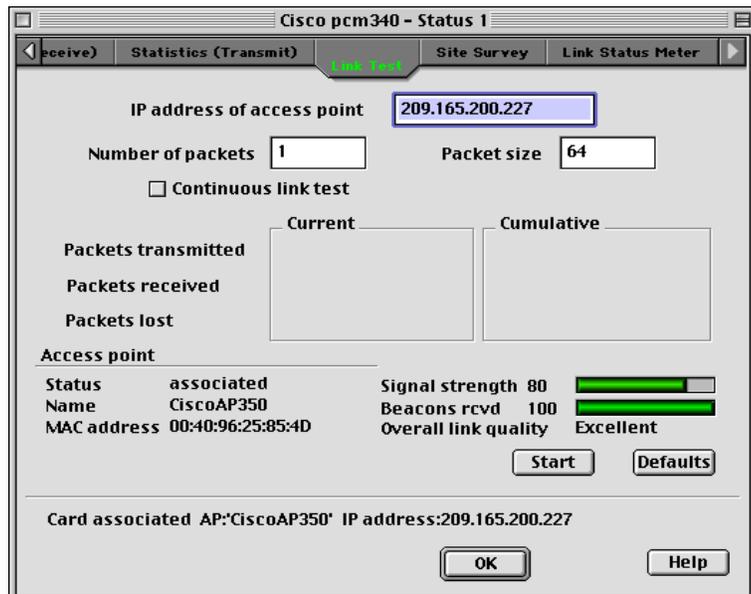
The following prerequisites are required before you can run an RF link test:

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

Follow the steps below to run an RF link test.

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

Figure 7-6 Link Test Screen



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

- Step 3** You can set the link test to run until it has attempted to send a specific number of packets or to run until you stop it. Follow one of the steps below to determine how long the link test will run:
- Type the number of packets that the link test should attempt to send in the Number of Packets field. (The Number of Packets parameter is ignored if the Continuous Link Test check box is selected.)

Range: 1 to 1000

Default: 1
 - Select the Continuous Link Test check box to allow the link test to run continuously.

Default: Deselected
- Step 4** Type the size of the data packet that is to be sent to the access point in the Packet Size field.
- Range:** 64 to 1514
- Default:** 64
- Step 5** Click the **Start** button to run the link test. While the test is running, statistics are displayed and updated periodically.

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

Figure 7-7 Link Test Screen (While Running)

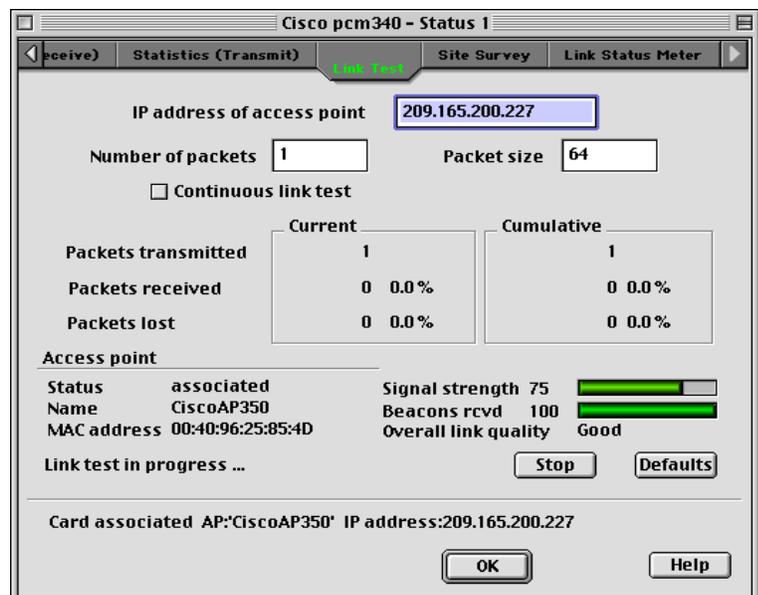


Table 7-4 interprets the statistics that are displayed on the Link Test screen while the link test is running.

Table 7-4 Link Test Statistics

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

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

Diagnostic Tools for Mac OS X

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

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

Viewing the Current Status of Your Client Adapter

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

Figure 7-8 Client Utility Advanced Properties Status Screen

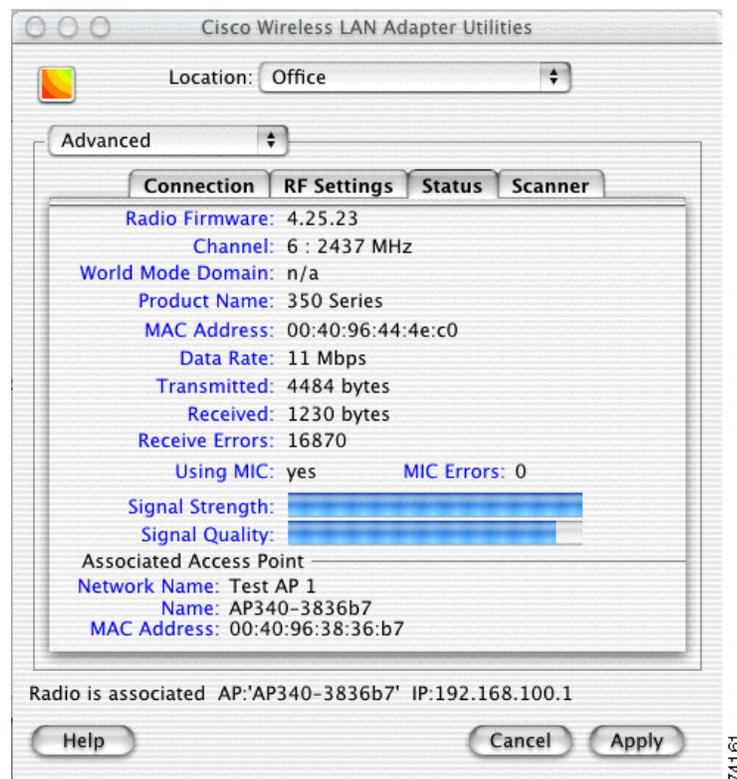


Table 7-5 describes the parameters on the status screen.

Table 7-5 Client Adapter Status Screen Parameters

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

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

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

Assessing the Wireless and Wired Links

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

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

Viewing the Link Status Meter

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

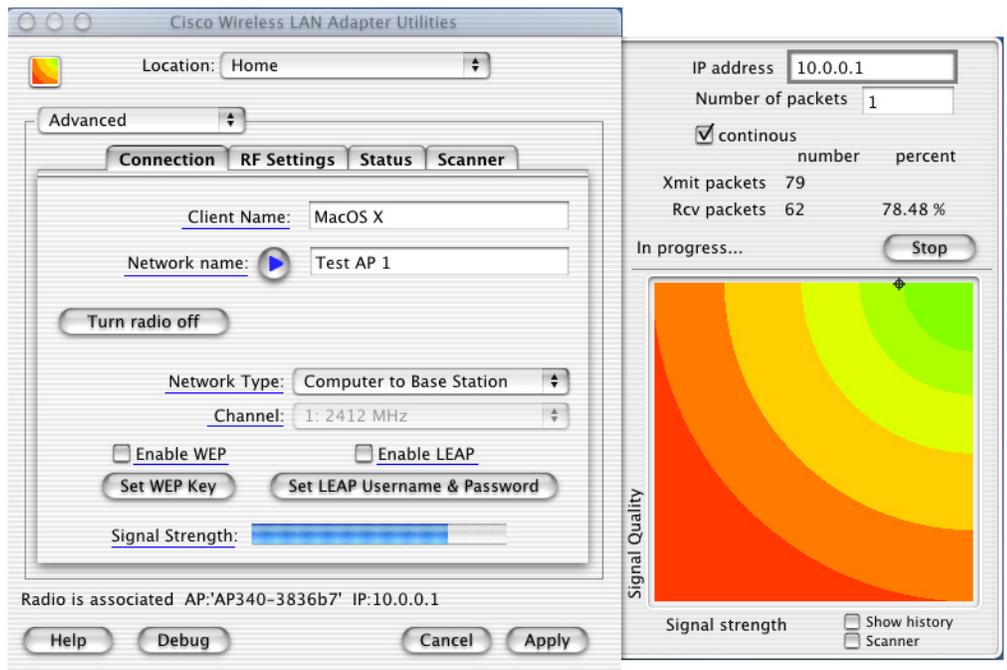
Figure 7-9 LSM Icon on Client Utility Advanced Properties Screen



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

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

Figure 7-10 LSM Screen



The LSM screen provides a graphical display of the following:

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

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

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

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

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

**Note**

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

Running a Link Test

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

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

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

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

Follow the steps below to run a link test:

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

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

**Note**

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

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

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

Table 7-6 Link Test Statistics

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

Determining Local Access Points

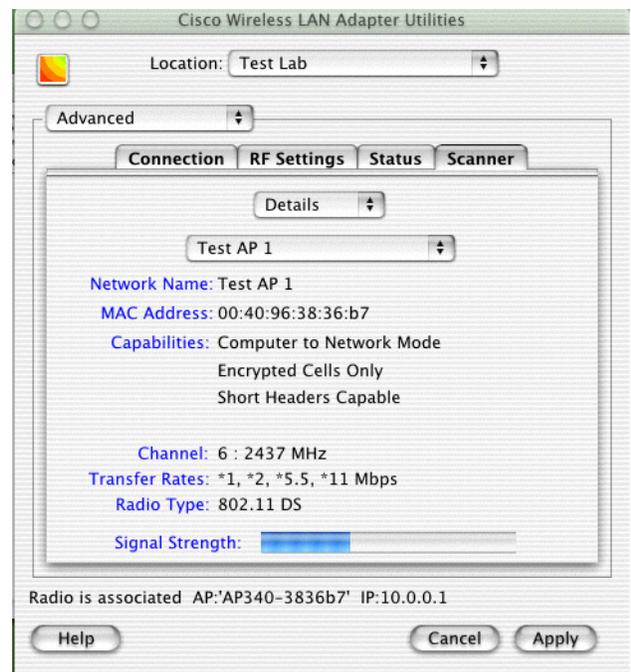
The client utility provides two methods used to detect local access points:

- Scanner Tab
- LSM Scanner

Scanner Tab

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

Figure 7-11 Scanner Details Screen



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



Note

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

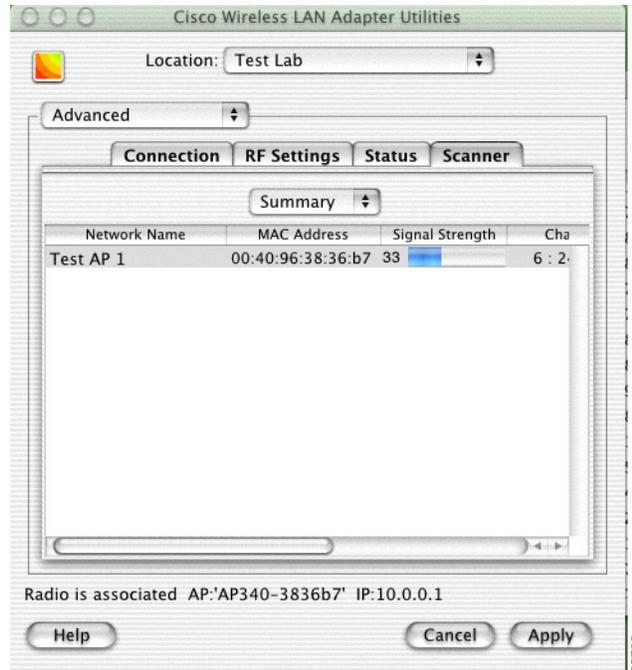
Table 7-7 lists and describes the parameters on the scanner details screen.

Table 7-7 Scanner Details Screen Parameters

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

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

Figure 7-12 Scanner Summary Screen



Note

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

The scanner summary screen provides the following information fields:

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

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

LSM Scanner

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



Note

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

Figure 7-13 LSM Scanner Screen

