



Performing Diagnostics

This chapter explains how to use ACU to perform user-level diagnostics.

The following topics are covered in this chapter:

- [Overview of ACU Diagnostic Tools, page 7-2](#)
- [Setting Parameters that Affect ACU Diagnostic Tools, page 7-3](#)
- [Viewing the Current Status of Your Client Adapter, page 7-4](#)
- [Viewing Statistics for Your Client Adapter, page 7-12](#)
- [Viewing the Link Status Meter, page 7-16](#)
- [Running an RF Link Test, page 7-18](#)

Overview of ACU Diagnostic Tools

In addition to enabling you to configure your client adapter for use in various types of networks, ACU 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 a graphical image of your client adapter's RF link
- Run an RF link test to assess the performance of the RF link between your client adapter and its associated access point

[Table 7-1](#) enables you to quickly locate instructions for using each of the diagnostic tools.

Table 7-1 *Locating Diagnostic Instructions*

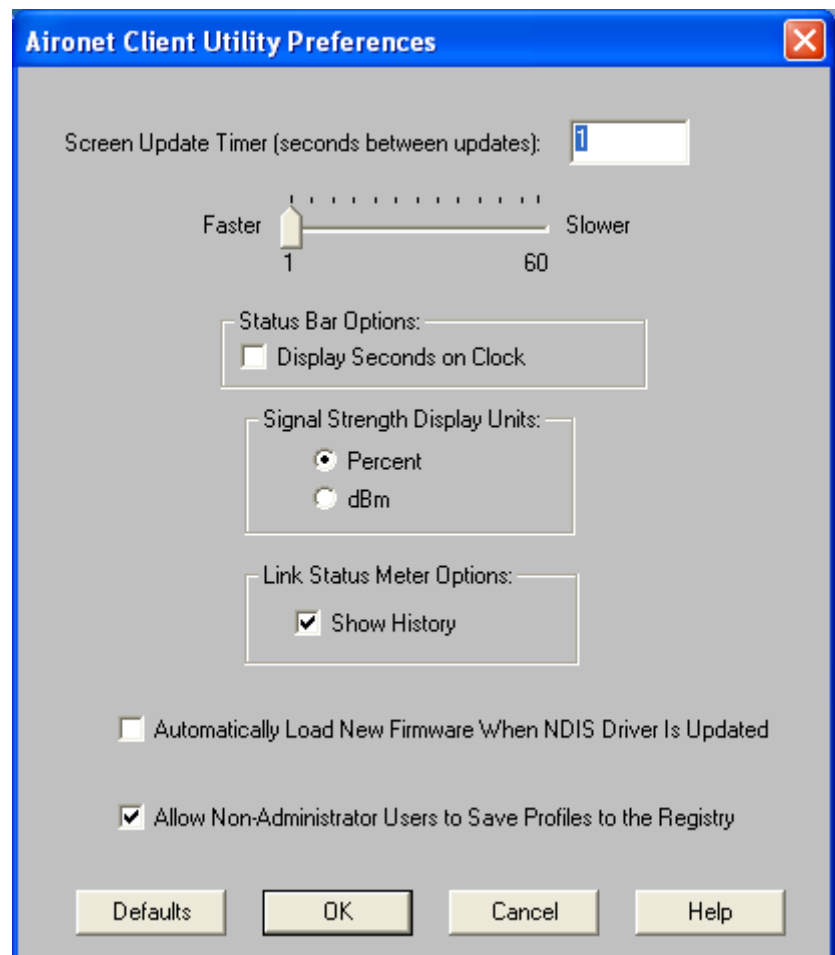
Diagnostic Tool	Page Number
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Statistics	7-12
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Setting Parameters that Affect ACU Diagnostic Tools

Several parameters affect the operation of ACU diagnostic tools. Follow these steps to set these parameters.

- Step 1** Open ACU.
- Step 2** Click the **Preferences** icon or choose **Preferences** from the Options drop-down menu. The Aironet Client Utility Preferences screen appears (see [Figure 7-1](#)).

Figure 7-1 Aironet Client Utility Preferences Screen



Step 3 Table 7-2 lists and describes the parameters that affect the operation of ACU diagnostic tools. Follow the instructions in the table to change any parameters.

Table 7-2 Parameters Affecting ACU Diagnostic Tools

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						
Signal Strength Display Units	Specifies the units used to display signal strength on the Status, Linktest, and Site Survey screens. Default: Percent						
	<table border="1"> <thead> <tr> <th>Units</th> <th>Description</th> </tr> </thead> <tbody> <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> </tbody> </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.						
Show History	Checking this check box causes the Link Status Meter 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. Default: Checked						

Step 4 Click **OK** to save your changes.

Viewing the Current Status of Your Client Adapter

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, open ACU; then click the **Status** icon or choose **Status** from the Commands drop-down menu. The Status screen appears. Figure 7-2 shows the Status screen with the signal strength values displayed as percentages, and Figure 7-3 shows the bottom of the same screen with the signal strength values displayed in decibels with respect to milliwatts (dBm).



Note

The name of the current profile appears in parentheses at the top of the screen.

Figure 7-2 Status Screen (with Signal Strength as a Percentage)

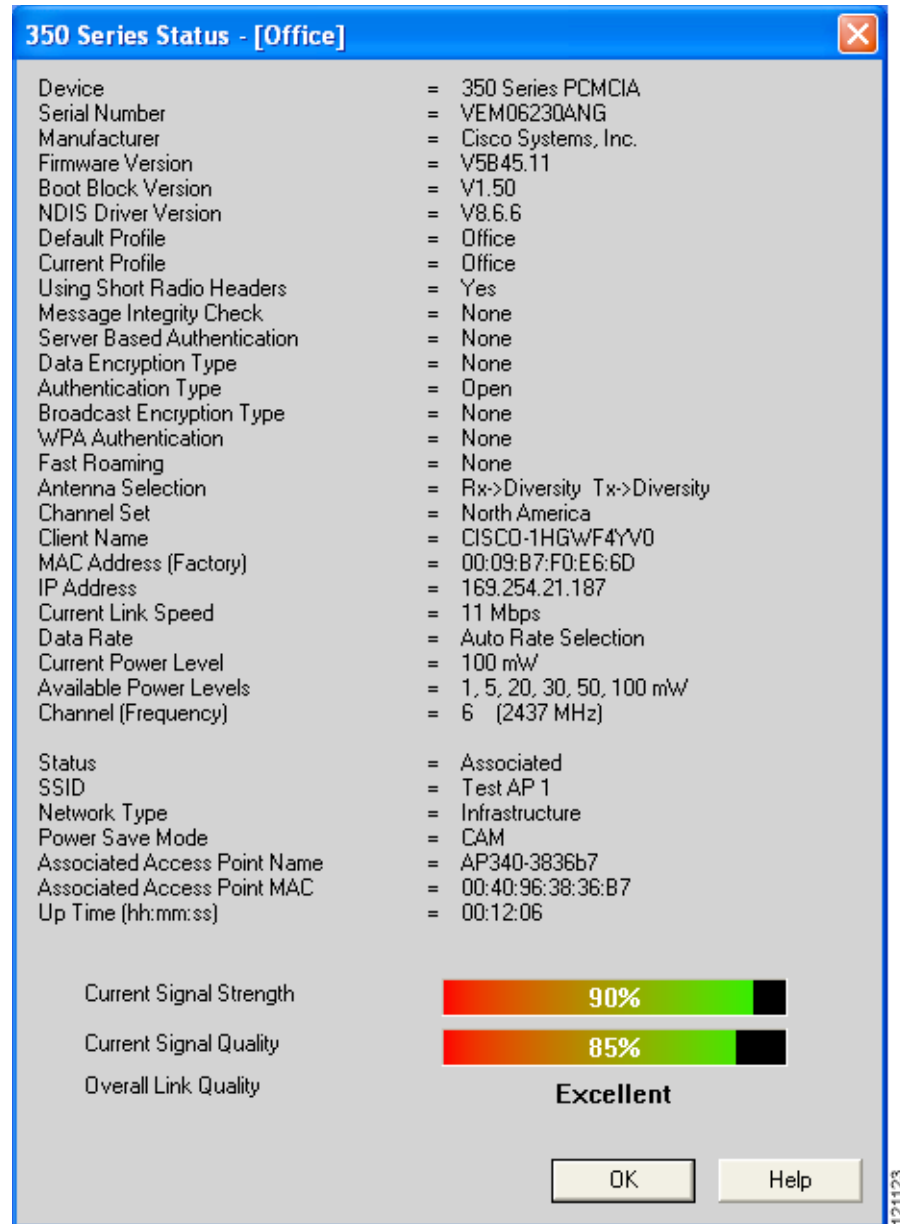


Figure 7-3 Bottom of Status Screen (with Signal Strength in dBm)

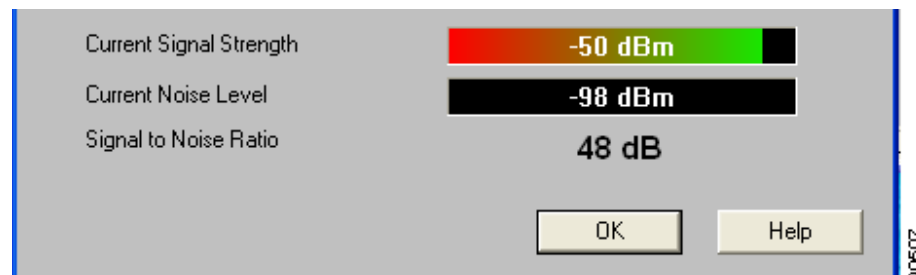


Table 7-3 interprets each element of the Status screen.

Table 7-3 Client Adapter Status

Status	Description
Device	A description of your client adapter.
Serial Number	The serial number of your client adapter. Note The serial number appears only if the number has been programmed into your card.
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	The network configuration (or profile) shown in the Use Selected Profile drop-down box on the Profile Manager screen. This is the profile that you have selected as the active profile. Note The current profile may be different than the default profile if you are using auto profile selection. The client adapter will not switch profiles as long as it remains associated to the access point or reassociates within 10 seconds (or within the time specified by the authentication timeout value if LEAP or EAP-FAST is enabled). Refer to Chapter 4 for information on creating and using profiles.
Current Profile	The network configuration (or profile) your client adapter is currently using. Note The current profile may be different than the default profile if you are using auto profile selection. The client adapter does not switch profiles as long as it remains associated to the access point or reassociates within 10 seconds (or within the time specified by the authentication timeout value if LEAP or EAP-FAST is enabled). Refer to Chapter 4 for information on creating and using profiles. Note If your current profile becomes disabled due to an invalid LEAP username and password, this field lists the profile as <i>Disabled</i> .
Using Short Radio Headers	Indicates whether your client adapter is actually using short radio headers. Value: Yes or No Note This setting appears only for 2.4-GHz client adapters. Note Refer to the Use Short Radio Headers parameter in Table 5-3 for information on using short radio headers.

Table 7-3 Client Adapter Status (continued)

Status	Description												
Message Integrity Check	<p>Indicates whether your client adapter is using message integrity check (MIC) to protect packets sent to and received from the access point.</p> <p>MIC prevents 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.</p> <p>Note MIC is supported automatically by the client adapter's driver, but it must be enabled on the access point.</p> <p>Value: None, MMH, or Michael</p>												
	<table border="1"> <thead> <tr> <th>Message Integrity Check</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>MIC is disabled.</td> </tr> <tr> <td>MMH</td> <td>MIC is enabled and is being used with CKIP.</td> </tr> <tr> <td>Michael</td> <td>MIC is enabled and is being used with WPA and TKIP.</td> </tr> </tbody> </table>	Message Integrity Check	Description	None	MIC is disabled.	MMH	MIC is enabled and is being used with CKIP.	Michael	MIC is enabled and is being used with WPA and TKIP.				
Message Integrity Check	Description												
None	MIC is disabled.												
MMH	MIC is enabled and is being used with CKIP.												
Michael	MIC is enabled and is being used with WPA and TKIP.												
Server Based Authentication	<p>Indicates the configuration of the access point to which your client adapter is associated.</p> <p>Value: None, WEP Key In Use, Cell Is Secure, or LEAP Authenticated</p>												
	<table border="1"> <thead> <tr> <th>Server Based Authentication</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>The access point is configured for No Encryption.</td> </tr> <tr> <td>WEP Key In Use</td> <td>The access point is configured for Optional encryption.</td> </tr> <tr> <td>Cell Is Secure</td> <td> <p>The access point is configured for Full Encryption.</p> <p>Note If the client's current profile does not have Allow Association to Mixed Cells enabled, the client can associate only to access points that use full encryption.</p> </td> </tr> <tr> <td>LEAP Authenticated</td> <td>The client is using LEAP and is authenticated to an access point that has WEP and Network-EAP enabled.</td> </tr> <tr> <td>EAP-FAST Authenticated</td> <td>The client is using EAP-FAST and is authenticated to an access point that has WEP and Network-EAP enabled.</td> </tr> </tbody> </table>	Server Based Authentication	Description	None	The access point is configured for No Encryption.	WEP Key In Use	The access point is configured for Optional encryption.	Cell Is Secure	<p>The access point is configured for Full Encryption.</p> <p>Note If the client's current profile does not have Allow Association to Mixed Cells enabled, the client can associate only to access points that use full encryption.</p>	LEAP Authenticated	The client is using LEAP and is authenticated to an access point that has WEP and Network-EAP enabled.	EAP-FAST Authenticated	The client is using EAP-FAST and is authenticated to an access point that has WEP and Network-EAP enabled.
Server Based Authentication	Description												
None	The access point is configured for No Encryption.												
WEP Key In Use	The access point is configured for Optional encryption.												
Cell Is Secure	<p>The access point is configured for Full Encryption.</p> <p>Note If the client's current profile does not have Allow Association to Mixed Cells enabled, the client can associate only to access points that use full encryption.</p>												
LEAP Authenticated	The client is using LEAP and is authenticated to an access point that has WEP and Network-EAP enabled.												
EAP-FAST Authenticated	The client is using EAP-FAST and is authenticated to an access point that has WEP and Network-EAP enabled.												

Table 7-3 Client Adapter Status (continued)

Status	Description
Data Encryption Type	<p>Indicates the type of encryption that is being used for unicast packets.</p> <p>Value: None, WEP, TKIP, or CKIP</p> <p>Note Refer to the “Overview of Security Features” section on page 5-23 for details on these encryption types.</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>Note Refer to the “Setting Network Security Parameters” section on page 5-21 for information on setting the authentication type.</p>
Broadcast Encryption Type	<p>Indicates the type of encryption that is being used for broadcast and multicast packets.</p> <p>Value: None, WEP, TKIP, or CKIP</p> <p>Note Refer to the “Overview of Security Features” section on page 5-23 for details on these encryption types.</p>
WPA Authentication	<p>Indicates whether WPA is enabled on the client adapter and the access point to which it is associated.</p> <p>Value: None or WPA</p> <p>Note Refer to the “Wi-Fi Protected Access (WPA)” section on page 5-27 for more information on WPA.</p>
Fast Roaming	<p>Indicates whether fast roaming is enabled on the client adapter.</p> <p>Value: None or CCKM</p> <p>Note Refer to the “Fast Roaming (CCKM)” section on page 5-28 for more information on fast roaming.</p>
Antenna Selection	<p>The antenna mode that your client adapter is currently using.</p> <p>Value: Diversity, Primary Only, Secondary Only (Primary Only is the only option available for PCI client adapters)</p> <p>Note This setting appears only for 2.4-GHz client adapters.</p> <p>Note The Primary Only and Secondary Only values were formerly named Right Only and Left Only, respectively. Refer to the Antenna Mode (Receive) and Antenna Mode (Transmit) parameters in Table 5-4 and Table 5-5 for information on setting the antenna mode.</p>
Channel Set	<p>The regulatory domain for which your client adapter is currently configured, such as Americas. (For the Japan channel set, the Call ID is also displayed.) This value is not user selectable.</p> <p>Note Refer to Appendix D for a list of channel identifiers, channel center frequencies, and regulatory domains for each channel.</p>

Table 7-3 Client Adapter Status (continued)

Status	Description
Client Name	The name your client adapter uses when it associates to an access point. Note Refer to the Client Name parameter in Table 5-2 for information on setting the client name.
MAC Address	The MAC address assigned to your client adapter at the factory.
IP Address	The IP address of your client adapter.
Current Link Speed	The rate at which your client adapter is currently transmitting data packets. Value: 1, 2, 5.5, or 11 Mbps (2.4-GHz client adapters); 6, 9, 12, 18, 24, 36, 48, or 54 Mbps (5-GHz client adapters)
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 (2.4-GHz client adapters); 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps, or Auto Rate Selection (5-GHz client adapters) Note Refer to the Data Rate parameter in Table 5-3 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 (350 series client adapters); 5, 10, or 20 mW (5-GHz client adapters) Note Refer to the Transmit Power parameter in Table 5-3 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 (350 series client adapters); 5, 10, or 20 mW (5-GHz client adapters) Note Refer to the Transmit Power parameter in Table 5-3 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 client adapter radio and regulatory domain Note Refer to the Channel parameter in Table 5-3 for information on selecting the frequency for your client adapter.
Status	The operational mode of your client adapter. Value: Error, Not Associated, Associated, Authenticating, Authenticated, Authentication Failed, or Ad Hoc Mode

Table 7-3 Client Adapter Status (continued)

Status	Description
SSID	<p>The name of the network to which your client adapter is currently associated.</p> <p>Note Refer to the SSID1 parameter in Table 5-2 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 5-2 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 5-2 for information on setting the client adapter's power save mode.</p>
Associated Access Point Name	<p>The name of the access point to which your client adapter is associated. It is shown only if the client adapter is in infrastructure mode, the access point was configured with a name, and Aironet Extensions are enabled (on access points running Cisco IOS Release 12.2(4)JA or later).</p> <p>Note This field shows up to 15 characters although the name of the access point may be longer.</p>
Associated Access Point IP Address	<p>The IP address of the access point to which your client adapter is associated. It is shown only if the client adapter is in infrastructure mode, the access point was configured with an IP address, and Aironet Extensions are enabled (on access points running Cisco IOS Release 12.2(4)JA or later).</p> <p>Note If Aironet Extensions are disabled, the IP address of the associated access point is shown as 0.0.0.0.</p>
Associated Access Point MAC Address	<p>The MAC address of the access point to which your client adapter is associated. It is shown only if the client adapter is in infrastructure mode.</p> <p>Note This field displays the MAC address of the access point's Ethernet port (for access points that do not run Cisco IOS) or the MAC address of the access point's radio (for access points that run Cisco IOS). The MAC address of the Ethernet port on access points that run Cisco IOS is printed on a label on the back of the device.</p>
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> <p>Note The beacon period is shown only if your client adapter is in ad hoc mode.</p>
Up Time (hh:mm:ss)	<p>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.</p>

Table 7-3 Client Adapter Status (continued)

Status	Description
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>
Current Signal Quality (2.4-GHz client adapters)	<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 for 2.4-GHz client adapters and only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>
Current Noise Level (2.4-GHz client adapters)	<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 for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>
Current Beacons Received (5-GHz client adapters)	<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 clearer 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 for 5-GHz client adapters.</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, or Excellent</p> <p>Note This setting appears for 2.4-GHz client adapters (but only if you selected signal strength to be displayed as a percentage) and for 5-GHz client adapters. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>
Signal to Noise Ratio (2.4-GHz client adapters)	<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 90 dB</p> <p>Note This setting appears only for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>

Viewing Statistics for Your Client Adapter

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, open ACU; then click the **Statistics** icon or choose **Statistics** from the Commands drop-down menu. The Statistics screen appears (see [Figure 7-4](#)).

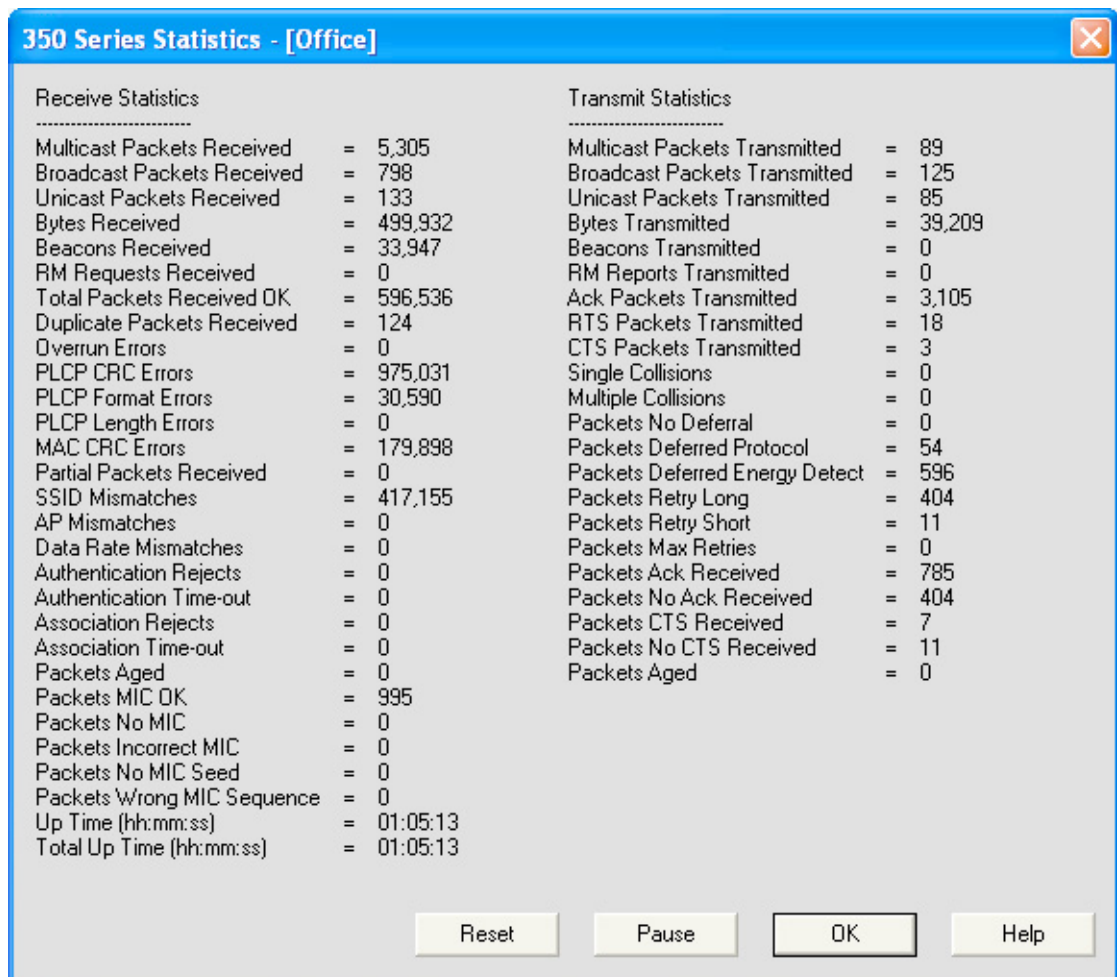

Note

The name of the current profile appears in parentheses at the top of the screen.


Note

The receive and transmit statistics are host statistics. That is, they show packets and errors received or sent by the Windows device. Link status tests from the access point or site survey tool are performed at the firmware level; therefore, they have no effect on the statistics shown in the Statistics screen.

Figure 7-4 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 7-2](#).

[Table 7-4](#) describes each statistic that is displayed for your client adapter.

Table 7-4 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.
RM Requests Received	The number of valid radio management (RM) request frames that were received successfully. Note This field is displayed only if RM is enabled.
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 because a cyclic redundancy check (CRC) error was found in the header. Note CRC errors can be attributed to packet collisions caused by a dense population of client adapters, overlapping access point coverage on a channel, high multipath conditions from bounced signals, or the presence of other 2.4-GHz signals from devices such as microwave ovens, wireless handset phones, etc.
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 because an unknown value was found 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 because an illegal header length was found.
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. Note CRC errors can be attributed to packet collisions caused by a dense population of client adapters, overlapping access point coverage on a channel, high multipath conditions from bounced signals, or the presence of other 2.4-GHz signals from devices such as microwave ovens, wireless handset phones, etc.

Table 7-4 Client Adapter Statistics (continued)

Statistic	Description
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 5-4 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 5-3 for information on supported data rates.
WPA Mismatches	The number of probe responses or beacons received that do not qualify for association because of a mismatched WPA information element. WPA information elements are sent by access points to advertise supported authentication modes and supported ciphers. Note This field is displayed only if WPA is enabled.
Authentication Rejects	The number of times the client adapter tried to authenticate to an access point but was rejected.
Authentication Time-out	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 Time-out	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.
Packets MIC OK	The number of packets that were received successfully with a valid message integrity check (MIC). Note This field is displayed only if MIC is enabled on the access point.
Packets No MIC	The number of packets that were discarded because no MIC was found. Note This field is displayed only if MIC is enabled on the access point.

Table 7-4 Client Adapter Statistics (continued)

Statistic	Description
Packets Incorrect MIC	The number of packets that were discarded because an incorrect MIC value was found. Note This field is displayed only if MIC is enabled on the access point.
Packets No MIC Seed	The number of packets that were discarded because no MIC seed was received. Note This field is displayed only if MIC is enabled on the access point.
Packets Wrong MIC Sequence	The number of packets that were discarded because the MIC sequence number was wrong. Note This field is displayed only if MIC is enabled on the access point.
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).
RM Reports Transmitted	The number of radio management (RM) report frames that were generated and transmitted in response to a valid RM request. Note This field is displayed only if (RM) is enabled.
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.
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 because a collision occurred.

Table 7-4 Client Adapter Statistics (continued)

Statistic	Description
Multiple Collisions	The number of packets that had to be retransmitted more than once because additional collisions occurred.
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 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.

Viewing the Link Status Meter

ACU's link status meter can be used to assess the performance of your client adapter's RF link. If this tool is used 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 an access point.

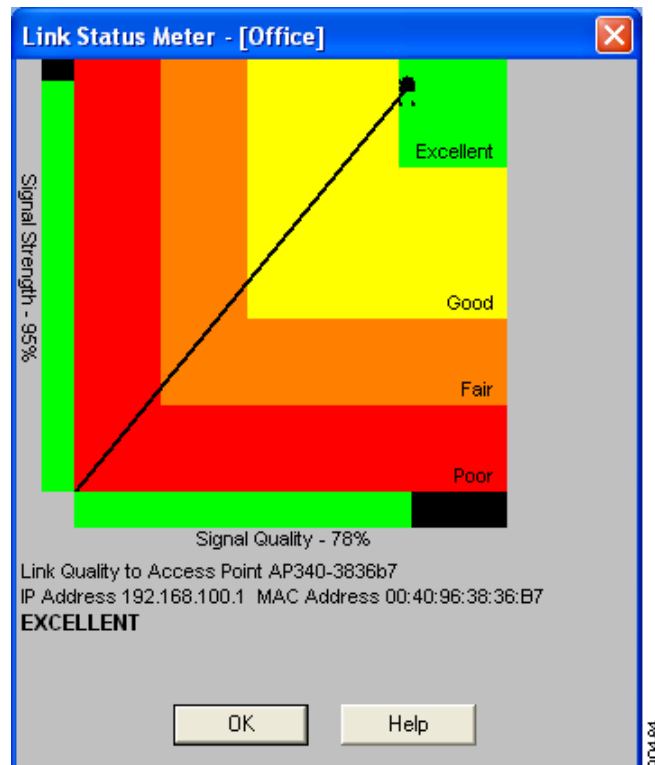
To open the link status meter, open ACU; then click the **Link Status Meter** icon or choose **Link Status Meter** from the Commands drop-down menu. The Link Status Meter screen appears (see [Figure 7-5](#)).



Note

The name of the current profile appears in parentheses at the top of the screen.

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 diagonal line (see Figure 7-5). 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. The name, IP address, and MAC address of the access point that is associated to your client adapter are indicated at the bottom of the display.

**Note**

The access point name and IP address are shown only if the client adapter is in infrastructure mode, the access point was configured with a name and an IP address, and Aironet Extensions are enabled (on access points running Cisco IOS Release 12.2(4)JA or later).

**Note**

The access point MAC address is shown only if the client adapter is in infrastructure mode. This field displays the MAC address of the access point’s Ethernet port (for access points that do not run Cisco IOS) or the MAC address of the access point’s radio (for access points that run Cisco IOS). The MAC address of the Ethernet port on access points that run Cisco IOS is printed on a label on the back of the device.

**Note**

ACU's Status screen also shows signal strength and signal quality. However on the Status screen, these data are represented by histograms.

If you want to see a recent history of the RF performance between your client adapter and its associated access point, check the **Show History** check box on the Aironet Client Utility Preferences screen. Black dots on the graphical display show the performance of the last 50 signals.

Running an RF Link Test

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 on ACU's RF Network Properties screen (see the Data Rate parameter in [Table 5-3](#)). 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.

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).

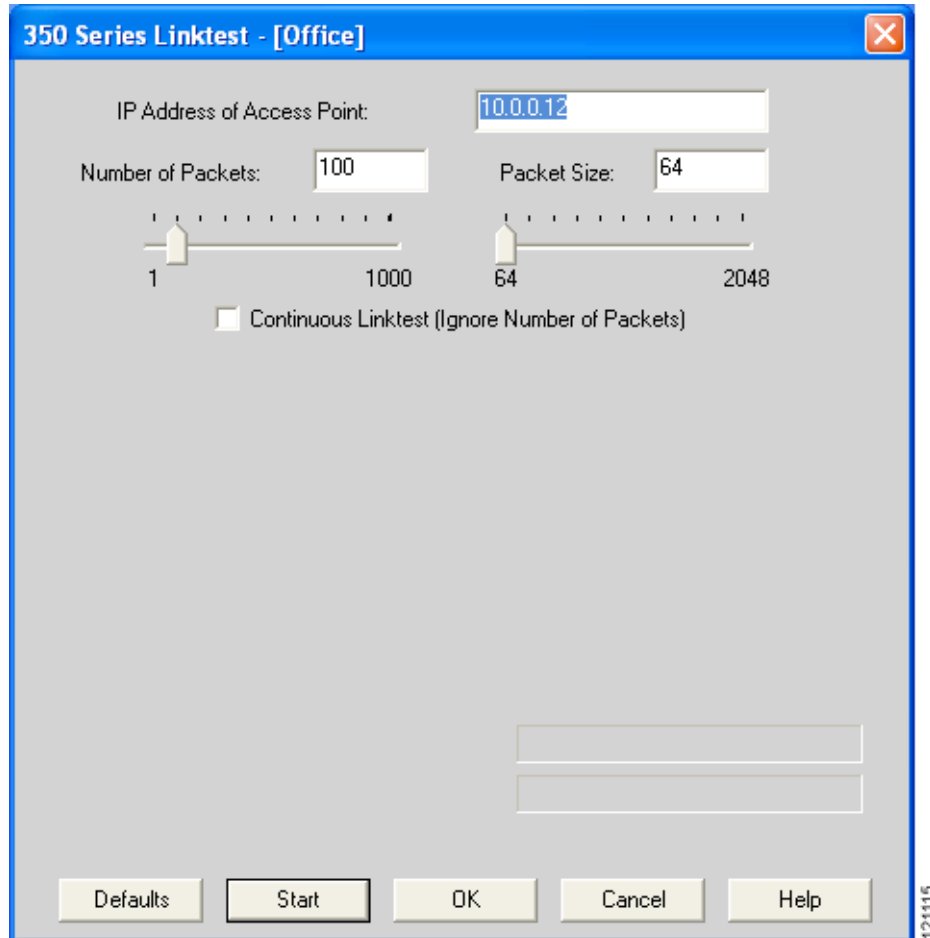
Follow these steps to run an RF link test.

- Step 1** Open ACU; then click the **Link Test** icon or choose **Linktest** from the Commands drop-down menu. The Linktest screen appears (see [Figure 7-6](#)).

**Note**

The name of the current profile appears in parentheses at the top of the screen.

Figure 7-6 Linktest Screen



- Step 2** In the IP Address of Access Point field, enter the IP address of the access point or other wireless device 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 these steps to determine how long the link test will run:
- Choose 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 set this value. (The Number of Packets parameter is ignored if the **Continuous Linktest** check box is checked.)

Range: 1 to 1000

Default: 4
 - Check the **Continuous Linktest** check box to allow the link test to run continuously.

Default: Unchecked
- Step 4** Choose 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 set this value.
- Range:** 64 to 2048
- Default:** 100



Note The Windows TCP/IP stack fragments (splits up) packets that are greater than 512 bytes. Therefore, the number of transmitted packets does 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 7-7 shows the Linktest screen with the signal strength values displayed as percentages, and Figure 7-8 shows the bottom of the same screen with the signal strength values displayed in dBm.

Figure 7-7 Linktest Screen (with Test Running and Signal Strength as a Percentage)

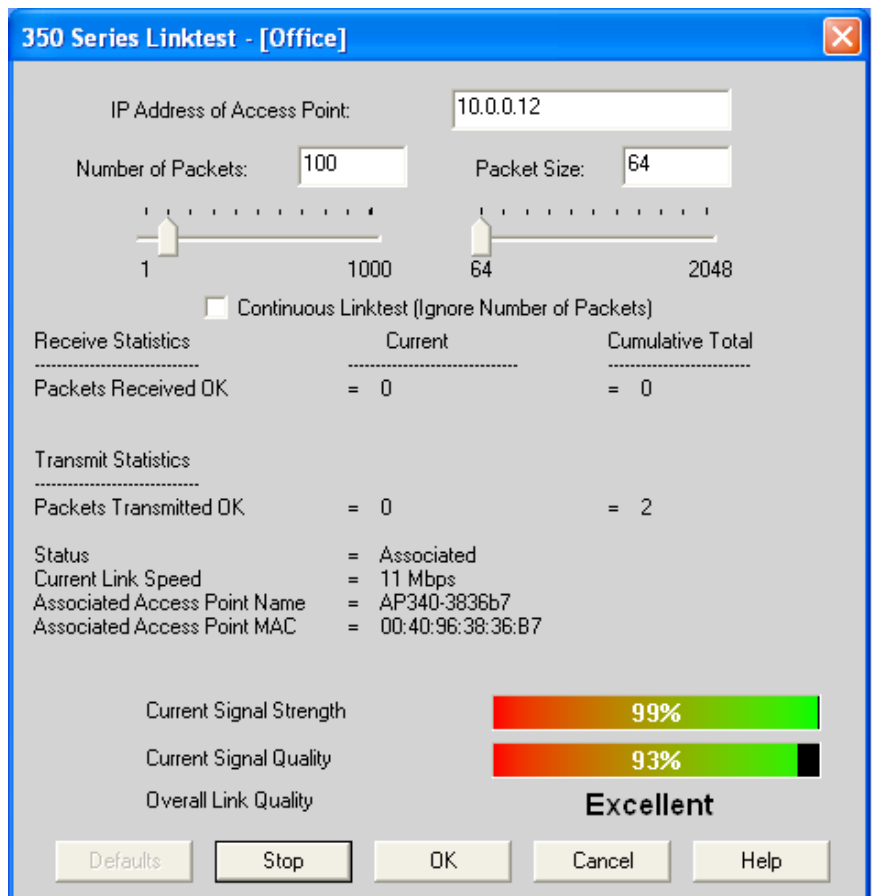


Figure 7-8 Bottom of Linktest Screen (with Test Running and Signal Strength in dBm)



Table 7-5 interprets the statistics that are displayed on the Linktest screen while the link test is running.

Table 7-5 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 (2.4-GHz client adapters); 6, 9, 12, 18, 24, 36, 48, or 54 Mbps (5-GHz client adapters)
Associated Access Point Name	The name of the access point to which your client adapter is associated. It is shown only if the client adapter is in infrastructure mode, the access point was configured with a name, and Aironet Extensions are enabled (on access points running Cisco IOS Release 12.2(4)JA or later). Note This field shows up to 15 characters although the name of the access point may be longer.
Associated Access Point MAC Address	The MAC address of the access point to which your client adapter is associated. It is shown only if the client adapter is in infrastructure mode. Note This field displays the MAC address of the access point's Ethernet port (for access points that do not run Cisco IOS) or the MAC address of the access point's radio (for access points that run Cisco IOS). The MAC address of the Ethernet port on access points that run Cisco IOS is printed on a label on the back of the device.
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 Signal Quality (2.4-GHz client adapters)	The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal. Range: 0 to 100% Note This setting appears only for 2.4-GHz client adapters and only if you selected signal strength to be displayed as a percentage. See the Signal Strength Display Units parameter in Table 7-2 for information.

Table 7-5 Linktest Statistics (continued)

Linktest Statistic	Description
Current Noise Level (2.4-GHz client adapters)	<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 for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>
Current Beacons Received (5-GHz client adapters)	<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 clearer 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 for 5-GHz client adapters.</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, or Excellent</p> <p>Note This setting appears for 2.4-GHz client adapters (but only if you selected signal strength to be displayed as a percentage) and for 5-GHz client adapters. See the Signal Strength Display Units parameter in Table 7-2 for information.</p>
Signal to Noise Ratio (2.4-GHz client adapters)	<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 90 dB</p> <p>Note This setting appears only for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the "Signal Strength Display Units" parameter in Table 7-2 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**.