

APPENDIX

F

Performing a Site Survey

This appendix explains how ACU's site survey tool can be used when conducting a site survey.

The following topics are covered in this appendix:

- [Overview, page F-2](#)
- [Specifying Signal Strength Units, page F-3](#)
- [Using Passive Mode, page F-3](#)
- [Using Active Mode, page F-7](#)
- [Forcing the Client Adapter to Reassociate, page F-13](#)

Overview



Note This appendix applies only to people who are responsible for conducting a site survey to determine the best placement of infrastructure devices within a wireless network.

ACU's site survey tool can assist you in conducting a site survey. The tool operates at the RF level and is used to determine the best placement and coverage (overlap) for your network's infrastructure devices. During a 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 (or other infrastructure device).

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 on page F-3 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 F-7 to activate the active mode.

Guidelines

Keep the following guidelines 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.

Additional Information

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

- **Data rates**—Sensitivity and range are inversely proportional to data bit rates. Therefore, the maximum radio range is achieved at the lowest workable data rate, and a decrease in receiver threshold sensitivity occurs as the radio data increases.
- **Antenna type and placement**—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height.
- **Physical environment**—Clear or open areas provide better radio range than closed or filled areas. Also, the less cluttered the work environment, the greater the range.

- **Obstructions**—A physical obstruction such as metal shelving or a steel pillar can hinder the performance of wireless devices. Avoid placing these devices in a location where a metal barrier is between the sending and receiving antennas.
- **Building materials**—Radio penetration is greatly influenced by the building material used in construction. For example, drywall construction allows greater range than concrete blocks, and metal or steel construction is a barrier to radio signals.

**Note**

Refer to the hardware installation guide for your infrastructure device for additional information on factors affecting placement.

Specifying Signal Strength Units

Follow the steps below to specify how signal strength units are displayed on the site survey screens.

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- Step 1** Open ACU.
 - Step 2** Click the **Preferences** icon or select **Preferences** from the Options drop-down menu. The Aironet Client Utility Preferences screen appears.
 - Step 3** Under Signal Strength Display Units, select one of the following options:
 - **Percent**—Displays the signal strength as a percentage.
 - **dBm**—Displays the signal strength in decibels with respect to milliwatts.
 - Step 4** Click **OK** to save your changes.
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Using Passive Mode

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- Step 1** Open ACU; then click the **Site Survey** icon or select **Site Survey** from the Commands drop-down menu. The Site Survey - Passive Mode screen appears, provided a client adapter is installed in your computer and is running.

Figure F-1 shows the Site Survey - Passive Mode screen with the signal strength values displayed as percentages, and Figure F-2 shows the top of the same screen with the signal strength values displayed in dBm.

**Note**

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

■ Using Passive Mode

Figure F-1 Site Survey - Passive Mode Screen (with Signal Strength as a Percentage)

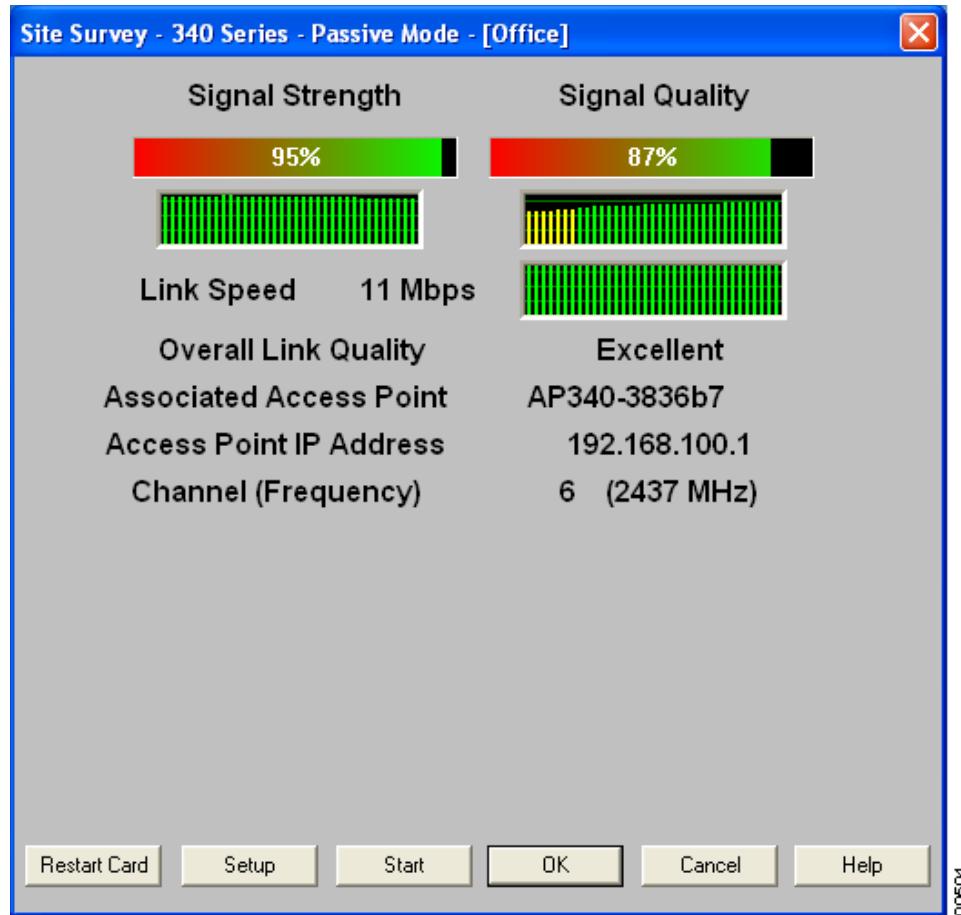


Figure F-2 Top of Site Survey - Passive Mode Screen (with Signal Strength in dBm)

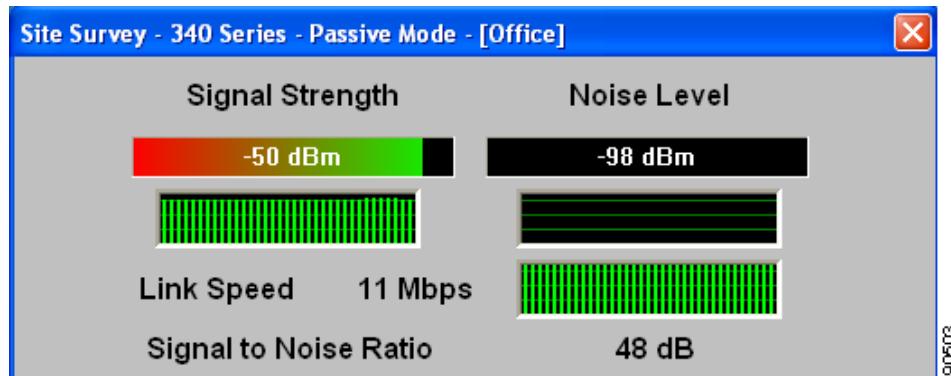


Table F-1 interprets the information that is displayed on the Site Survey - Passive Mode screen.

Table F-1 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>
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>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> <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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
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>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 for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the “Specifying Signal Strength Units” section on page F-3 for information.</p>
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>

Table F-1 Site Survey Passive Mode Statistics (continued)

Statistic	Description
Link Speed	<p>In passive mode, the site survey tool monitors transmitted network traffic, and the data rate reflects the rate at which the packets are being transmitted.</p> <p>The Link Speed histogram provides a visual interpretation of the current rate at which your client adapter is transmitting 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 (2.4-GHz client adapters); 6, 9, 12, 18, 24, 36, 48, or 54 Mbps (5-GHz client adapters)</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 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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
Signal to Noise Ratio (2.4-GHz client adapters)	<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 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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
Associated Access Point	<p>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 greater).</p>
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 greater).</p> <p>Note If Aironet Extensions are disabled, the IP address of the associated access point is shown as 0.0.0.0.</p>
Channel (Frequency)	<p>The frequency that your client adapter is currently using as the channel for communications.</p> <p>Value: Dependent on client adapter radio and regulatory domain</p>

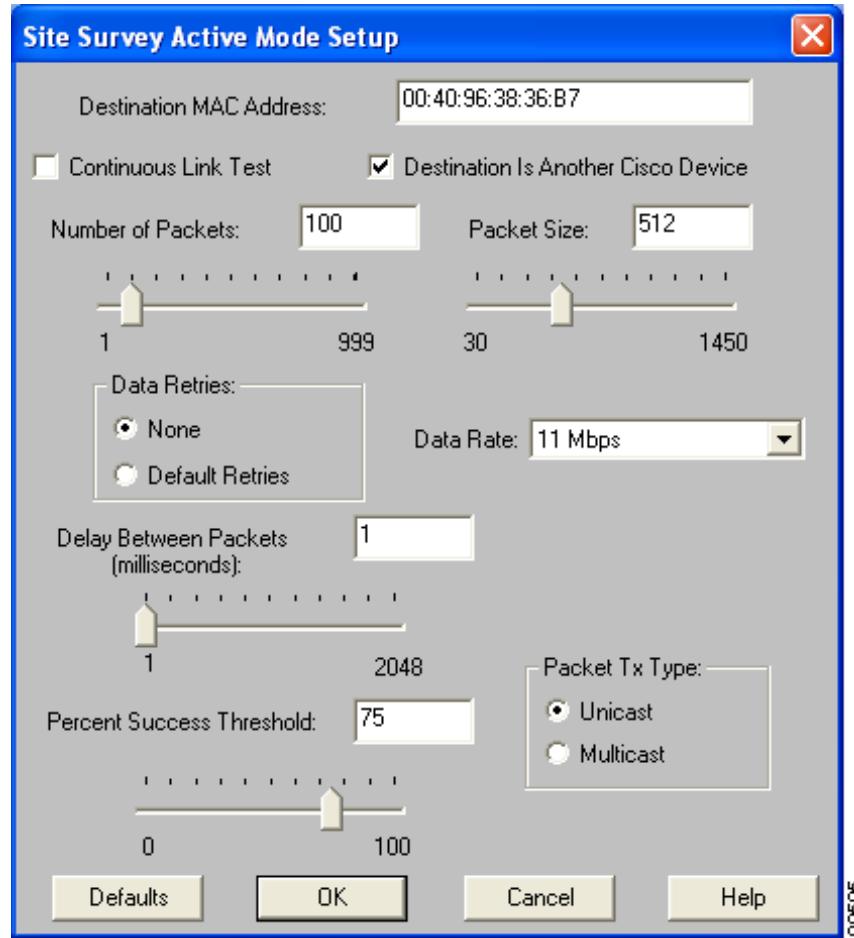
- Step 2** If you want to activate the site survey active mode, go to the “[Using Active Mode](#)” section on page F-7. Otherwise, click **OK** or **Cancel** to exit the site survey application.

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 F-1](#)), click the **Setup** button. The Site Survey Active Mode Setup screen appears (see [Figure F-3](#)).

Figure F-3 Site Survey Active Mode Setup Screen



[Table F-2](#) lists and describes the parameters that affect how the site survey is performed. Follow the instructions in the table to set any parameters.

Table F-2 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 are 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 does not roam to other access points so that the size of a single cell can be determined.</p>						
Continuous Link Test	<p>Checking this check box 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: Unchecked</p>						
Destination Is Another Cisco/Aironet Device	<p>Checking this check box 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). In this case, packets sent to the client from the Cisco Aironet device contain additional information, such as lost to source, lost to target, and percent retries, and this information is displayed in the Site Survey - Active screen.</p> <p>If the device specified in the Destination MAC Address field is not a Cisco Aironet device, do not check this check box. In this case, the test sends out loopback packets, which originate from and return to the client adapter.</p> <p>Default: Checked</p>						
Number of Packets	<p>The number of packets that are sent during the test.</p> <p>Range: 1 to 999</p> <p>Default: 100</p>						
Packet Size	<p>The size of the packets that are sent during the test. Select a size that is 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 is 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 (16 for 2.4-GHz client adapters; 32 for 5-GHz client adapters) will be used.</td></tr> </tbody> </table>	Retry Value	Description	None	No retries will occur.	Default Retries	The firmware's default value for retries (16 for 2.4-GHz client adapters; 32 for 5-GHz client adapters) will be used.
Retry Value	Description						
None	No retries will occur.						
Default Retries	The firmware's default value for retries (16 for 2.4-GHz client adapters; 32 for 5-GHz client adapters) will be used.						

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

Parameter	Description						
Data Rate	The bit rate at which packets are transmitted. Rate shifting does not occur during the test because the echo test built into the radio firmware does not support it. 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) Default: 11 Mbps (2.4-GHz client adapters); 54 Mbps (5-GHz client adapters)						
Delay Between Packets	The delay (in milliseconds) between successive transmissions. Range: 1 to 2048 ms Default: 50 ms						
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						
Packet Tx Type	The packet type that is transmitted during the test. Default: Unicast <table border="1"> <thead> <tr> <th>Packet Type</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Unicast</td><td>When unicast packets are used, the system expects to receive an acknowledgment 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> </tbody> </table>	Packet Type	Description	Unicast	When unicast packets are used, the system expects to receive an acknowledgment 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 to receive an acknowledgment from the destination, and retries can occur.						
Multicast	When multicast packets are used, no packet retries occur during the test.						

Step 2 After setting any parameters, click **OK** to save the settings. The Site Survey - Passive Mode screen appears (see [Figure F-1](#)).

Step 3 Click the **Start** button to run the site survey test. The Site Survey - Active Mode screen appears.

[Figure F-4](#) shows the Site Survey - Active Mode screen with the signal strength values displayed as percentages, and [Figure F-5](#) shows the top of the same screen with the signal strength values displayed in dBm.

Using Active Mode

Figure F-4 Site Survey - Active Mode Screen (with Signal Strength as a Percentage)

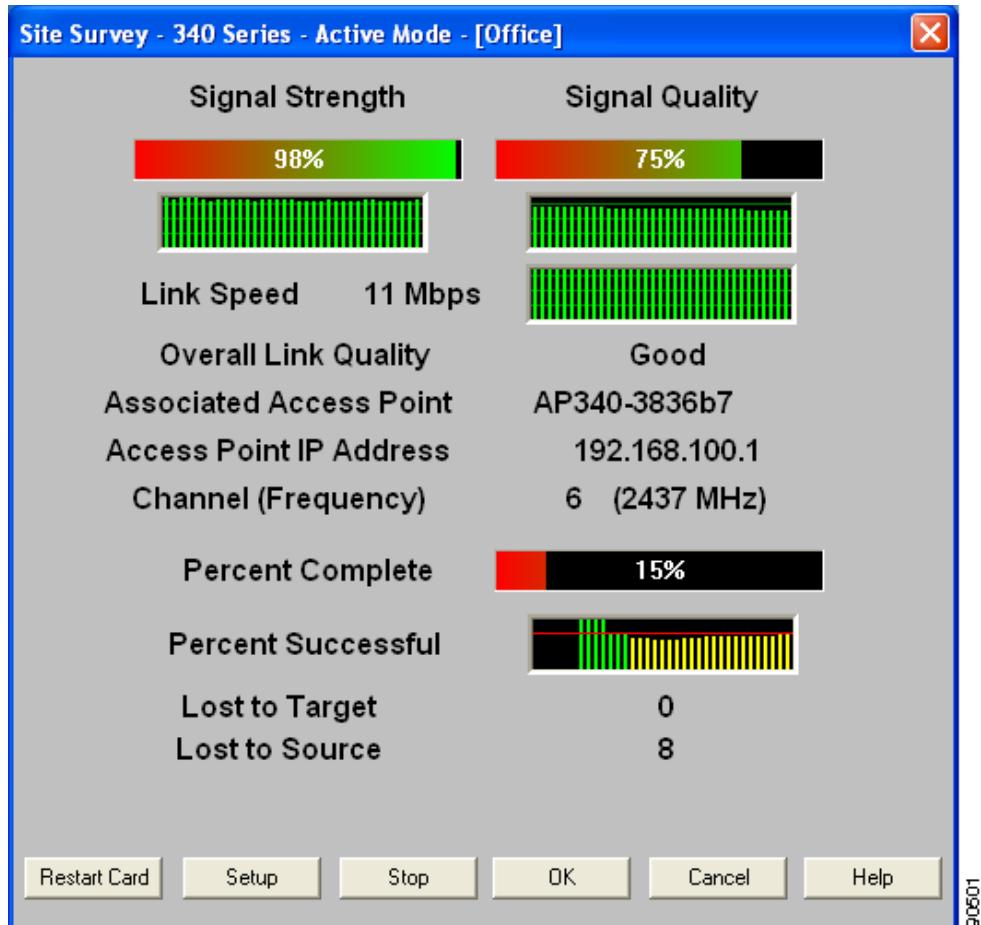


Figure F-5 Top of Site Survey - Active Mode Screen (with Signal Strength in dBm)

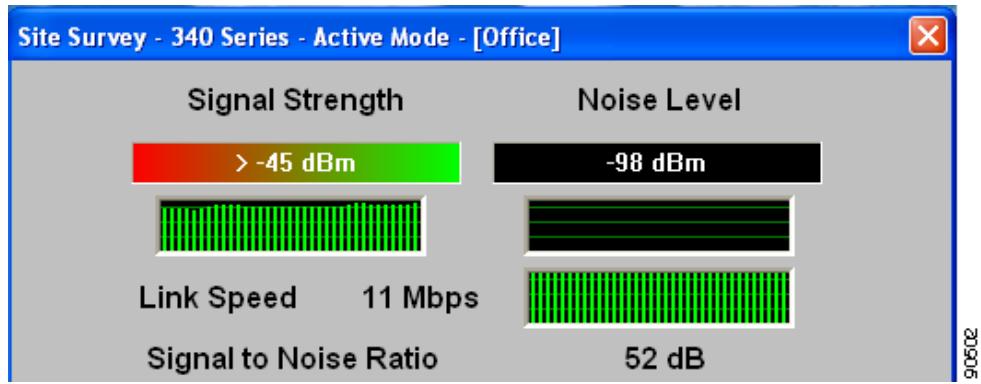


Table F-3 interprets the information that is displayed on the Site Survey - Active Mode screen while the site survey test is running.

Table F-3 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>
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>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> <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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
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>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 for 2.4-GHz client adapters and only if you selected signal strength to be displayed in dBm. See the “Specifying Signal Strength Units” section on page F-3 for information.</p>
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>

Table F-3 Site Survey Active Mode Statistics (continued)

Statistic	Description
Link Speed	<p>The rate at which your client adapter is transmitting 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 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 (2.4-GHz client adapters); 6, 9, 12, 18, 24, 36, 48, or 54 Mbps (5-GHz client adapters)</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 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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
Signal to Noise Ratio (2.4-GHz client adapters)	<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 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 “Specifying Signal Strength Units” section on page F-3 for information.</p>
Associated Access Point	<p>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 greater).</p>
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 greater).</p> <p>Note If Aironet Extensions are disabled, the IP address of the associated access point is shown as 0.0.0.0.</p>
Channel (Frequency)	<p>The frequency that your client adapter is currently using as the channel for communications.</p> <p>Value: Dependent on client adapter radio and regulatory domain</p>
Percent Complete	<p>The percentage of packets that have been transmitted based on the number specified in the Number of Packets field.</p>

Table F-3 Site Survey Active Mode Statistics (continued)

Statistic	Description
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 F-2 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 when 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.

Forcing the Client Adapter to Reassociate

The client adapter will attempt to maintain its association to an access point for as long as it can. Therefore if you are on a fringe area while conducting a site survey, you may want to reinitialize (or restart) the client adapter in an attempt to force it to disassociate from the access point to which it is currently associated and reassociate to another access point.



Note

Restarting the client adapter may cause you to lose your wireless network connection.

Follow the steps below to attempt to force the client adapter to disassociate from its current access point and reassociate to another during a site survey.

- Step 1** Click the **Restart Card** button on the bottom of the Site Survey screen.
- Step 2** When prompted to confirm your decision, click **Yes**. The driver stops the client adapter's radio, writes the configuration (although no parameter settings have been changed), and restarts the radio.

■ Forcing the Client Adapter to Reassociate