APPENDIX E

Performing a Site Survey

This appendix explains how the Site Survey Tool (SST) utility can be used when conducting a site survey.

The following topics are covered in this appendix:

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.

The Site Survey Tool (SST) utility can assist you in conducting a site survey. SST 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).

SST 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 E-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 E-5 to activate the active mode.

Guidelines

Keep the following guidelines in mind when preparing to perform a site survey:

- Use the active mode when performing 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.
- 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.

Using Passive Mode

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

Step 1 Select **Start > Programs > Cisco > Site Survey Tool**. The Site Survey - Passive screen appears (see Figure E-1), provided a client adapter is installed in the Windows CE device and is running.

Note This screen and the other screens in this chapter represent Windows CE devices with both a display width and a display height greater than 240 pixels, such as the HP Jornada 820 display of 640 x 480. On Windows CE devices with smaller displays, the site survey screens vary slightly from the screens shown here.

Figure E-1 Site Survey - Passive Screen

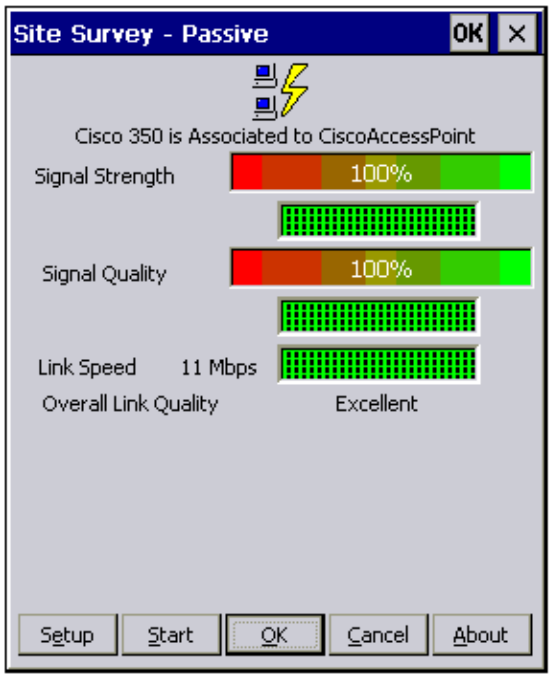

Table E-1 interprets the information that is displayed on the Site Survey - Passive screen.

Table E-1 Site Survey Passive Mode Statistics

Statistic	Description
The first line of the Site Survey - Passive screen	Indicates the operational mode of your client adapter and the name or MAC address of any associated access point. **Value:** Associated, Not Associated, Authenticated, or Ad Hoc 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. 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). **Range:** 0 to 100%
Signal Quality (Beacons Received is displayed instead if your firmware version is less than 4.05)	The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal. 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). **Range:** 0 to 100%
Link Speed	The rate at which your client adapter is receiving echo packets from its associated access point. The Link Speed histogram provides a visual interpretation of the current rate at which your client adapter is receiving packets. Differences in link speed are indicated by the following colors: green (fastest), yellow (middle of the range), and red (slowest). **Value:** 1, 2, 5.5, or 11 Mbps **Note** To examine real-time link speed for your client adapter, use the active mode. In passive mode, the link-speed indicator reports the speed of echo packets and does not indicate real-time link speed.
Overall Link Quality	The client adapter's ability to communicate with the access point. **Value:** Not Associated, Poor, Fair, Good, Excellent

Step 2 If you want to activate the site survey active mode, go to the "Using Active Mode" section on page E-5. 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 screen (see Figure E-1), click the **Setup** button. The Active Mode Setup screen appears (see Figure E-2).

Figure E-2 Active Mode Setup Screen

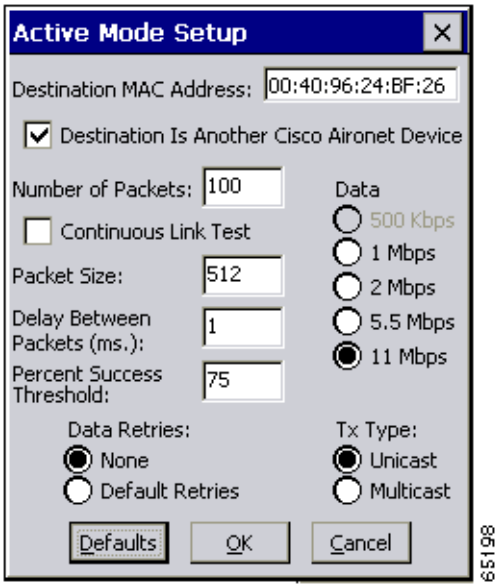

Table E-2 lists and describes the parameters that affect how the site survey is performed. Follow the instructions in the table to set any parameters.

Table E-2 Site Survey Active Mode Parameters

Parameter	Description
Destination MAC Address	The MAC address of the access point (in infrastructure mode) or other clients (in ad hoc mode) that will be used in the test. **Default:** The MAC address of the access point (in infrastructure mode) to which your client adapter is associated **Note** During the test, the client adapter will not roam to other access points so that the size of a single cell can be determined.
Destination Is Another Cisco Aironet Device	Selecting this checkbox indicates that the device you named in the Destination MAC Address field is a Cisco Aironet access point (in infrastructure mode) or client (in ad hoc mode). 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. If the device specified in the Destination MAC Address field is not a Cisco Aironet device, do not select this checkbox. In this case, the test sends out loopback packets, which originate from and return to the client adapter. **Default:** Selected
Number of Packets	The number of packets that will be sent during the test. **Range:** 1 to 999 **Default:** 100
Data Rate	The bit rate at which packets will be transmitted. Rate shifting will 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 **Default:** 11 Mbps
Continuous Link Test	Selecting this checkbox causes the test to run until you click **OK** or **Stop**. The test loops repeatedly for the number of packets specified in the Number of Packets field. **Default:** Deselected
Packet Size	The size of the packets that will be sent during the test. Select a size that will be typical during normal system use. **Range:** 30 to 1450 **Default:** 512
Delay Between Packets	The delay (in milliseconds) between successive transmissions. **Range:** 1 to 2048 ms **Default:** 50 ms

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

Parameter	Description	
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	
Data Retries	The number of times a transmission will be retried if an acknowledgment (Ack) is not returned by the destination device. **Default:** None	
	Retry Value	**Description**
	None	No retries will occur.
	Default Retries	The firmware's default value for retries (16) will be used.
Tx Type	The packet type that will be transmitted during the test. **Default:** Unicast	
	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 screen appears (see Figure E-1).

Step 3 Click the **Start** button to run the site survey test. The Site Survey - Active screen appears (see Figure E-3).

Figure E-3 Site Survey - Active Screen

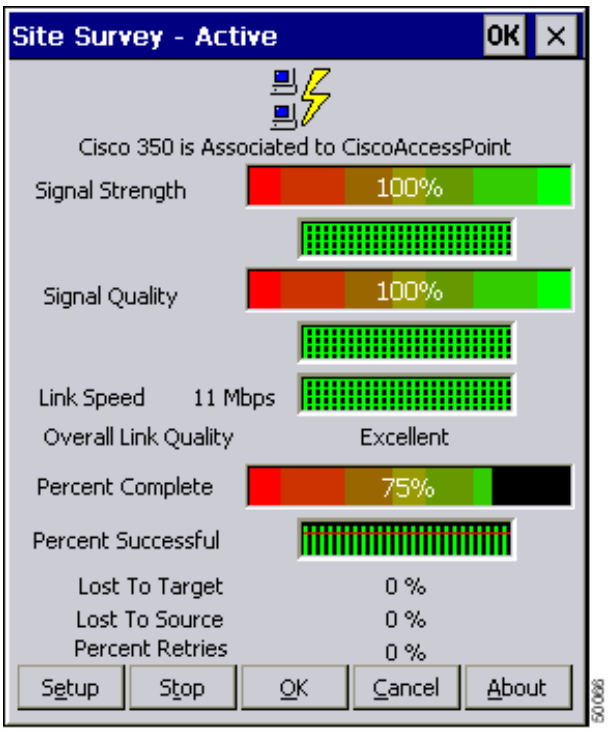

Table E-3 interprets the information that is displayed on the Site Survey - Active screen while the site survey test is running.

Table E-3 Site Survey Active Mode Statistics

Statistic	Description
The first line of the Site Survey - Active screen	Indicates the operational mode of your client adapter and the name or MAC address of any associated access point. **Value:** Associated, Not Associated, Authenticated, or Ad Hoc 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. 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). **Range:** 0 to 100%

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

Statistic	Description
Signal Quality (Beacons Received is displayed instead if your firmware version is less than 4.05)	The signal quality for all received packets. The higher the value and the more green the bar graph is, the clearer the signal. 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). **Range:** 0 to 100%
Link Speed	The rate at which your client adapter is transmitting or receiving packets to or from its associated access point. The Link Speed histogram provides a visual interpretation of the current rate at which your client adapter is transmitting or receiving packets. Differences in link speed are indicated by the following colors: green (fastest), yellow (middle of the range), and red (slowest). **Value:** 1, 2, 5.5, or 11 Mbps
Overall Link Quality	The client adapter's ability to communicate with the access point. **Value:** Not Associated, Poor, Fair, Good, Excellent
Percent Complete	The percentage of packets that have been transmitted based on the number specified in the Number of Packets field.
Percent Successful	The percentage of packets that were transmitted successfully. The Percent Successful histogram provides a visual interpretation of the percentage of packets that are not lost. The value you set for the Percent Success Threshold is indicated by the red line. Percentages greater than or equal to this value are displayed as green bars; percentages below this value are displayed as yellow bars. **Note** Refer to the Percent Success Threshold parameter in Table E-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.
Percent Retries	The percentage of packets that were retried for transmission. **Note** This value is calculated as follows: (number of retries x 100) / number of packets sent If a lot of packets get lost, the number of retries could be greater than the number of packets sent. Then this field would show a value greater than 100%.

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

A 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 try to force the adapter to disassociate from the access point to which it is currently associated in the hope that it will reassociate to another access point.

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 While SST is open, double-click the **Cisco ACU icon** or select **Start > Programs > Cisco > Aironet Client Utility** to also open ACU.

Step 2 Click **OK** on the ACU screen. The first line of the Site Survey screen displays "Not Associated" while the client adapter disassociates from its current access point and then displays "Associated" once the adapter is reset and reassociated to an access point.