



## Positioning Wireless Devices

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This appendix describes the client utility site survey tool and provides guidelines for the use of this tool.

The following topics are covered in this section:

- [Overview, page E-2](#)
- [Site Survey, page E-2](#)

# Overview

Determining the network location of your wireless products can be influenced by a number of factors. This section discusses those factors and provides guidelines and tools for achieving optimum placement.

The site survey test tools provided with the client utilities can help you to determine the best placement for access points and workstations within your wireless network. Refer to the *Cisco Aironet Access Point Hardware Installation Guide* for additional information on the placement of access points.

# Site Survey

Because of differences in component configuration, placement, and physical environment, every network application is a unique installation. Before installing the system, you should perform a site survey to determine the optimum utilization of networking components and to maximize range, coverage, and network performance.

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

- **Data rates**—Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. 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 performance of the client adapter. Avoid locating the workstation in a location where there is a metal barrier 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. Metal or steel construction is a barrier to radio signals.

## Performing a Site Survey

The pcm3x0PPC client utility's site survey tool for Mac OS 9.x operates at the RF level and is used to determine the best placement and coverage (overlap) for your network's access points. During the site survey, the current status of the network is read from the client adapter and displayed once per second so you can accurately gauge network performance. The feedback that you receive can help you to eliminate areas of low RF signal levels that can result in a loss of connection between the client adapter and its associated access point.

The site survey tool does not initiate any RF network traffic; it simply listens to the traffic that the client adapter hears and displays the results.

If you are using the Mac OS X operating system, you can use the Status screen, the Scanner screen, or the LSM screen on the client utility Advanced properties screen to perform a site survey.

## Guidelines

The following guidelines should be kept in mind when preparing to perform a site survey:

- Perform the site survey when the RF link is functioning with all other systems and noise sources operational.
- Execute the site survey entirely from a mobile station.
- Set your client adapter's RF Transmit level at different settings to determine the minimum level required to cover the wireless cell.

## Site Survey on Mac OS 9.x

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

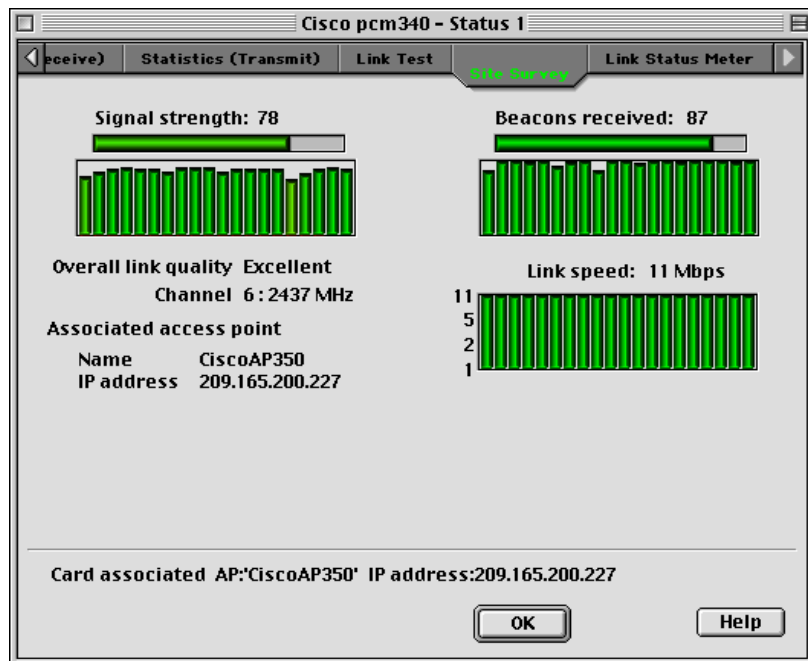
- Step 1** Select **Status** from the File pull-down menu (see [Figure E-1](#)) and click the **Site Survey** tab.

**Figure E-1 File Pull-Down Menu**



The Site Survey screen appears (see [Figure E-2](#)).

**Figure E-2 Site Survey Screen**



[Table E-1](#) interprets the information that is displayed on the Site Survey screen.

**Table E-1 Site Survey 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 height of the vertical bars (the taller the bars, the stronger the signal).</p> <p><b>Range:</b> 0 to 100%</p>
Beacons Received	<p>The percentage of beacon packets received versus those expected to be received. The higher the value and the more green the bar graph is, the better the quality of the signal.</p> <p>The histogram below the bar graph provides a visual interpretation of the current quality of the signal. Differences in signal quality are indicated by the height of the vertical bars (the taller the bars, the stronger the signal).</p> <p><b>Example:</b> 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><b>Range:</b> 0 to 100%</p>

**Table E-1 Site Survey Statistics (continued)**

<b>Statistic</b>	<b>Description</b>
Overall Link Quality	The client adapter's ability to communicate with the access point. <b>Value:</b> Not Associated, Poor, Fair, Good, Excellent
Channel	The frequency that your client adapter is currently using as the channel for communications. <b>Value:</b> Dependent on regulatory domain
Link Speed	The rate at which your client adapter is receiving 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 height of the vertical bars (the taller the bars, the greater the data rate). <b>Value:</b> 1, 2, 5.5, or 11 Mbps
Name	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.
IP Address	The IP address of the access point to which your client adapter is associated. It is shown only if the access point was configured with an IP address and you are in infrastructure mode.

**Step 2** Click **OK** to exit the site survey application.

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## Site Survey on Mac OS X

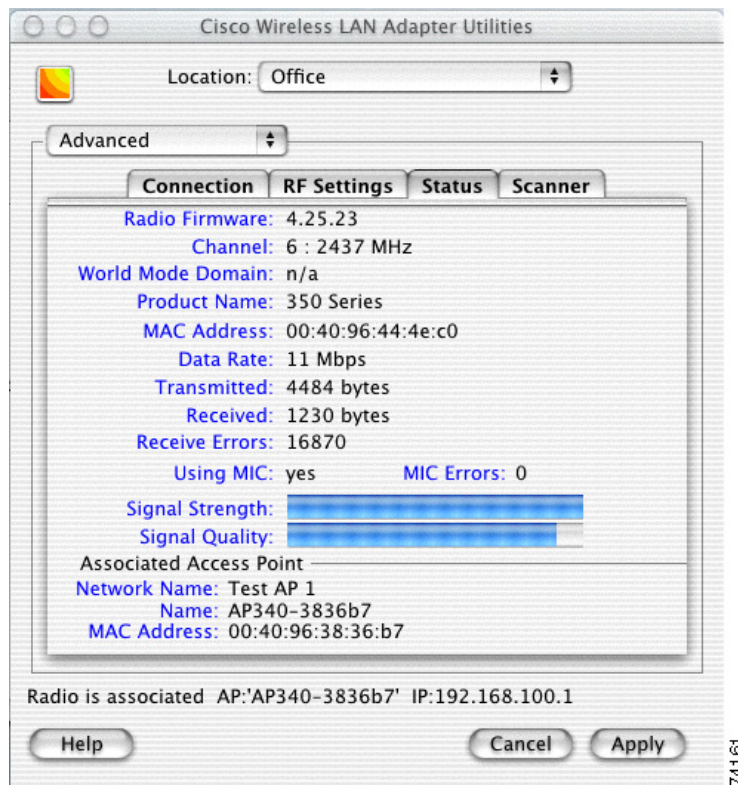
The client utility supports several tools that can be used to display information to perform a site survey:

- Advanced parameters status screen—provides signal strength, signal quality, and data rate of the access point signal.
- Advanced parameters scanner screen—allows you to select a specific access point from a list of detected access points configured for broadcast SSID and provides the signal strength and the transfer rates supported by the selected access point.
- LSM scanner tool—provides a graphical display that shows both signal strength and signal quality of the detected access points configured for broadcast SSID.

Follow the steps below to obtain information about the wireless network traffic using the status screen:

- Step 1** Click the Status tab on the client utility advanced properties screen and the Status Screen is displayed (see [Figure E-3](#)).

**Figure E-3** Status Screen



The status screen indicates the network name, MAC address, data rate, signal quality, and signal strength of the signal from the access point.

- Step 2** Monitor the signal strength and signal quality as you walk around the wireless cell area.

[Table E-2](#) describes the parameters on the status screen.

**Table E-2 Client Adapter Status Screen Parameters**

Parameter	Description
Firmware Version	The version of the radio firmware that is currently running on your client adapter.
Channel	Specifies which frequency channel your client adapter is using to communicate with the access point.
World Mode Domain	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.
Product Name	Identifies the type of client adapter you are using. <b>Value:</b> 340 Series, 350 Series, or 4800 Series
MAC Address	The MAC address assigned to your client adapter at the factory
Data Rate	The rate at which your client adapter is currently transmitting data packets.
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.
Using MIC	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.  <b>Note</b> If the access point is using MIC, your client adapter's driver and firmware must support MIC; otherwise, the client cannot associate.  <b>Value:</b> 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.
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	The network name or SSID of your wireless network.

**Table E-2 Client Adapter Status (continued)Screen Parameters (continued)**

<b>Parameter</b>	<b>Description</b>
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.