C H A P T E R **5**

Adding and Using Maps

This chapter describes how to add maps to the Cisco WCS database and use them to monitor your wireless LAN. With the Cisco WCS database, you can add maps and view your managed system on realistic campus, building, and floor maps.

Additionally, you can enable location presences by mobility server to provide expanded Civic (city, state, postal code, country) and GEO (longitude, latitude) location information beyond the Cisco default setting (campus, building, floor, and X,Y coordinates). This information can then to be requested by clients on a demand basis for use by location-based services and applications.

Location Presence can be configured when a new campus, building, floor, or outdoor area is being added or configured at a later date.

Note A mobility server should be synchronized before Location Presence is enabled. For details on enabling location presence and assigning its parameters, refer to Cisco Context-Aware Services documentation at this location:

http://www.cisco.com/en/US/docs/wireless/mse/3350/5.2/CAS/configuration/guide/msecg_ch7_CAS.html.

This configuration guide also covers verifying location accuracy, using chokepoints, using Wi-FI TDOA receivers[1], applying calibration models and other context-aware planning and verification topics.

This chapter contains the following sections:

1. The Wi-Fi TDOA receiver is an external system designed to receive signals transmitted from a tagged, tracked asset. These signals are then forwarded to the mobility services engine for used in calculating location of a tagged asset. TDOA receivers use the Time Difference of Arrival (TDOA) method to calculate tag location. TDOA uses data from a minimum of three TDOA receivers to generate a tagged asset's location.

Monitoring Maps Overview

> **Note** To view or edit current maps, choose **Monitor > Maps** (see Figure 5-1) and select the appropriate map from the list. Use the Select a command drop-down list to access additional functionality.

Figure 5-1   Monitor > Maps Page

The Monitor > Maps page provides a summary of all campuses, buildings, outdoor areas, and floors. The available information includes:

- Total APs—Number of total access points for each map.
- 802.11a/n Radios and 802.11b/g/n Radios—Number of 802.11a/n and 802.11b/g/n radios associated with each map.
- Out of Service (OOS) Radios—Number of 802.11a/n and 802.11b/g/n radios associated with each map.
- Clients—Number of clients associated to access points on the map.

> **Note** This number is based on the most recent Client Statistics Poll. The number of clients located on the map by MSE may not match this number.

- 802.11a/n and 802.11b/g/n Avg Air Quality—Indicates the average Air Quality (AQ) for 802.11a/n and 802.11b.g.n radios.
- 802.11a/n and 802.11b/g/n Min Air Quality—Indicates the minimum Air Quality (AQ) for 802.11a/n and 802.11b/g/n radios.
- Status—Indicates the current status of the map.
  - Red triangle—Critical fault
  - Yellow triangle—Minor fault
  - Green square—Ok

The left sidebar lists all campuses, buildings, and floors in a tree view. When you click a campus, building, or floor in the Maps Tree View menu, the main area of the page displays corresponding information.

Note Click **Edit View** to change the information displayed for the listed maps. See "Configuring Edit View" section on page 5-3 for more information.
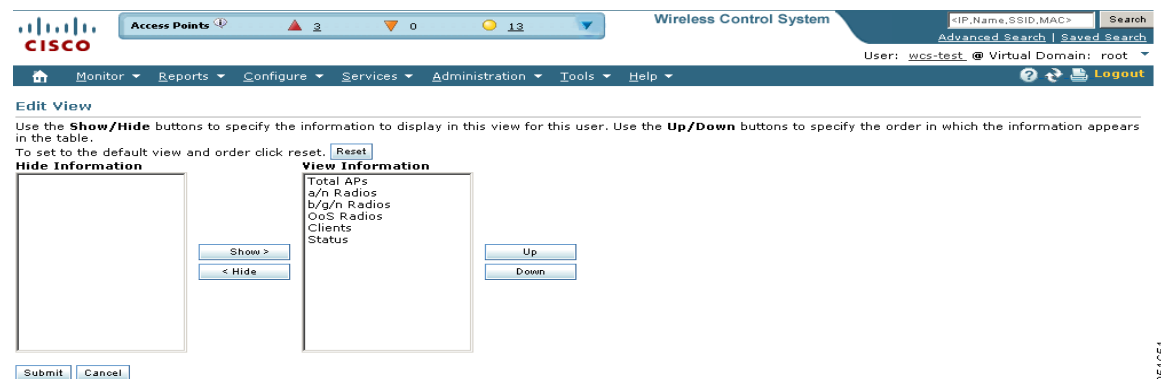
Use the Select a command drop-down list for additional map functionality. See "Select a Command for Maps" section on page 5-4 for more information.

To search for a specific map, use the WCS search feature.

Configuring Edit View

The Edit View page enables you to choose which columns appear in the maps list page (see Figure 5-2).

Figure 5-2   *Edit View Page*

Column names appear in one of the following lists:

- Hide Information—Lists columns that do not appear in the table. The Hide button points to this list.
- View Information—Lists columns that do not appear in the table. The Show button points to this list.

To display a column in a table, click it in the Hide Information list, then click **Show**. To remove a column from a table, click it in the View Information list, then click **Hide**. You can select more than one column by holding down the Shift or Control key.

To change the position of a column in the View Information list, click it, then click **Up** or **Down**. The higher a column is in the list, the farther left it appears in the table.

Edit View Command Buttons

The following command buttons appear in the Edit View page:

- Reset—Set the table to the default display.
- Show—Move the highlighted columns from the Hide Information list to the View Information list.
- Hide—Move the highlighted columns from the View Information list to the Hide Information list.
- Up—Move the highlighted columns upward in the list (further to the left in the table).

- Down—Move the highlighted columns downward in the list (further to the right in the table).

- Submit—Save the changes to the table columns and return to the previous page.

- Cancel—Undo the changes to the table columns and return to the previous page.

Select a Command for Maps

The Select a Command drop-down list provides access to the following map functionality:

- Adding a Campus Map, page 5-4

- Adding Buildings, page 5-5

- Deleting a Map, page 5-12

- Moving Buildings, page 5-12

- Copying a Map, page 5-13

- Editing Map Properties, page 5-13

- Searching Maps, page 5-21

Adding a Campus Map

Follow these steps to add a single campus map to the Cisco WCS database.

Step 1   Save the map in .PNG, .JPG, .JPEG, or .GIF format.

✎

Note   The map can be any size because WCS automatically resizes the map to fit its working areas.

Step 2   Browse to and import the map from anywhere in your file system.

Step 3   Choose **Monitor > Maps** to display the Maps page (see Figure 5-3).

Figure 5-3   New Campus Page

Step 4   From the Select a command drop-down list, choose **New Campus**, and click **Go**.

Step 5   On the Maps > New Campus page, enter the campus name and campus contact name.

Step 6   Browse to and choose the image filename containing the map of the campus and click **Open**.

Step 7   Select the **Maintain Aspect Ratio** check box to prevent length and width distortion when WCS resizes the map.

Step 8   Enter the horizontal and vertical span of the map in feet.

> ✎
> **Note**   To change the unit of measurement (feet or meters), select Monitor > Maps and select **Properties** from the Select a command drop-down list.

> ✎
> **Note**   The horizontal and vertical span should be larger than any building or floor plan to be added to the campus.

Step 9   Click **OK** to add this campus map to the Cisco WCS database. WCS displays the Maps page, which lists maps in the database, map types, and campus status.

Step 10   (Optional) To assign location presence information, click the newly created campus link in the Monitor > Maps page. See the "Managing Location Presence Information" section on page 5-16 for more information.

Adding Buildings

You can add buildings to the Cisco WCS database regardless of whether you have added campus maps to the database. This section explains how to add a building to a campus map or a standalone building (one that is not part of a campus) to the Cisco WCS database.

Adding a Building to a Campus Map

Follow these steps to add a building to a campus map in the Cisco WCS database.

Step 1   Choose **Monitor > Maps** to display the Maps page.

Step 2   Click the desired campus. WCS displays the Maps > *Campus Name* page.

Step 3   From the Select a command drop-down list, choose **New Building**, and click **Go** (see Figure 5-4).

Figure 5-4   Campus > New Building Page

Step 4 On the *Campus Name* > New Building page, follow these steps to create a virtual building in which to organize related floor plan maps:

a. Enter the building name.

b. Enter the building contact name.

c. Enter the number of floors and basements.

d. Enter the horizontal position (distance from the corner of the building rectangle to the left edge of the campus map) and the vertical position (distance from the corner of the building rectangle to the top edge of the campus map) in feet.

Note To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

e. Enter an approximate building horizontal span and vertical span (width and depth on the map) in feet.

Note To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

Tip The horizontal and vertical span should be larger than or the same size as any floors that you might add later.You can also use Ctrl-click to resize the bounding area in the upper left corner of the campus map. As you change the size of the bounding area, the Horizontal Span and Vertical Span parameters of the building change to match your actions.

    f. Click **Place** to put the building on the campus map. WCS creates a building rectangle scaled to the size of the campus map.

    g. Click the building rectangle and drag it to the desired position on the campus map.

> **Note** After adding a new building, you can move it from one campus to another without having to recreate it.

    h. Click **Save** to save this building and its campus location to the database. WCS saves the building name in the building rectangle on the campus map.

> **Note** A hyperlink associated with the building takes you to the corresponding Map page.

Step 5 *(Optional)* To assign location presence information for the new outdoor area, do the following:

    a. Choose **Edit Location Presence Info** from the Select a command drop-down list. Click **Go**. The Location Presence page appears (see Figure 5-5).

> **Note** By default, the Override Child Element's Presence Info check box is selected. This option should remain selected if you want to propagate the campus location to all buildings and floors on that campus. When adding buildings to the campus map, you can import the campus location information. The campus address cannot be imported to a building if the check box is deselected. This option should be deselected if you want to assign building-specific addresses to buildings on its campus rather than one campus address to all.

Figure 5-5   Location Presence Page

b. Choose either the **Civic**, **GPS markers**, or **Advanced** tab.

  – Civic Address identifies the campus by name, street, house number, house number suffix, city (address line2), state, postal code, and country.

  – GPS Markers identify the campus by longitude and latitude.

  – Advanced identifies the campus with expanded civic information such as neighborhood, city division, country, and postal community name.

> **Note**   Each selected parameter is inclusive of all of those above it. For example, if you choose Advanced, it can also provide GPS and Civic location information upon client demand. The selected setting must match what is set on the location server level (Services > Mobility Services).

> **Note**   If a client requests location information such as GPS Markers for a campus, building, floor, or outdoor area that is not configured for that parameter, an error message is returned.

c. By default, the Override Child Element's Presence Info check box is selected. There is no need to alter this setting for standalone buildings.

Step 6   Click **Save**.

Adding a Standalone Building

Follow these steps to add a standalone building to the Cisco WCS database:

Step 1   Choose **Monitor > Maps** to display the Maps page.

Step 2   From the Select a command drop-down list, choose **New Building**, and click **Go** (see Figure 5-6).

Figure 5-6   New Standalone Building Page

Step 3   On the Maps > New Building page, follow these steps to create a virtual building in which to organize related floor plan maps:

  a. Enter the building name.

  b. Enter the building contact name.

> ✎
> **Note**   After adding a new building, you can move it from one campus to another without having to recreate it.

  c. Enter the number of floors and basements.

  d. Enter an approximate building horizontal span and vertical span (width and depth on the map) in feet.

> ✎
> **Note**   To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

> ✎
> **Note**   The horizontal and vertical span should be larger than or the same size as any floors that you might add later.

e. Click **OK** to save this building to the database.

Step 4 *(Optional)* To assign location presence information for the new building, do the following:

a. Choose **Location Presence** from the Select a command drop-down list. Click **Go**. The Location Presence page appears (see Figure 5-5).

b. Choose either the Civic, GPS markers, or Advanced tab.

– Civic Address identifies the campus by name, street, house number, house number suffix, city (address line2), state, postal code, and country.

– GPS Markers identify the campus by longitude and latitude.

– Advanced identifies the campus with expanded civic information such as neighborhood, city division, county, and postal community name.

> **Note** Each selected parameter is inclusive of all of those above it. For example, if you select Advanced, it can also provide GPS and Civic location information upon client demand. The selected setting must match what is set on the location server level (Services > Mobility Services).

> **Note** If a client requests location information such as GPS Markers for a campus, building, floor, or outdoor area that is not configured for that parameter, an error message is returned.

c. By default, the Override Child Element's Presence Info check box is selected.
This option should remain selected if you want to propagate the campus location to all buildings and floors on that campus. When adding buildings to the campus map, you can import the location information. The campus address cannot be imported to a building if the check box is deselected. This option should be deselected if you want to assign building-specific addresses to buildings on its campus rather than one campus address to all.

Step 5 Click **Save**.

> **Note** The standalone buildings are automatically placed in a System Campus.
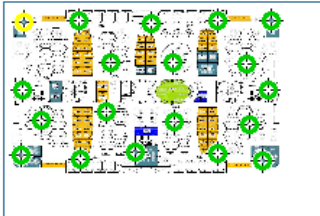
Managing a Current Campus

To view a current campus map, follow these steps:

Step 1 Choose **Monitor > Maps**.

Step 2 Click the name of the campus map to open its details page (see Figure 5-7).

Figure 5-7   Building View Page

Step 3   The Select a command drop-down list provides the following options:

- New Floor Area—See Adding and Enhancing Floor Plans for more information.
- Edit Building—See Editing a Current Campus for more information.
- Delete Building— See Deleting a Map for more information.
- Copy Building—See Copying a Map for more information.
- Edit Location Presence Information—See Managing Location Presence Information for more information.

✎

Note   Use the Monitor > Maps > Campus View main navigation bar at the top of the campus image to enlarge or decrease the size of the map view and to hide or show the map grid (which displays the map size in feet or meters).

Editing a Current Campus

To edit a current campus map, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Click the name of the campus map to open its details page.

Step 3   From the Select a command drop-down list, choose **Edit Campus**.

Step 4   Make any necessary changes to the Campus Name, Contact, Number of Floors, Number of Basements, and Dimensions (feet).

Note   To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

Step 5   Click **Next**.

Step 6   Make any additional changes to Maintain Aspect Ratio or Dimensions (feet).

Step 7   Click **OK**.

Note   System Campus is part of all partitions. Also, you can not edit or delete a system campus.

Moving Buildings

To move a building to a different campus, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Select the check box of the applicable building.

Step 3   From the Select a command drop-down list, click **Move Buildings**.

Step 4   Click **Go**.

Step 5   Select the Target Campus from the drop-down list.

Step 6   Select the buildings that you want to move. Unselect any buildings that will remain in their current location.

Step 7   Click **OK**.

Deleting a Map

Follow these steps to delete a map.

Step 1   In the Monitor > Maps page, select the check box(es) for the map(s) that you want to delete.

Step 2   Click **Delete** at the bottom of the map list or choose **Delete Maps** from the Select a Command drop-down list, and click **Go**.

Step 3   Click **OK** to confirm the deletion.

Note   Deleting a campus or building also deletes all of its container maps. The access points from all deleted maps are moved to an Unassigned state. System Campus can not be deleted, however, buildings or floors in a System Campus can be modified.

Editing Map Properties

To edit your map properties, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, click **Properties**.

Step 3   Click **Go**.

Step 4   Edit the information in Table 5-1.

Table 5-1   Map Properties Parameters

Parameter or Control	Description
Unit of Dimension	Set dimension measurement in feet or meters for all Cisco WCS maps.
Wall Usage Calibration	Choose to use or not use walls, or set to automatic.
Refresh Map From Network	Enable refresh of map data for Cisco WCS to update maps by polling the Cisco WLAN Solution each time an Cisco WLAN Solution operator requests a map update. Select disable for Cisco WCS to update maps from its stored database. **Note** Updates to the database may not be frequent enough to keep the map data current.
Advanced Debug Mode	This option must be enabled on both the location appliance and WCS to allow use of the location accuracy testpoint feature.

Copying a Map

The following guidelines apply to the copying process:

- Only the child elements are copied to the new map.

- The selected map is copied to the current applicable partition.

- Overlapping areas are not selected when buildings are copied. You should edit these after copying the map for proper positioning.

- If the selected map is above ground, the first available floor above ground is used for the copy.

- If the selected map is a basement, the first available basement is used for the copy.

- The following are *not* copied:

  – Access points and their positioning coordinates.

  – Planning mode data.

Note   You can not copy a System Campus.

To copy a map, follow these steps:

Step 1   In the **Monitor > Maps** page, select the check box of the map that you want to copy.

Step 2   From the Select a Command drop-down list, click **Copy Maps**. The Copy Maps page opens (see Figure 5-8).

Figure 5-8   Copy Maps Page

Step 3   Enter the name of the new map to which you want to copy the current map.

Note   If a map with the new name already exists, the copying process stops.

Step 4   Select the Copy Option (Map Only or Map and Map Details).

Note   Map and Map Details includes coverage areas, perimeters, obstacles, location regions, markers, and rails.

Step 5   Click **Copy** to complete the copying process or **Cancel** to close the page without copying the current map.

Exporting a Map

The Export Map feature allows you to export map or calibration information to XML. The exported XML will be in an encrypted format and will not be readable. XML and images are bundled, tarred, and zipped into a file for a successful import into another WCS.

To export a map, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, click **Export Maps**. The Export Map page appears (see Figure 5-9).

Figure 5-9   *Export Map Page*
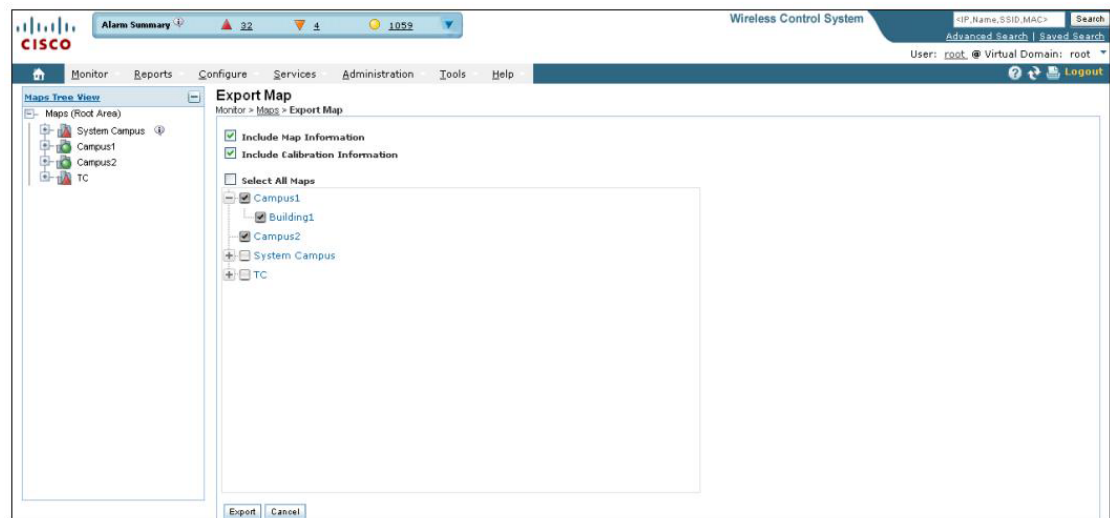
Step 3   Select the maps that you want to export.

Step 4   Click **Export** to export the selected map data.

Importing a Map

The Import Map feature allows you to import map information from external sources such as XML, WLSE, and CSV. During import, the XML may be encrypted (if exported from WCS) or unencrypted.

To import a map, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, click **Import Maps**. The Import Map page appears (see Figure 5-10).

Figure 5-10   *Import Map Page*
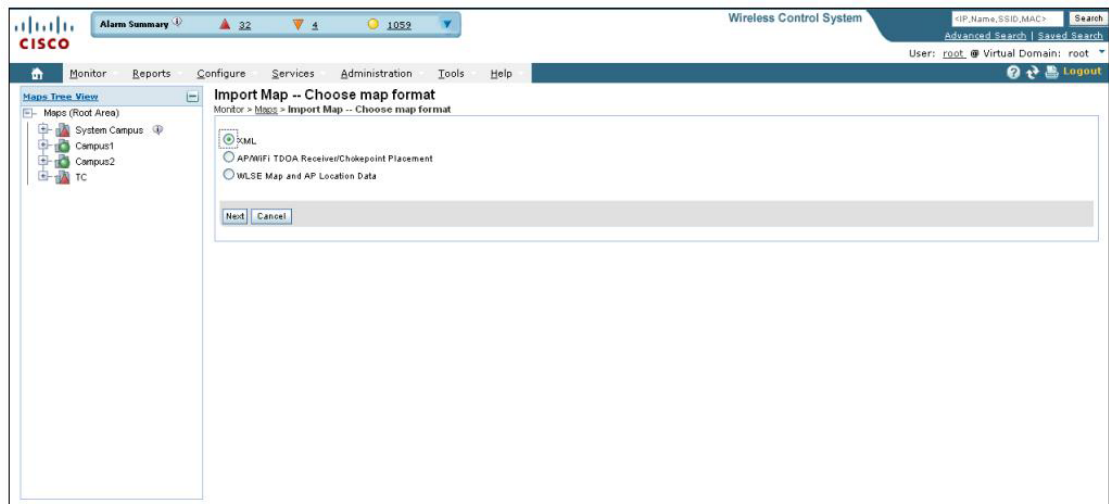

Step 3   Choose the map format.

Step 4   Select one of the following formats:

- XML

- AP/WiFi TDOA Receiver/Chokepoint Placement

- WLSE Map and AP Location Data

✎

Note   The XML format option is available only to the root user.

Step 5   Click **Next**.

Step 6   Click **Browse** to select the file that you want to import.

Step 7   Click **Import** to import the selected data.

Managing Location Presence Information

You can enable location presence by mobility services engine to provide expanded Civic (city, state, postal code, country) and GEO (longitude, latitude) location information beyond the Cisco default setting (campus, building, floor, and X,Y coordinates). This information can then be requested by clients on a demand basis for use by location-based services and applications. See Enabling Location Presence for Mobility Services for more information on enabling location presence.

To view or edit current location presence information for a current map, follow these steps:

Step 1   In the Monitor > Maps page, select the check box of the map.

Step 2   From the Select a command drop-down list, choose **Location Presence**.

Step 3   Click **Go**. The Location Presence page appears (see Figure 5-11).

> **Note**   The current map location information (Area Type, Campus, Building, and Floor) refer to the map you selected from the Monitor > Maps page. To select a different map, use the Select a Map to Update Presence Information drop-down lists to select the new map location.

Figure 5-11   Location Presence Page

Step 4   Choose either the Civic, GPS markers, or Advanced tab.

- Civic Address—Identifies the campus, building, or floor by name, street, house number, house number suffix, city (address line2), state, postal code, and country.

- GPS Markers—Identify the campus, building, or floor by longitude and latitude.

- Advanced—Identifies the campus, building, or floor with expanded civic information such as neighborhood, city division, county, and postal community name.

> **Note**   Each selected parameter is inclusive of all of those above it. For example, if you select Advanced, it can also provide GPS and Civic location information upon client demand. The selected setting must match what is set on the mobility services engine level. See the "Enabling Location Presence for Mobility Services" section on page 5-18 for more information.

> **Note**   If a client requests location information such as GPS markers for a campus, building, floor, or outdoor area that is not configured for that parameter, an error message appears.

> **Note** By default, the Override Child Element's Presence Info check box is selected.

Enabling Location Presence for Mobility Services

You can enable location presence by mobility services engine to provide expanded Civic (city, state, postal code, country) and GEO (longitude, latitude) location information beyond the Cisco default setting (campus, building, floor, and X.Y coordinates). This information can then be requested by clients on a demand basis for use by location-based services and applications.

Location Presence can be configured when a new campus, building, floor, or outdoor area is being added or configured at a later date.

Once enabled, the mobility services engine is capable of providing location to any requesting Cisco CX v5 client.

> **Note** Before enabling this feature, synchronize the mobility services engine.

To enable and configure location presence on a mobility services engine, follow these steps:

Step 1 Click **Services > Mobility Services**.

Step 2 Select the mobility services engine to which the campus or building is assigned.

Step 3 From the Context-Aware Software menu (left sidebar), select **Presence Parameters** from the Administration sub-heading. The Presence page opens.

Step 4 Select the Service Type **On Demand** check box to enable location presence for Cisco CX clients v5.

Step 5 Choose one of the following Location Resolution options:

    a. When Building is selected, the mobility services engine can provide any requesting client, its location by building.

        – For example, if a client requests its location and the client is located in Building A, the mobility services engine returns the client address as *Building A*.

    b. When AP is selected, the mobility services engine can provide any requesting client, its location by its associated access point. The MAC address of the access point displays.

        – For example, if a client requests its location and the client is associated with an access point with a MAC address of 3034:00hh:0adg, the mobility services engine returns the client address of *3034:00hh:0adg*.

    c. When X,Y is selected, the mobility services engine can provide any requesting client, its location by its X and Y coordinates.

        – For example, if a client requests its location and the client is located at (50, 200), the mobility services engine returns the client address of *50, 200*.

Step 6 Check any or all of the location formats.

    a. Select the **Cisco** check box to provide location by campus, building and floor, and X and Y coordinates.

    b. Select the **Civic** check box to provide the name and address (street, city, state, postal code, country) of a campus, building, floor or outdoor area.

> **Note**   To import a file with multiple Civic listings, refer to Importing Civic Information for Mobility Services.

    c.   Select the **GEO** check box to provide the longitude and latitude coordinates.

Step 7   By default, the Text check box for Location Response Encoding is selected. It indicates the format of the information when received by the client. There is no need to change this setting.

Step 8   Select the Retransmission Rule **Enable** check box to allow the receiving client to retransmit the received information to another party.

Step 9   Enter a Retention Expiration value in minutes. This determines how long the received information is stored by the client before it is overwritten. Default value is 24 hours (1440 minutes).

Step 10   Click **Save**.

Adding Outdoor Areas

Follow these steps to add an outdoor area to a campus map.

> **Note**   You can add outdoor areas to a campus map in the Cisco WCS database regardless of whether you have added outdoor area maps to the database.

Step 1   If you want to add a map of the outdoor area to the database, save the map in .PNG, .JPG, .JPEG, or .GIF format. Then browse to and import the map from anywhere in your file system.

> **Note**   You do not need a map to add an outdoor area. You can simply define the dimensions of the area to add it to the database. The map can be any size because WCS automatically resizes the map to fit the workspace.

Step 2   Choose **Monitor > Maps** to display the Maps page.

Step 3   Click the desired campus. WCS displays the Maps > *Campus Name* page.

Step 4   From the Select a command drop-down list, choose **New Outdoor Area**, and click **Go** (see Figure 5-12).

Figure 5-12   Create New Area Page

Step 5 On the *Campus Name* > New Outdoor Area page, follow these steps to create a manageable outdoor area:

a. Name—Enter the outdoor area name.

b. Contact—Enter the outdoor area contact name.

c. Area Type (RF Model)—Cubes and Walled Offices, Drywall Office Only, Outdoor Open Space (default).

d. AP Height (feet)—Enter the height of the access point.

e. Image File—Name of the file containing the outdoor area map. Use the browse button to find the file.

Step 6 Click **Next**.

Step 7 Enter the following information:

- Name—The user-defined name of the outdoor area.

- Contact—The user-defined contact name.

- Zoom—Use to zoom in or zoom out on the map that you are currently viewing.

- Maintain Image Aspect Ratio—Select this check box to maintain the aspect ratio (ratio of horizontal and vertical pixels) of the map image. Maintaining the aspect ratio prevents visual distortion of the map.

- Horizontal Position—Distance from the corner of the outdoor area rectangle to the left edge of the campus map, in feet or meters.

- Vertical Position—Distance from the corner of the outdoor area rectangle to the top edge of the campus map, in feet or meters.

- Horizontal Span—Horizontal measurement (left to right) of the outdoor area rectangle, in feet or meters.

- Vertical Span—Vertical measurement (up and down) of the outdoor area rectangle, in feet or meters.

Tip The horizontal and vertical spans should be larger than or the same size as any floors that may be added later. Use **Ctrl-click** to resize the bounding area in the upper-left corner of the campus map. The horizontal and vertical span parameters change to match.

Note   To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

Step 8   Click **Place** to put the outdoor area on the campus map. WCS creates an outdoor area rectangle scaled to the size of the campus map.

Step 9   Click and drag the outdoor area rectangle to the desired position on the campus map.

Step 10   Click **Save** to save this outdoor area and its campus location to the database.

Note   A hyperlink associated with the outdoor area takes you to the corresponding Map page.

Step 11   (Optional) To assign location presence information for the new outdoor area, select Edit Location Presence Info, and click Go. See Managing Location Presence Information for more information.

Note   By default, the Override Child Element's Presence Info check box is selected. There is no need to alter this setting for outdoor areas.

Deleting Outdoor Areas

To delete a current outdoor area, follow these steps:

Step 1   In the Monitor > Maps page, select the check box for the outdoor area that you want to delete.

Step 2   Click **Delete** at the bottom of the map list (or choose **Delete Maps** from the Select a Command drop-down list, and click **Go**.

Step 3   Click **OK** to confirm the deletion.

Searching Maps

Use the controls in the left sidebar to create and save custom searches:

- New Search drop-down list: Opens the Search Maps page. Use the Search Maps page to configure, run, and save searches.
- Saved Searches drop-down list: Lists the saved custom searches. To open a saved search, choose it from the Saved Searches list.
- Edit Link: Opens the Edit Saved Searches page. You can delete saved searches in the Edit Saved Searches page.
- Audit Status: Allows you to search based on audit status of not available (audit status is not available), identical (no configuration differences were found during the last audit), or mismatch (configuration differences were found during the last audit).

You can configure the following parameters in the Search Maps page:

- Search for
- Map Name
- Search in
- Save Search
- Items per page

After you click **Go**, the map search results page appears:

Table 5-2   Map Search Results

Parameter	Options
Name	Clicking an item in the Name list gives a map of an existing building with individual floor area maps for each floor.
Type	Campus, building, or floor area.
WCS	WCS name.
Total APs	Displays the total number of Cisco radios detected.
a/n Radios	Displays the number of 802.11a/n Cisco radios.
b/g/n Radios	Displays the number of 802.11b/g/n Cisco radios.
OOS Radios	Displays the number of Out of Service access points associated with this controller.

Adding and Enhancing Floor Plans

This section explains how to add floor plans to either a campus building or a standalone building in the Cisco WCS database. It also provides instructions on using the WCS map editor to enhance floor plans that you have created and the WCS planning mode to calculate the number of access points required to cover an area.

Adding Floor Plans to a Campus Building

After you add a building to a campus map, you can add individual floor plan and basement maps to the building. Follow these steps to add floor plans to a campus building.

Step 1 Save your floor plan maps in .PNG, .JPG, or .GIF format.

Note The maps can be any size because WCS automatically resizes the maps to fit the workspace.

Step 2 Browse to and import the floor plan maps from anywhere in your file system. You can also import CAD image files DXF and DWG.

> ✎ **Note**   If there are problems converting the auto-cad file, an error message is displayed. WCS uses a native image conversion library to convert auto-cad files into raster formats like PNG. If the native library cannot be loaded, WCS returns the "unable to convert the auto-cad file" message. If you receive this error, make sure all the required dependencies are met for the native library. To find any dependency problems, use Dependency Walker on Windows platforms or ldd on Linux platforms. The following dlls must be present under the /webnms/rfdlls WCS installation directory: LIBGFL254.DLL, MFC71.DLL, MSVCR71.DLL, and MSVCP71.DLL. If dependency problems occurred, you may need to install the required libraries and restart WCS.

> ✎ **Note**   An imported auto-cad file can become blurred when you zoom. Without the zoom, the clarity is about the same as the original auto-cad file. Make sure all relevant sections are clearly visible in the original auto-cad file (DWG/DXF) and then import the auto-cad file into PNG/GIF format rather than JPEG or JPG.

Step 3   Choose **Monitor > Maps** to display the Maps page (see Figure 5-13).

Figure 5-13   Monitor > Maps Page

Step 4   From the Maps Tree View or the Monitor > Maps list, click the desired campus. WCS displays the Maps > *Campus Name* page.

Step 5   Hover your cursor over the name within an existing building rectangle to highlight it.

> ✎ **Note**   When you highlight the name within a building rectangle, the building description appears in the sidebar.

> ✎ **Note**   You can also access the building from the Campus View page. In the Campus View page, click the building name to open the Building View page.

Step 6   From the Select a command drop-down list, choose **New Floor Area**, and click **Go** (see Figure 5-14).

Figure 5-14   *New Floor Area Page*

Step 7   On the *Building Name* > New Floor Area page, follow these steps to add floors to a building in which to organize related floor plan maps:

a.   Enter the floor or basement name.

b.   Enter the floor or basement contact name.

c.   Choose the floor or basement number.

d.   Choose the floor or basement type (RF Model).

e.   Enter the floor-to-floor height in feet.

> **Note**   To change the unit of measurement (feet or meters), select *Monitor* > *Maps* and select **Properties** from the Select a command drop-down list.

f.   Select the **Image** or **CAD File** check box; then browse to and choose the desired floor or basement image or CAD filename and click **Open**.

> **Note**   If you are importing a CAD file, use the **Convert CAD File** drop-down list to determine the image file for conversion.

> **Tip**   A JPEG (JPG) format is not recommended for an auto-cad conversion. Unless a JPEG is specifically required, use a PNG or GIF format for higher quality images.

g.   Click **Next**. At this point, if a CAD file was specified, a default image preview is generated and loaded.

> **Note**   WCS uses a native image conversion library to convert auto-cad files into raster formats like .PNG. When there are issues loading the native library, WCS throws the following error: "Unable to convert the auto-cad file. Reason: Error while loading the auto-cad image conversion library.
>
> If this error displays, make sure all the required dependencies are met for the native library.
>
> On Windows platform, you can use tools such as "Dependency Walker" to find out dependency issues.

Make sure that the following dlls are present under \webnms\rfdlls directory under your WCS installation directory:

\webnms\rfdlls\LIBGFL254.DLL
\webnms\rfdlls\MFC71.DLL
\webnms\rfdlls\MSVCR71.DLL
\webnms\rfdlls\MSVCP71.DLL

On Linux platform, you can use tools such as "ldd" to find out any dependency issues.

If there are any dependency issues, fix them by installing the required libraries for missing dependencies and then restart WCS.

The names of the CAD file layers are listed, with check boxes to the right side of the image indicating which are enabled.

> **Note**   When you choose the floor or basement image filename, WCS displays the image in the building-sized grid.

> **Note**   The maps can be any size because WCS automatically resizes the maps to fit the workspace.

> **Note**   The maps must be saved in .PNG, .JPG, .JPEG, or .GIF format.

h. If you have CAD file layers, you can select or deselect as many as you want and click **Preview** to view an updated image. Click **Next** when you are ready to proceed with the selected layers.

i. Enter the remaining parameters for the floor area (see Figure 5-15).

Figure 5-15   Floor Area Parameters

j. Either leave the **Maintain Aspect Ratio** check box selected to preserve the original image aspect ratio or unselect the check box to change the image aspect ratio.

k. Enter an approximate floor or basement horizontal span and vertical span (width and depth on the map) in feet.

✎ **Note**   To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

✎ **Note**   The horizontal and vertical span should be smaller than or the same size as the building horizontal span and vertical span in the Cisco WCS database.

l. If desired, click **Place** to locate the floor or basement image on the building grid.

🔍 **Tip**   You can use Ctrl-click to resize the image within the building-sized grid.

m. Click **OK** to save this floor plan to the database. WCS displays the floor plan image on the Maps > *Campus Name > Building Name* page.

> **Note**   Use different floor names in each building. If you are adding more than one building to the campus map, do not use a floor name that exists in another building. This overlap causes incorrect mapping information between a floor and a building.

Step 8   Click any of the floor or basement images to view the floor plan or basement map.

> **Note**   You can zoom in and out to view the map at different sizes, and you can add access points. See the "Inspecting VoWLAN Location Readiness" section on page 5-44 for instructions.

Adding Floor Plans to a Standalone Building

After you have added a standalone building to the Cisco WCS database, you can add individual floor plan maps to the building. Follow these steps to add floor plans to a standalone building.

Step 1   Save your floor plan maps in .PNG, .JPG, or .GIF format.

> **Note**   The maps can be any size because WCS automatically resizes the maps to fit the workspace.

Step 2   Browse to and import the floor plan maps from anywhere in your file system. You can import CAD files in DXF or DWG formats or any of the formats you created in Step 1.

> **Note**   If there are problems converting the auto-cad file, an error message is displayed. WCS uses a native image conversion library to convert auto-cad files into raster formats link PNG. If the native library cannot be loaded, WCS returns the "unable to convert the auto-cad file" message. If you receive this error, make sure all the required dependencies are met for the native library. To find any dependency problems, use Dependency Walker on Windows platforms or ldd on Linux platforms. The following dlls must be present under the /webnms/rfdlls WCS installation directory: LIBGFL254.DLL, MFC71.DLL, MSVCR71.DLL, and MSVCP71.DLL. If dependency problems occurred, you may need to install the required libraries and restart WCS.

> **Note**   An imported auto-cad file can become blurred when you zoom. Without the zoom, the clarity is about the same as the original auto-cad file. Make sure all relevant sections are clearly visible in the original auto-cad file (DWG/DXF) and then import the auto-cad file into PNG/GIF format rather than JPEG or JPG.

Step 3   Choose **Monitor > Maps** to display the Maps page.

Step 4   From the Maps Tree View or the Monitor > Maps list, click the desired building. WCS displays the Maps > *Building Name* page.

Step 5   From the Select a command drop-down list, choose **New Floor Area**, and click **Go**.

Step 6 On the *Building Name* > New Floor Area page, follow these steps to add floors to a building in which to organize related floor plan maps:

    a. Enter the floor or basement name.

    b. Enter the floor or basement contact name.

    c. Choose the floor or basement number.

    d. Choose the floor or basement type.

    e. Enter the floor-to-floor height in feet.

> **Note** To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

    f. Select the Image File check box; then browse to and choose the desired floor or basement image filename and click **Open**.

    g. Click **Next**.

> **Note** When you choose the floor or basement image filename, WCS displays the image in the building-sized grid.

    h. If you imported a CAD file, you are directed to the image conversion page.

> **Note** The length of time for the conversion varies and depends on the file size, file detail, and number of layers in the file.

    i. Either leave the **Maintain Aspect Ratio** check box selected to preserve the original image aspect ratio or unselect the check box to change the image aspect ratio.

    j. Enter an approximate floor or basement horizontal span and vertical span (width and depth on the map) in feet.

> **Note** To change the unit of measurement (feet or meters), select *Monitor > Maps* and select **Properties** from the Select a command drop-down list.

> **Note** The horizontal and vertical span should be smaller than or the same size as the building horizontal span and vertical span in the Cisco WCS database.

    k. If desired, click **Place** to locate the floor or basement image on the building grid.

> **Tip** You can use Ctrl-click to resize the image within the building-sized grid.

    l. Click **OK** to save this floor plan to the database. WCS displays the floor plan image on the **Maps > Building Name** page.

Step 7 Click any of the floor or basement images to view the floor plan or basement map.

✎

Note   You can zoom in and out to view the map at different sizes, and you can add access points. See the "Inspecting VoWLAN Location Readiness" section on page 5-44 for instructions.

Using the Map Editor

You can use the WCS map editor to define, draw, and enhance floor plan information. The map editor enables you to create obstacles to consider when you computer RF prediction heat maps for access points. You can also add coverage areas for MSEs that locate clients and tags in that particular area. Follow these general guidelines to use the map editor.

Map Editor Functions

With the map editor, you can perform the following functions:

- Save—Saves the current map image.
- Recompute prediction—Updates the RF prediction heatmap if any changes are made to the existing floor map image.
- Reload Last Saved—Loads the last saved map image.
- Select all—Selects all the obstacles and coverage areas that you have created.
- Unselect—Deselects the obstacles and coverage areas that are selected.
- Move selected Obstacles—Moves the selected obstacles to a different location on the map.
- Duplicate selected Obstacles—Creates a copy of the selected obstacles.
- Zoom in/Zoom out— Zoom in or out on the image you are currently viewing.
- Show floor image—Use this to display the floor image.
- Show obstacles—Use this to display the obstacles.
- Larger resolution/Medium resolution/Smaller resolution—Increase or decrease the resolution of the floor map image.
- SNAP Mode—Use this to snap an obstacle to its nearest obstacle while drawing.
- ORTHO Mode—Use to draw a horizontal or vertical obstacle. This is especially useful when you want to draw all the obstacles at right angles.

General Notes and Guidelines for Using the Map Editor

Consider the following when modifying a building or floor map using the map editor.

- Cisco recommends that you use the map editor to draw walls and other obstacles rather than importing an .FPE file from the legacy floor plan editor.
  - If necessary, you can still import .FPE files. To do so, navigate to the desired floor area, choose **Edit Floor Area** from the Select a command drop-down list, click **Go**, select the **FPE File** check box, and browse to and choose the .FPE file.
- You can add any number of walls to a floor plan with the map editor; however, the processing power and memory of a client workstation may limit the refresh and rendering aspects of WCS.

- – Cisco recommends a practical limit of 400 walls per floor for machines with 1-GB RAM or less.
- All walls are used by WCS when generating RF coverage heatmaps.
  - – However, the MSEs use no more than 50 heavy walls in its calculations, and the MSE does not use light walls in its calculations because those attenuations are already accounted for during the calibration process.
- If you have a high resolution image (near 12 megapixels), you may need to scale down the image resolution with an image editing software prior to using map editor.

Follow these steps to use the map editor.

Step 1 Choose **Monitor > Maps** to display the Maps page.

Step 2 Click the desired campus. WCS displays the **Maps > Campus Name** page.

Step 3 Click a campus building.

Step 4 Click the desired floor area. WCS displays the **Maps > Campus Name > Building Name > Floor Area Name** page.

Step 5 From the Select a command drop-down list, choose **Map Editor**, and click **Go**. WCS displays the Map Editor page.

Step 6 Make sure that the floor plan images are properly scaled so that all white space outside of the external walls is removed. To make sure that floor dimensions are accurate, choose the compass tool from the toolbar.

Step 7 Position the reference length. When you do, the Scale menu appears with the line length supplied. Enter the dimensions (width and height) of the reference length and click **OK**.

Step 8 Determine the propogation pattern at the Antenna Mode drop-down list.

Step 9 Make antenna adjustments by sliding the antenna orientation bar to the desired degree of direction.

Step 10 Choose the desired access point.

Step 11 Click **Save**.

Using the Map Editor to Draw Polygon Areas

If you have a building that is non-rectangular or you want to mark a non-rectangular area within a floor, you can use the map editor to draw a polygon-shaped area.

Step 1 Add the floor plan if it is not already represented in WCS (refer to the "Adding and Enhancing Floor Plans" section on page 5-22).

Step 2 Choose **Monitor > Maps**.

Step 3 Click the Map Name that corresponds to the outdoor area, campus, building, or floor you want to edit.

Step 4 From the Select a command drop-down list, choose **Map Editor**, and click **Go**.

Step 5 In the Map Editor page, click the **Add Perimeter** icon on the tool bar (see Figure 5-16).

A dialog box appears.

**Note** An example of a polygon-shaped area is seen in Figure 5-16.

Figure 5-16   Map Editor Page
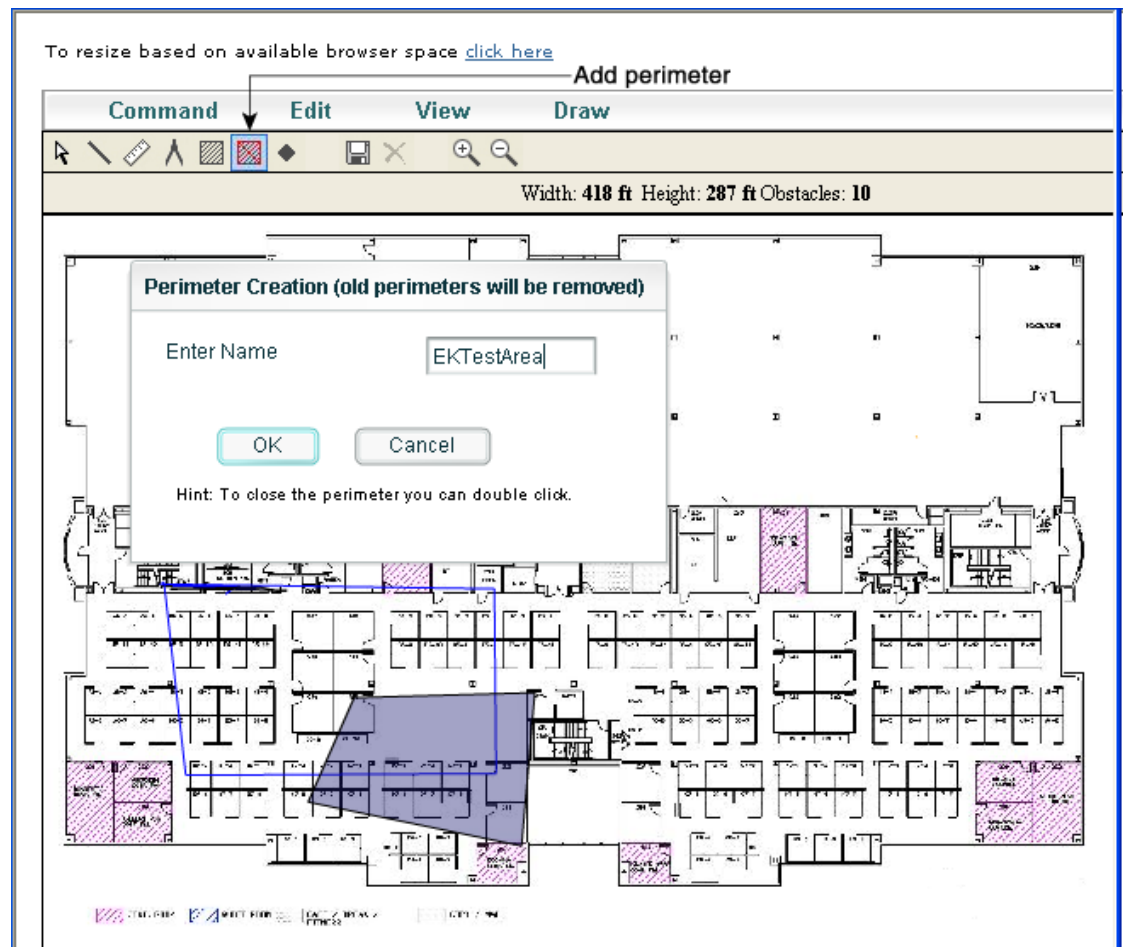
Step 6   Enter the name of the area that you are defining. Click **OK**.

A drawing tool appears.

Step 7   Move the drawing tool to the area you want to outline.

- Click the left mouse button to begin and end drawing a line.

- When you have completely outlined the area, double-click the left mouse button and the area is highlighted on the screen (see Figure 5-17).

- The outlined area must be a closed object to highlight on the map.

Figure 5-17   Polygon Area
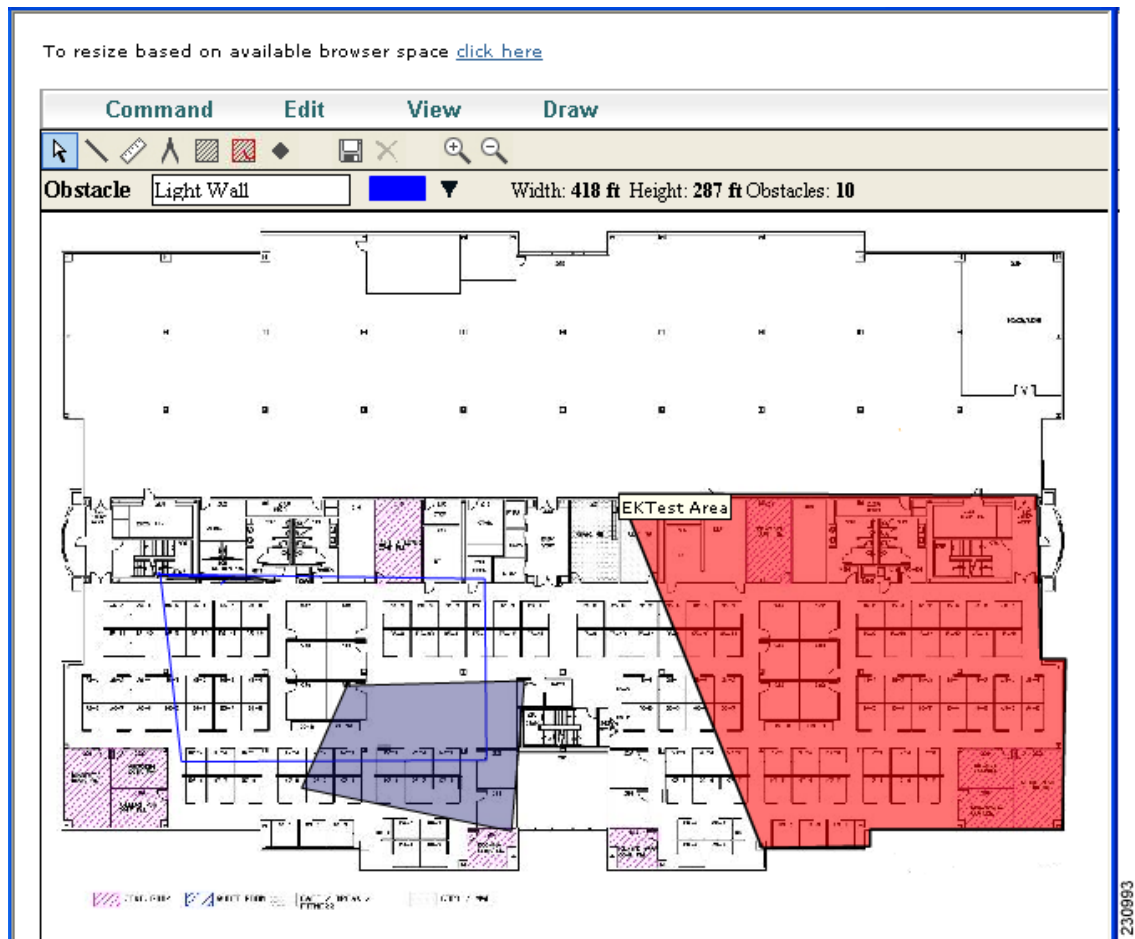
Step 8   Click the disk icon on the toolbar to save the newly drawn area.

Step 9   Choose **Command > Exit** to close the page. You are returned to the original floor plan.

✎
Note   When you return to the original floor plan view, after exiting the map editor, the newly drawn area is not seen; however, it appears in the Planning Model page when you add elements.

Step 10   Select **Planning Mode** from the Select a command drop-down list to begin adding elements to the newly defined polygon-shaped area.

Table 5-3 explains the color coding of obstacles.

Table 5-3   Obstacle Color Coding

Type of Obstacle	Color Coding	Loss (in dB)
Thick wall	🟧	13
Light wall	🟦	2

Table 5-3   Obstacle Color Coding (continued)

Type of Obstacle	Color Coding	Loss (in dB)
Heavy door		15
Light door		4
Cubicle		1
Glass		1.5

Note   The RF prediction heatmaps for access points approximates of the actual RF signal intensity. It takes into account the attenuation of obstacles drawn using the Map Editor but it does not take into account the attenuation of various building materials, such as drywall or metal objects, nor does it display the effects of RF signals bouncing off obstructions. The thick wall (color-coded orange) with a loss of 13 dB may not be enough to contain the RF signal beyond the walls of the heatmap.

Filtering Access Point Heatmap Floor Settings

If you enable the Access Point Heatmap floor setting and click the blue arrow to the right of the Floor Settings, the Contributing APs page opens with heatmap filtering options (Figure 5-18).

Figure 5-18   Access Point Heatmaps Filter
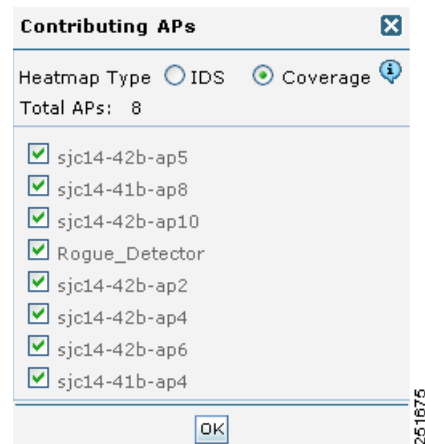
Access point heatmap filtering options include:

- Heatmap Type—Select IDS, Coverage, or Air Quality. If you choose Air Quality, you can further filter the heat map type for access points with average air quality or minimum air quality. Select the appropriate radio button.

> **Note** If you have monitor mode access points on the floor plan, you have a choice between IDS or coverage heatmap types. A coverage heatmap excludes monitor mode access points.

> **Note** Heatmap filtering type ("IDS" versus "Coverage") will not be available unless an IDS (monitor) AP is on the map.

- Total APs—Displays the number of access points positioned on the map.
- Select the access point check box(es) to determine which heatmaps display on the image map.

Click **OK** when all applicable filtering criteria are selected.

Understanding RF Heatmap Calculation

The RF heatmap calculation is based on an internal grid. Depending on the exact positioning of an obstacle in that grid, the RF heatmap, within a few or meters of the obstacle, may or may not account for the obstacle attenuation.

In detail, grid squares partially affected by an obstacle crossing the grid square may or may not incorporate the obstacle attenuation according to the geometry of the access point, obstacle, and grid.

For example, consider a wall crossing one grid square. In example Figure 5-19, the midpoint of the grid square is behind the wall from the access point, so the whole grid square is colored with attenuation, including the top left corner that is actually in front of the wall. Figure 5-21 displays how the attenuation would ideally appear in this situation.

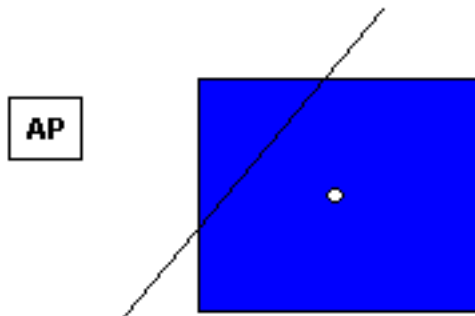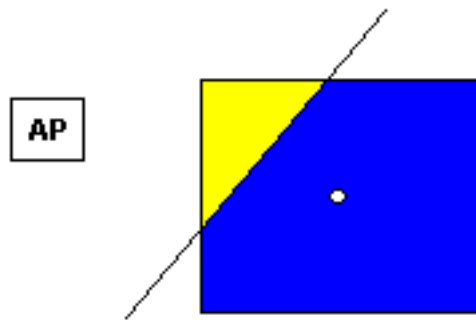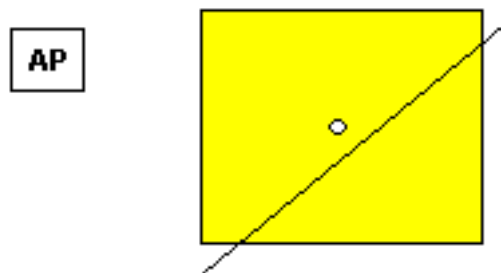*Figure 5-19   Access Point/Grid Example One (Actual Attenuation)*

Figure 5-20   Access Point/Grid Example One (Ideal Attenuation)

Conversely, in example Figure 5-21, the midpoint of the grid square is on the same side of the wall as the access point, so the whole grid square is not colored with attenuation, including the bottom right corner that is actually behind the wall from the access point. Figure 5-22 displays how the attenuation would ideally appear in this situation.

Figure 5-21   Access Point/Grid Example Two (Actual Attenuation)

Figure 5-22   Access Point/Grid Example Two (Ideal Attenuation)
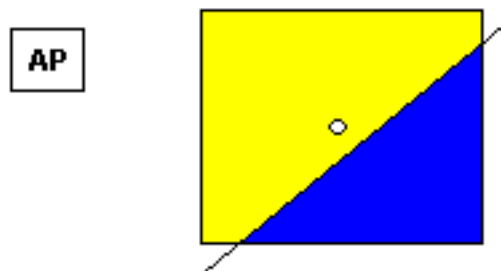
Filtering AP Mesh Info Floor Settings

Note   The AP Mesh Info option displays only when bridging access points are added to the floor.

When this option is selected, Cisco WCS initiates a contact with the controllers and displays information about bridging access points. The following information is displayed:

–   Link between the child and the parent access point.

–   An arrow that indicates the direction from child to parent access point.

–   A color coded link that indicates the signal-to-noise ratio (SNR). A green link represents a high SNR (above 25 dB), an amber represents an acceptable SNR (20-25 dB), and a red link represents a very low SNR (below 20 dB).

If you enable the AP Mesh Info floor setting and click the blue arrow to the right of the floor settings, the Mesh Parent-Child Hierarchical View page opens with mesh filtering options.

You can update the map view by choosing the access points you want to see on the map. From the Quick Selections drop-down list, choose to select only root access point, various hops between the first and the fourth, or select all access points.

Note   For a child access point to be visible, its parent must also be selected.

Click **OK** when all applicable filtering criteria are selected.

Planning Mode

You can calculate the recommended number and location of access points based on whether data and/or voice traffic and/or location are active.

Note   Based on the throughput specified for each protocol (802.11a or 802.11 b/g), planning mode calculates the total number of access points required that would provide optimum coverage in your network.

- Accessing Planning Mode
- Using Planning Mode to Calculate Access Point Requirements
- Inspecting VoWLAN Location Readiness

Accessing Planning Mode

To access the Planning Mode feature, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Select the desired campus or building from the Name list.

Step 3   Click the desired floor area in the Building.

Step 4   From the Select a command drop-down list, click **Planning Mode**.

Step 5   Click **Go**.

✎

Note   Planning mode does not use AP type or Antenna pattern information for calculating the number of access points required. The calculation is based on the access point coverage area or the number of users per access point.

Planning Mode options:

- Add APs—Enables you to add access points on a map. See the "Adding Access Points" section on page 5-45 for details.

- Delete APs—Deletes the selected access points.

- Map Editor—Opens the Map Editor page. See the "Using the Map Editor" section on page 5-29 for details.

- Synchronize with Deployment—Synchronizes your planning mode access points with the current deployment scenario.

- Generate Proposal—View a planning summary of the current access points deployment.

- Planned AP Association Tool—Allows you to perform add, delete or import an AP Association from an excel or CSV file. Once an access point is defined, it can be associated to a base radio MAC address using the Planned AP Association Tool. If the AP is not discovered they get pushed into a standby bucket and get associated when discovered.

✎

Note   AP association is subjected to a limitation that AP should not belong to any floor or outdoor area. If the AP is already assigned to a floor or outdoor area, then the standby bucket will hold the AP and when removed from the floor or outdoor, get positioned to the given floor. One Mac address cannot be put into bucket for multiple floor or outdoor areas.

✎

Note   The map synchronizations works only if the AP is associated to a base radio MAC address and not to its ethernet MAC address.

Using Planning Mode to Calculate Access Point Requirements

The WCS planning mode enables you to calculate the number of access points required to cover an area by placing fictitious access points on a map and allowing you to view the coverage area. Based on the throughput specified for each protocol (802.11a/n or 802.11b/g/n), planning mode calculates the total number of access points required to provide optimum coverage in your network. You can calculate the recommended number and location of access points based on the following criteria:

- traffic type active on the network: data or voice traffic or both

- location accuracy requirements

- number of active users

- number of users per square footage

To calculate the recommended number and placement of access points for a given deployment, follow these steps:

Step 1   Choose **Monitor > Maps**.

The page appears (see Figure 5-23).

Figure 5-23   Monitor > Maps Page

Step 2   **Click** the appropriate location link from the list that appears.

A color-coded map appears showing placement of all installed elements (access points, clients, tags) and their relative signal strength (see Figure 5-24).

Figure 5-24 **Selected Floor Area Showing Current Access Point Assignments**
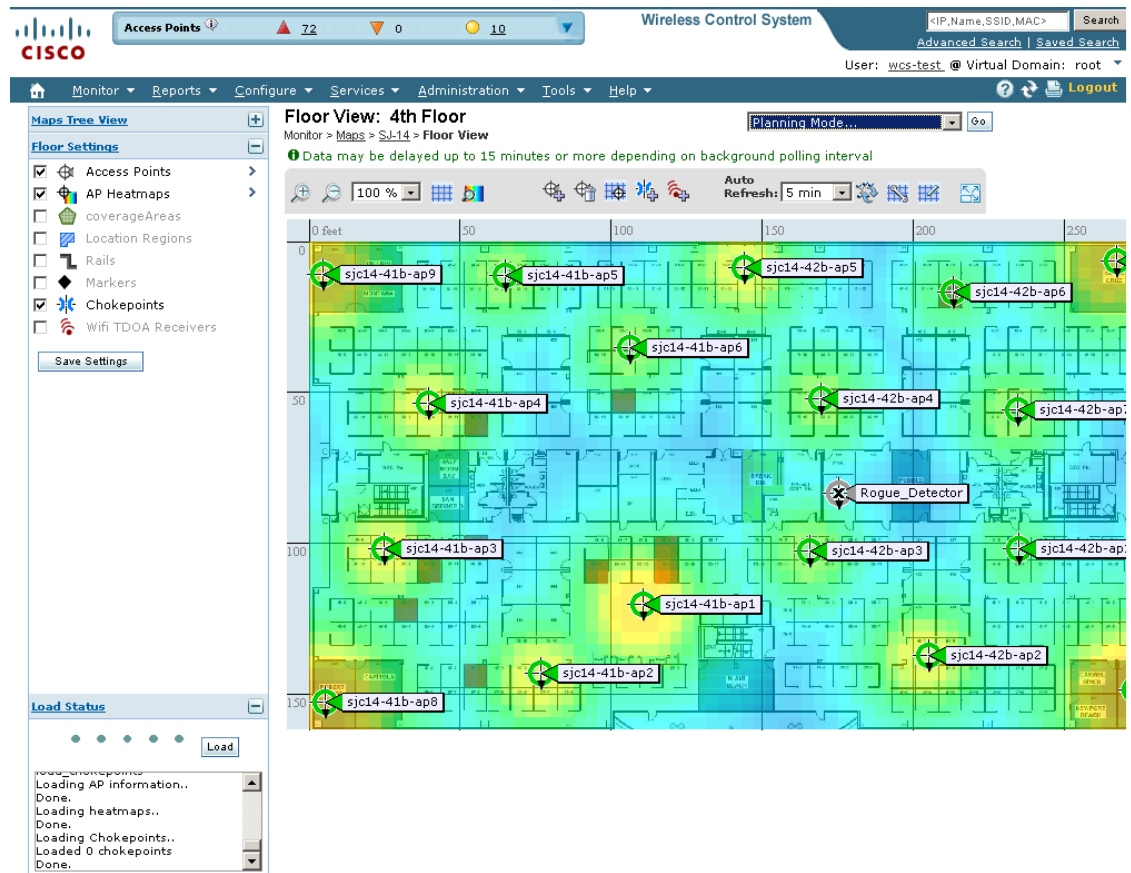
Step 3   Choose **Planning Mode** from the Select a command drop-down list, and click **Go**. A blank floor map appears.

Step 4   Click **Add APs**.

Step 5   In the page that appears, drag the dashed-line rectangle over the map location for which you want to calculate the recommended access points (see Figure 5-25).

Note   Adjust the size or placement of the rectangle by selecting the edge of the rectangle and holding down the **Ctrl** key. Move the mouse as necessary to outline the targeted location.

Figure 5-25   Add APs Page

Step 6 Select **Automatic** from the Add APs drop-down list.

Step 7 Select the **AP Type** and the appropriate antenna and protocol for that access point.

Step 8 Select the target throughput for the access point.

Step 9 Select the box(es) next to the **service(s)** that will be used on the floor. Options are Data/Coverage (default), Voice, Location, and Location with Monitor Mode APs. (see Table 5-5).

> **Note** You must select at least one service or an error occurs.

> **Note** If you select the **Advanced Options** box, two additional access point planning options appear: Demand and Override Coverage per AP. Additionally, a Safety Margin parameter appears for the Data/Coverage and Voice safety margin options (see Table 5-3).

Table 5-4   *Definition of Services Option*

Service Options	Description			
Data/Coverage	Select if data traffic is transmitted on the wireless LAN. The following densities are used depending on the band and data rates:			
	Band	**Path Loss Model (dBm)**	**Date Rate (Mb/s)**	**Area (Sq. ft.)**
	802.11a	–3.3	10-12	6000
	802.11a	–3.3	15-18	4500
	802.11a	–3.5	10-12	5000
	802.11a	–3.5	15-18	3250
	802.11bg	–3.3	5	6500
	802.11bg	–3.3	6	4500
	802.11bg	–3.5	5	5500
	802.11bg	–3.5	6	3500
	If you enable **Advanced Options** (select check box), you can select the desired safety margin (aggressive, safe, or very safe) of the signal strength threshold for data. • Aggressive = Minimum (–3 dBm) • Safe = Medium (0 dBm) • Very Safe = Maximum (+3 dBm)			
Voice	Select if voice traffic is transmitted on the wireless LAN. If you enable **Advanced Options** (select check box), you can select the desired safety margin (aggressive, safe, very safe or 7920-enabled) of the signal strength threshold for voice. • Aggressive = Minimum [–78 dBm (802.11a/b/g)] • Safe = Medium [–75 dBm (802.11a/b/g)] • Very Safe = Maximum [(–72 dBm (802.11a/b/g)] • 7920_enabled = [(–72 dBm (802.11a); –67 dBm (802.11b/g)]			
Location	Select to ensure that the recommended access point calculation provides the true location of an element within 10 meters at least 90% of the time. To meet the criteria, access points are collocated within 70 feet of each other in a hexagonal pattern employing staggered and perimeter placement. **Note** Each service option includes all services that are listed above it. For example, if you select the Location box, the calculation considers data/coverage, voice, and location in determining the optimum number of access points required.			

Table 5-5   Definition of Advanced Services

Service Options	Description		
Data/Coverage	Select if data traffic is transmitted on the wireless LAN. The following densities are used depending on the band and data rates:		
	Band	**Path Loss Model (dBm)**	**Date Rate (Mb/s)**	**Area (Sq. ft.)**

Band	Path Loss Model (dBm)	Date Rate (Mb/s)	Area (Sq. ft.)
802.11a	–3.3	10-12	6000
802.11a	–3.3	15-18	4500
802.11a	–3.5	10-12	5000
802.11a	–3.5	15-18	3250
802.11bg	–3.3	5	6500
802.11bg	–3.3	6	4500
802.11bg	–3.5	5	5500
802.11bg	–3.5	6	3500

| Service Options	Description
	If you enable **Advanced Options** (click check box), you can select the desired safety margin (aggressive, safe, or very safe) of the signal strength threshold for data. • Aggressive = Minimum (–3 dBm) • Safe = Medium (0 dBm) • Very Safe = Maximum (+3 dBm)
Voice	Select if voice traffic is transmitted on the wireless LAN. If you enable **Advanced Options** (click check box), you can select the desired safety margin (aggressive, safe, very safe or 7920-enabled) of the signal strength threshold for voice. • Aggressive = Minimum [–78 dBm (802.11a/b/g)] • Safe = Medium [–75 dBm (802.11a/b/g)] • Very Safe = Maximum [(–72 dBm (802.11a/b/g)] 7920_enabled = [(–72 dBm (802.11a); –67 dBm (802.11b/g)]
Location	Select to ensure that the recommended access point calculation provides the true location of an element within 10 meters at least 90% of the time. To meet the criteria, access points are collocated within 70 feet of each other in a hexagonal pattern employing staggered and perimeter placement. **Note** Each service option includes all services that are listed above it. For example, if you select the Location box, the calculation considers data/coverage, voice, and location in determining the optimum number of access points required.
Demand	Select if you want to use the total number of users or user ratio per access point as a basis for the access point calculation.

Table 5-5   Definition of Advanced Services (continued)

Service Options	Description
Override Coverage per AP	Select if you want to specify square foot coverage as the basis for access point coverage.
Safety Margin	Select option to qualify relative signal strength requirements for data and voice service in the access point calculation. Options are: Aggressive, Safe, Very Safe, and 7920-enabled (voice only). Select **Aggressive** to require minimal signal strength requirements in the calculation and **Very Safe** to request the highest signal strength.

Step 10   Click **Calculate**.

The recommended number of access points given the selected services appears (see Figure 5-26).

Figure 5-26   Recommended Number of Access Points Given Selected Services and Parameters
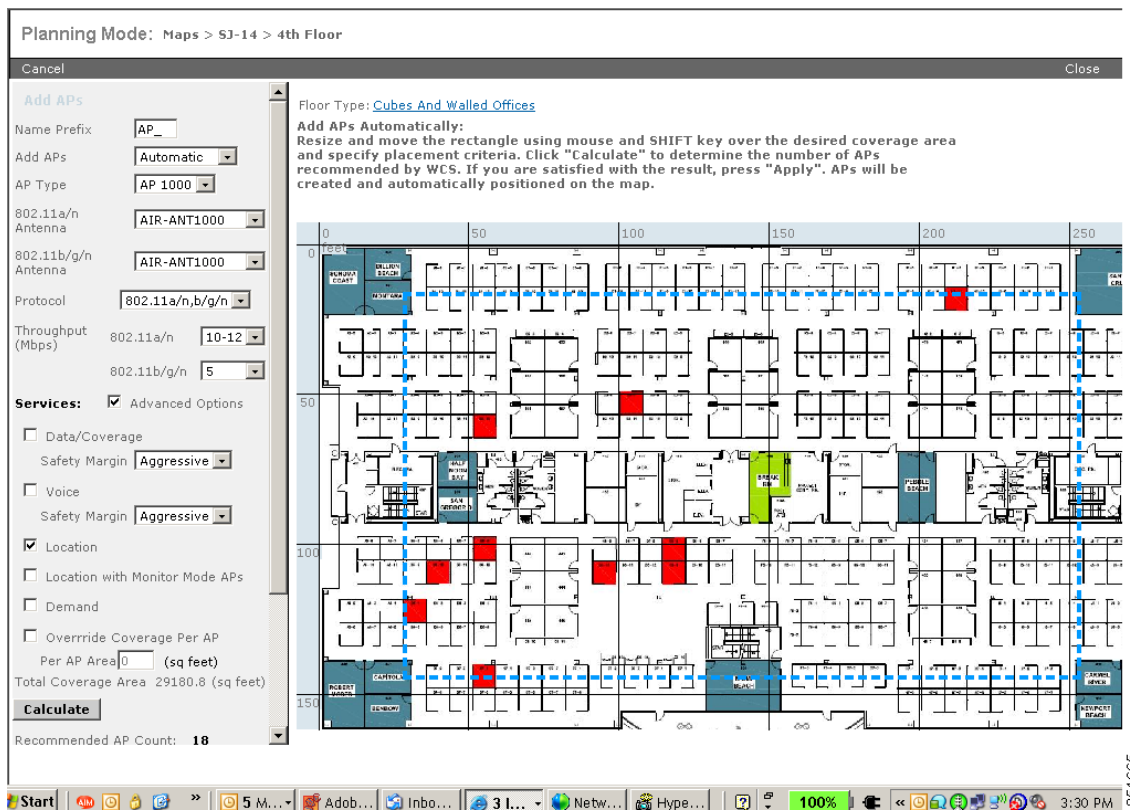

✎ **Note**   Recommended calculations assume the need for consistently strong signals unless adjusted downward by the **safety margin** advanced option. In some cases, the recommended number of access points is higher than what is required.

✎ **Note**   Walls are not used or accounted for in planning mode calculations.

Step 11 Click **Apply** to generate a map that shows proposed deployment of the recommended access points in the selected area based on the selected services and parameters (see Figure 5-27).

Figure 5-27   *Recommended Access Point Deployment Given Selected Services and Parameters*
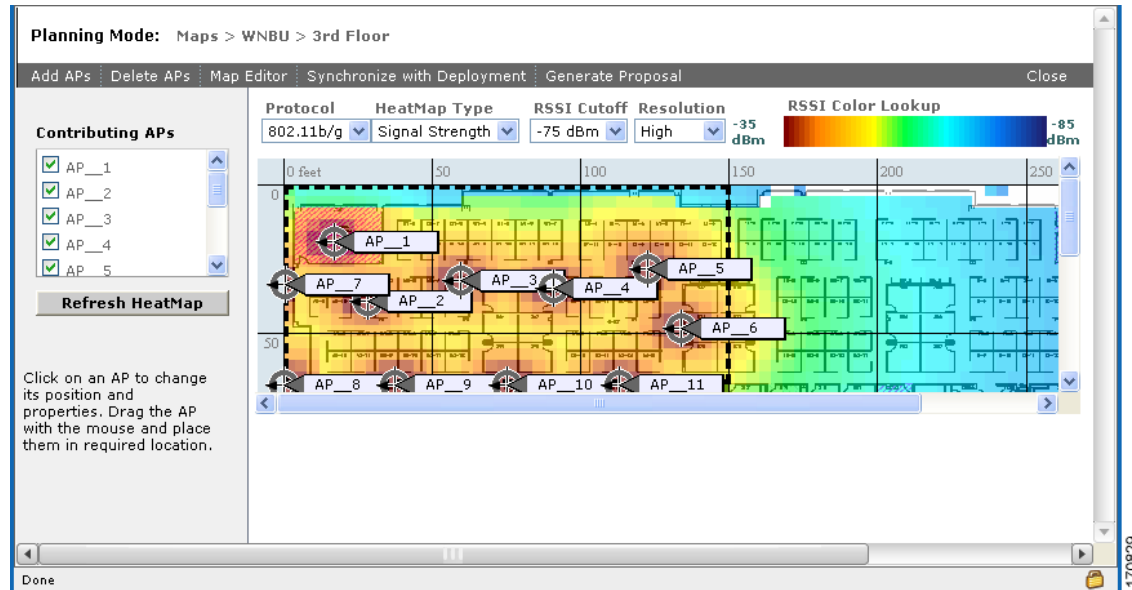
Step 12 Choose **Generate Proposal** to display a textual and graphical report of the recommended access point number and deployment based on the given input.

Inspecting VoWLAN Location Readiness

The Inspect Location Readiness feature is a distance-based predictive tool that can point out problem areas with access point placement. Voice readiness tool (the VoWLAN Readiness tool) allows you to verify that the RF coverage is sufficient for your voice needs. This tool verifies RSSI levels after access points have been installed.

The Inspect Location Readiness tool:

- Displays areas that have the required access point coverage and will provide accurate location results.
- Takes into consideration the placement of each access point along with the inter-access point spacing.
- Assumes that access points and controllers are known to WCS.

A point is defined as "location-ready" if the following is true:

- At least four access points are deployed on the floor.
- At least three access points are within 70 feet of the point-in-question.
- At least one access point is found to be resident in each quadrant surrounding the point-in-question.

To access the Inspect Location Readiness tool, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Choose the applicable floor area name.

Step 3   From the Select a command drop-down list, click **Inspect VoWLAN Readiness**, and click **Go**.

Step 4   Choose the applicable **Band**, **AP Transmit Power**, and **Client** parameters from the drop-down lists.

> **Note**   By default, the region map displays the region map for the b/g/n band for Cisco phone based RSSI threshold. The new settings cannot be saved.

Step 5   Depending on the selected client, the RSSI values may not be editable.

- Cisco Phone—RSSI values are not editable.
- Custom—RSSI values are editable with the following ranges:
  - Low threshold between –95dBm to –45dBm
  - High threshold between –90dBm to –40dBm

Step 6   The following color schemes indicate whether or not the area is Voice Ready:

- Green—Yes
- Yellow—Marginal
- Red—No

Troubleshooting Voice RF Coverage Issues

Perform the following to troubleshoot voice RF coverage issues:

- Set the AP Transmit parameter to **Max** (the maximum downlink power setting). If the map still shows some yellow or red regions, more access points are required to cover the floor.
- Increase the power level of the access points if a calibrated model shows red or yellow regions (where voice is expected to be deployed) while the AP Transmit parameter is set to *Current*.
- Verify the green, yellow, and red regions of the RF environment. These indicators are accurate whether the floor is calibrated or not, but floor calibration improves the accuracy.

Adding Access Points

After you add the .PNG, .JPG, .JPEG, or .GIF format floor plan and outdoor area maps to the Cisco WCS database, you can position lightweight access point icons on the maps to show where they are installed in the buildings. Follow these steps to add access points to floor plan and outdoor area maps.

Step 1   Choose **Monitor > Maps**. The Maps page opens (see Figure 5-28).

Figure 5-28   Monitor Maps Page

Step 2   From the Maps Tree View or the Monitor > Maps list, click the applicable floor to open the Floor View page (Figure 5-29).

Figure 5-29   Floor View Page

Step 3   From the Select a command drop-down list, choose **Add Access Points**, and click **Go**.

Step 4   On the Add Access Points page, choose the access points to add to the map.

Step 5   Click **OK** to add the access points to the map and display the Position Access Points map (see Figure 5-30).

Figure 5-30   Add Access Point Page

✎

Note   The access point icons appear in the upper left area of the map. Select the check box at the top of the list to select all access points.

Step 6   When all of the applicable access points are selected, click **OK** located at the bottom of the access point list.

The Position Access Points page opens (see Figure 5-31).

Figure 5-31   Position Access Points Page

Each access point you have chosen to add to the floor map is represented by a gray circle (differentiated by access point name or MAC address) and is lined up in the upper left part of the floor map.

Step 7   Click and drag each access point to the appropriate locations. Access points turn blue when selected.

> **Note** The small black arrow at the side of each access point represents Side A of each access point, and each access point's arrow must correspond with the direction in which the access points were installed.
> Side A is clearly noted on each 1000 series access point and has no relevance to the 802.11a/n radio.
> To adjust the directional arrow, choose the appropriate orientation in the Antenna Angle drop-down list.

When selected, the access point details display on the left side of the page (see Figure 5-32). Access point details include:

- AP Model—Indicates the model type of the selected access point.
- Protocol—Select the protocol for this access point from the drop-down list.
- Antenna—Select the appropriate antenna type for this access point from the drop-down list.
- Antenna/AP Image—The antenna image reflects the antenna selected from the Antenna drop-down list. Click the arrow at the top right of the antenna image to expand the image size.
- Antenna Orientation—Depending on the antenna type, enter the Azimuth and the Elevation orientations in degrees. The Azimuth option does not appear for every antenna.

> **Note** For internal antennas, the same elevation angle applies to both radios.

The antenna angle is relative to the map's X axis. Because the origin of the X (horizontal) and Y (vertical) axes is in the upper left corner of the map, 0 degrees points side A of the access point to the right, 90 degrees points side A down, 180 degrees points side A to the left, and so on.

The antenna elevation is used to move the antenna vertically, up or down, to a maximum of 90 degrees.

> **Note** Make sure each access point is in the correct location on the map and has the correct antenna orientation. Accurate access point positioning is critical when you use the maps to find coverage holes and rogue access points.

See this location for further information about the antenna elevation and azimuth patterns:

http://www.cisco.com/en/US/products/hw/wireless/ps469/tsd_products_support_series_home.html

Figure 5-32   Selected Access Point Details
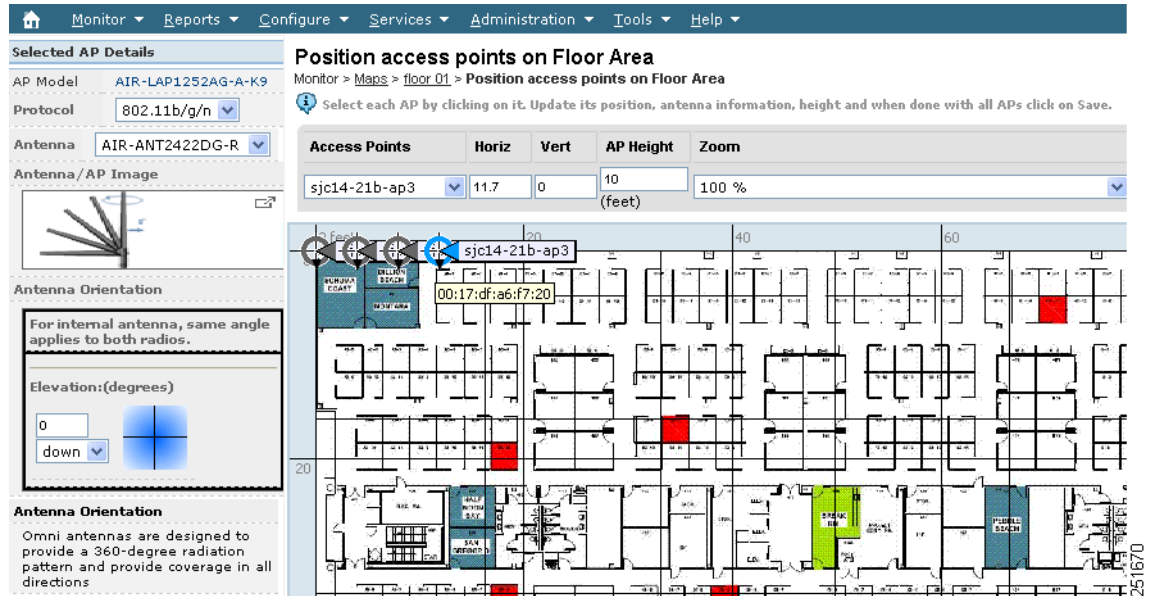
Step 8   When you are finished placing and adjusting each access point, click **Save**.

WCS computes the RF prediction for the coverage area. These RF predictions are popularly known as *heat maps* because they show the relative intensity of the RF signals on the coverage area map. Figure 5-33 shows an RF prediction heat map.

✎
Note   This display is only an approximation of the actual RF signal intensity because it does not take into account the attenuation of various building materials, such as drywall or metal objects, nor does it display the effects of RF signals bouncing off obstructions.

Figure 5-33   RF Prediction Heatmaps
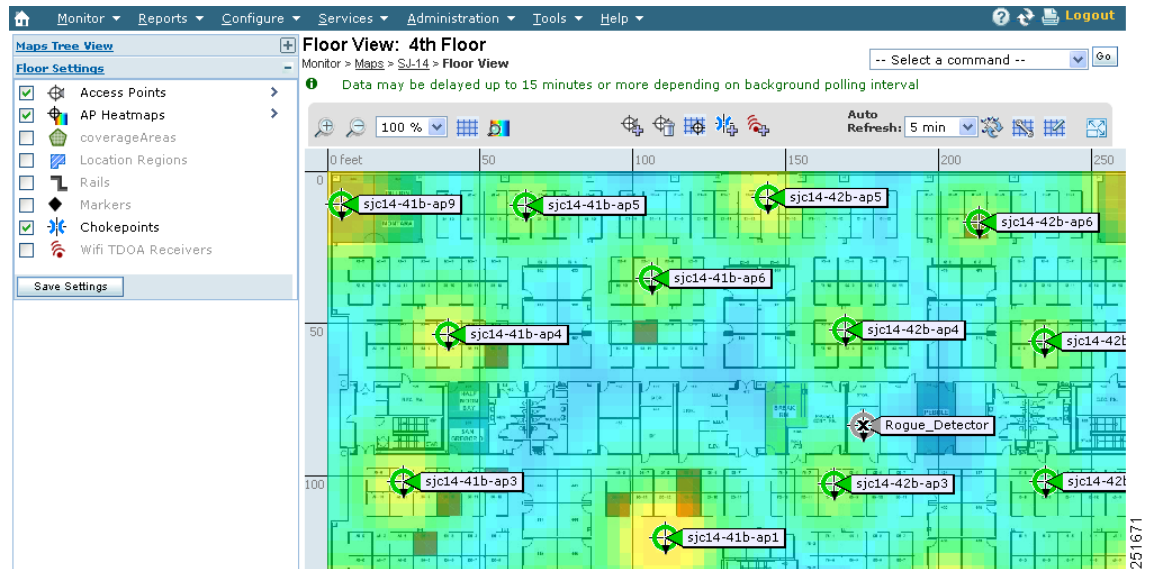
Note   See the "Placing Access Points" section on page 5-50 for more information on placing access points on a map.

Note   You can change the position of access points by importing or exporting a file. See the "Changing Access Point Positions by Importing and Exporting a File" section on page 5-80 for more information.

Placing Access Points

To determine the best location of all devices in the wireless LAN coverage areas, you need to consider the access point density and location.

Ensure that no fewer than 3 access points, and preferably 4 or 5, provide coverage to every area where device location is required. The more access points that detect a device, the better. This high level guideline translates into the following best practices, ordered by priority:

1. Most importantly, access points should surround the desired location.

2. One access point should be placed roughly every 50 to 70 linear feet (about 17 to 20 meters). This translates into one access point every 2,500 to 5000 square feet (about 230 to 450 square meters).

Note   The access point must be mounted so that it is under 20 feet high. For best performance, a mounting at 10 feet would be ideal.

Following these guidelines makes it more likely that access points will detect tracked devices. Rarely do two physical environments have the same RF characteristics. Users may need to adjust those parameters to their specific environment and requirements.

Note   Devices must be detected at signals greater than –75 dBm for the controllers to forward information to the location appliance. No fewer than three access points should be able to detect any device at signals below –75 dBm.

Note   If you have a ceiling-mounted AP with an integrated omni-directional antenna, the antenna orientation does not really need to be set in WCS. However, if you mount that same AP on the wall, you will have to set the antenna orientation to 90 degrees.

The Table 5-6 describes the orientation of the access points.

Table 5-6   Antenna Orientation of the Access Points

| Access Point	Antenna Orientation
1140 monunted on the ceiling	The Cisco Logo should be pointing to the floor. Elevation: 0 degrees.
1240 monunted on the ceiling	The Antenna should be perpendicular to the access point. Elevation: 0 degrees.
1240 mounted on the wall	The Antenna should be parallel to the access point. Elevation: 0 degrees. If the antenna was still perpendicular to AP then the angle will be 90 degree (up or down does not matter as dipole is omni).

Guidelines for Placing Access Points

Place access points along the periphery of coverage areas in order to keep devices close to the exterior of rooms and buildings (see Figure 5-34). Access points placed in the center of these coverage areas provide good data on devices that would otherwise appear equidistant from all other access points.

Figure 5-34   Access Points Clustered Together
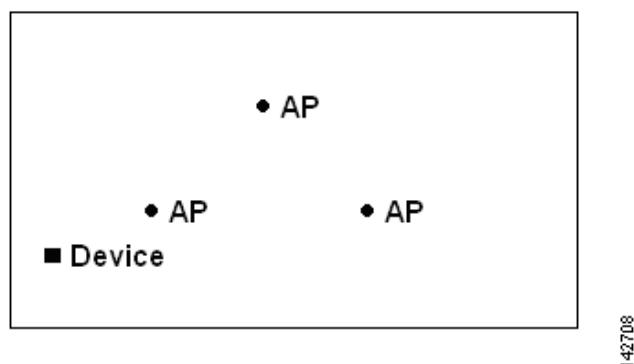
By increasing overall access point density and moving access points towards the perimeter of the coverage area, location accuracy is greatly improved (see Figure 5-35).

Figure 5-35   Improved Location Accuracy by Increasing Density
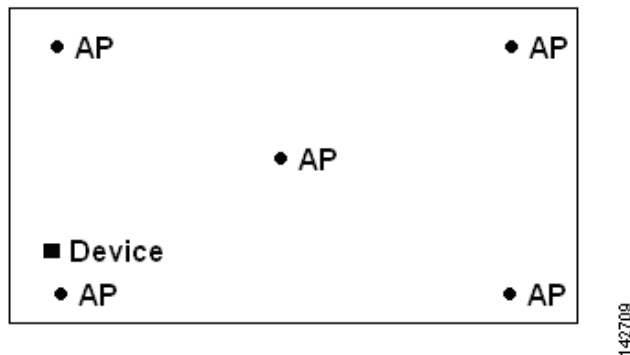
In long and narrow coverage areas, avoid placing access points in a straight line (see Figure 5-36). Stagger them so that each access point is more likely to provide a unique snapshot of a device's location.

Figure 5-36   Refrain From Straight Line Placement
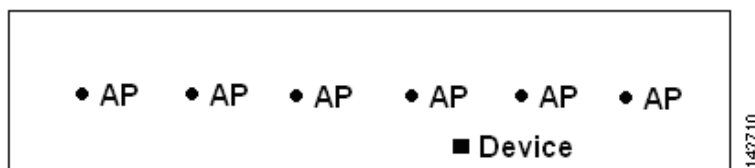
Although the design in Figure 5-36 may provide enough access point density for high bandwidth applications, location suffers because each access point's view of a single device is not varied enough; therefore, location is difficult to determine.

Move the access points to the perimeter of the coverage area and stagger them. Each has a greater likelihood of offering a distinctly different view of the device, resulting in higher location accuracy (see Figure 5-37).

Figure 5-37   Improved Location Accuracy by Staggering Around Perimeter
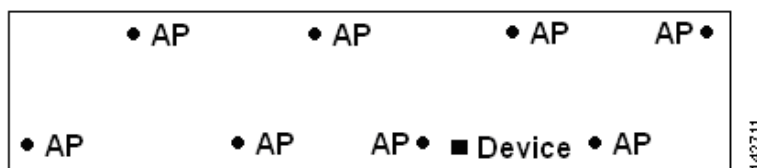
Designing a location-aware wireless LAN, while planning for voice as well, is better done with a few things in mind. Most current wireless handsets support only 802.11b/n, which offers only three non-overlapping channels. Therefore, wireless LANs designed for telephony tend to be less dense than those planned to carry data. Also, when traffic is queued in the Platinum QoS bucket (typically reserved for voice and other latency-sensitive traffic), lightweight access points postpone their scanning functions that allow them to peak at other channels and collect, among other things, device location information. The user has the option to supplement the wireless LAN deployment with access points set to monitor-only mode. Access points that perform only monitoring functions do not provide service to clients and do not create any interference. They simply scan the airwaves for device information.

Less dense wireless LAN installations, such as voice networks, find their location accuracy greatly increased by the addition and proper placement of monitor access points (see Figure 5-38).

Figure 5-38   *Less Dense Wireless LAN Installations*
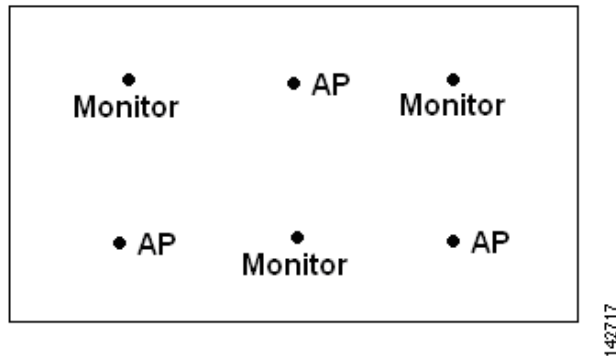
Verify coverage using a wireless laptop, handheld, or phone to ensure that no fewer than three access points are detected by the device. To verify client and asset tag location, ensure that WCS reports client devices and tags within the specified accuracy range (10 m, 90%).

Import Map and AP Location Data

When converting from autonomous to lightweight access points and from WLSE to WCS, one of the conversion steps is to manually re-enter the access point-related information into WCS. To speed up this process, you can export the information about access points from WLSE and import it into WCS.

Note   WCS expects a .tar file and checks for a .tar extension before importing the file. If the file you are trying to import is not a .tar file, WCS displays an error message and prompts you to import a different file.

Note   For more information on the WLSE data export functionality (WLSE version 2.15), see **http://<WLSE_IP_ADDRESS>:1741/debug/export/exportSite.jsp**.

To map properties and import a tar file containing WLSE data using the WCS web interface, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, choose **Import WLSE Map and AP Location Data**.

Step 3   Click **Go**. The Import WLSE Map and AP Location Data page opens (Figure 5-39).

Figure 5-39   Import WLSE Map and AP Location Data Page
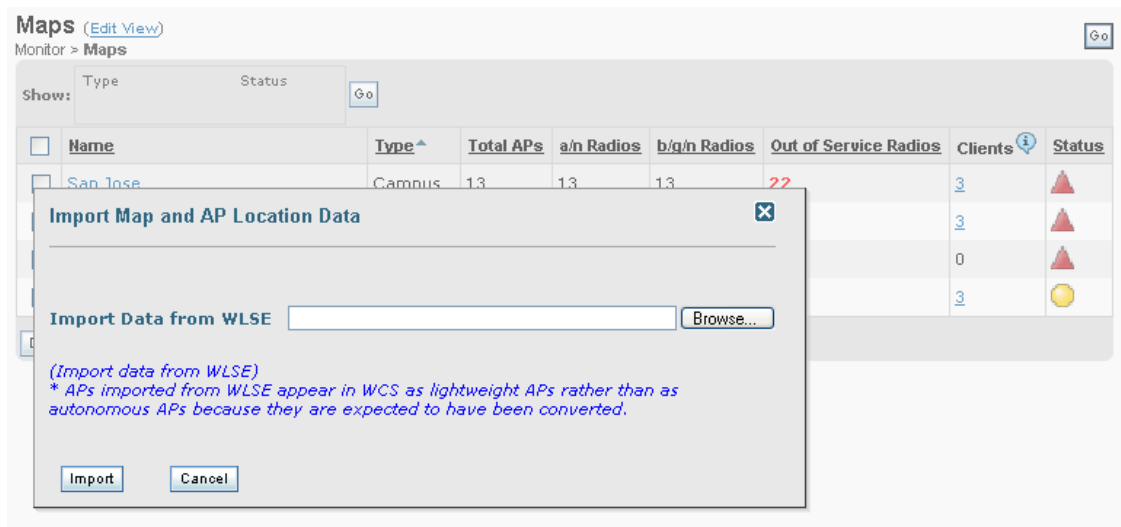
Step 4   In the Import Data from WLSE section, click **Browse** to select the file to import.

Step 5   Find and select the .tar file to import and click **Open**.

WCS displays the name of the file in the Import From text box.

Step 6   Click **Import**.

WCS uploads the file and temporarily saves it into a local directory while it is being processed. If the file contains data that cannot be processed, WCS prompts you to correct the problem and retry. Once the file has been loaded, WCS displays a report of what will be added to WCS. The report also specifies what cannot be added and why.

Step 7   If some of the data to be imported already exists, WCS either uses the existing data in the case of campuses or overwrites the existing data using the imported data in the cases of buildings and floors.

Note   If there are duplicate names between a WLSE site and building combination and a WCS campus (or top-level building) and building combination, WCS displays a message in the Pre Execute Import Report indicating that it will delete the existing building.

Step 8   Click **Import** to import the WLSE data.

WCS displays a report indicating what was imported.

Step 9   Choose **Monitor > Maps** to view the imported data.

Positioning Access Points, Wi-Fi TDOA Receivers, and Chokepoints by Importing or Exporting a File

You can change an access point, Wi-Fi TDOA receiver, or chokepoint position by importing or exporting a file. The file contains only the lines describing the component you want to move. This option takes less time than manually changing multiple positions. See the *Cisco Context-Aware Services Configuration Guide* for more information on chokepoints and Wi-Fi TDOA receivers.

The Wi-Fi TDOA receiver is an external system designed to receive signals transmitted from a tagged, tracked asset. These signals are then forwarded to the mobility services engine for used in calculating location of a tagged asset. TDOA receivers use the Time Difference of Arrival (TDOA) method to calculate tag location. TDOA uses data from a minimum of three TDOA receivers to generate a tagged asset's location.

To change an access point, Wi-Fi TDOA receiver, or chokepoint position, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, choose **Properties**.

Step 3   At the Unit of Dimension drop-down list, choose feet or meters.

Step 4   Select the Advanced Debug Mode **Enable** radio button.

Step 5   Click **OK**.

Step 6   From the Select a command drop-down list, select **Export/Import AP/WiFi TDOA Receiver/Chokepoint Placement**.

Step 7   In the Import/Export AP/WiFi TDOA Receiver/Chokepoint Placement page, click **Browse** to find the file you want to import.

> **Note**   The file must already be created and added to WCS.

> **Note**   The following is the correct file format:
>
> [BuildingName], [FloorName], [AP/WiFi TDOA Receiver/Chokepoint Name], (aAngle), (bAngle), [X], [Y], ([aAngleElevation, bAngleElevation, Z]), (aAntennaType, aAntennaMode, (aAntennaPattern, (aAntennaGain)), bAntennaType, bAntennaDiversity, (bAntennaPattern, bAntennaGain)))))
>
> The parameters in square brackets are mandatory, and those in parentheses are optional.

> **Note**   Angles must be entered in radians (X,Y), and the height is entered in feet. The aAngle and bAngle range is from –2Pi (-6.28...) to 2Pi (6.28...), and the elevation ranges from –Pi (-3.14...) to Pi (3.14...).

Step 8   Click **Import**. The RF calculation takes approximately two seconds per component.

Floor Area Map Overview

- Floor Settings
- Viewing Floor Component Details
- Floor View Navigation
- Select a Command for Floor Areas

Floor Settings

You can modify the appearance of the floor map by selecting or clearing Floor Settings check boxes (Figure 5-40). The selected Floor Settings display in the map image. The Floor Settings options include:
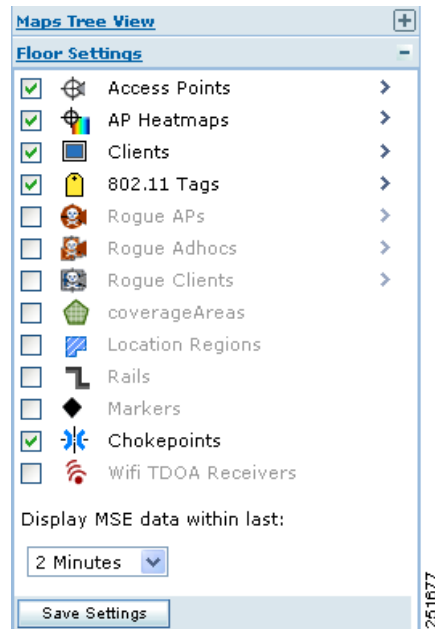
- Access Points—See "Filtering Access Point Floor Settings" for more information.

- AP Heatmaps—See "Filtering Client Floor Settings" for more information.

- AP Mesh Info—Displays only if mesh access points are present in outdoor areas. See "Filtering AP Mesh Info Floor Settings" for more information.

- Clients—Displays data only if an MSE was added in WCS. See "Filtering Client Floor Settings" for more information.

- 802.11 Tags—See "Filtering 802.11 Tag Floor Settings" for more information.

- Rogue APs—Displays data only if an MSE was added in WCS. See "Filtering Rogue AP Floor Settings" for more information.

- Rogue Adhocs—Displays data only if an MSE was added in WCS. See "Filtering Rogue Ad hoc Floor Settings" for more information.

- Rogue Clients—Displays data only if an MSE was added in WCS. See "Filtering Rogue Client Floor Settings" for more information.

- Coverage Areas

- Location Regions

- Rails

- Markers

- Chokepoints—Displays only if chokepoints are added in WCS.

- Wi-Fi TDOA Receivers

- Interferers—Displays details of the interferers on the wireless network. See "Filtering Interferer Settings" for more information.

Use the blue arrows to access Floor Setting filters for access points, access point heatmaps, clients, 802.11 tags, rogue access points, rogue ad hoc events, and rogue clients. When filtering options are selected, click **OK**.

Use the Display MSE data within last drop-down list to select the timeframe for mobility services engine data. This option only appears if an MSE is present on the WCS.

Click **Save Settings** to make the current view and filter settings your new default for all maps.
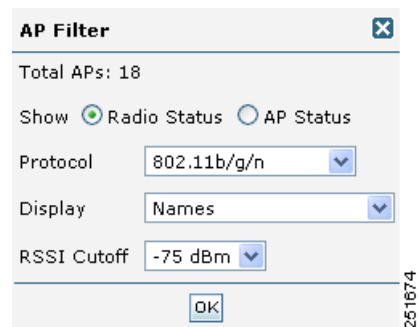
Figure 5-40   Floor Settings Parameters

Filtering Access Point Floor Settings

If you enable the Access Point floor setting and then click the blue arrow to the right of the Floor Settings, the access point filter page opens with filtering options (Figure 5-41).

Figure 5-41   Access Point Filter

Access point filtering options include:

- **Show**—Choose to display the radio status or access point status.
- **Protocol**—From the drop-down list, which radio types to display (802.11a/n, 802.11b/g/n, or both).
- **Display**—From the drop-down list, select the identifying information to display for the access points on the map image.
  - **Channels**—Displays the Cisco Radio channel number or Unavailable (if the access point is not connected).

> **Note** The available channels are defined by the country code setting and are regulated by country:
>
> http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a_ps430_Products_Data_Sheet.html.

– TX Power Level—Displays the current Cisco Radio transmit power level (with 1 being high) or Unavailable (if the access point is not connected).

> **Note** See the hardware installation guide for your access point regarding the maximum transmit power levels supported per regulatory domain. Use this URL http://www.cisco.com/en/US/products/ps5678/Products_Sub_Category_Home.html, click the specific access point from the Product Portfolio, and the choose **Install and Upgrade** from the Support page on the right. Also, refer to the data sheet for your access point regarding the number of power levels supported.

> **Note** The power levels are defined by the country code setting and are regulated by country:
>
> http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a_ps430_Products_Data_Sheet.html.

– Channel and Tx Power—Displays both the channel and transmit power level (or Unavailable if the access point is not connected).

– Coverage Holes—Displays a percentage of clients whose signal has become weaker until the client lost its connection, Unavailable for unconnected access points, or MonitorOnly for access points in monitor-only mode.

> **Note** Coverage holes are areas in which clients cannot receive a signal from the wireless network. When you deploy a wireless network, you must consider the cost of the initial network deployment and the percentage of coverage hole areas. A reasonable coverage hole criterion for launch is between 2 and 10 percent. This means that between two and ten test locations out of 100 random test locations might receive marginal service. After launch, Cisco Unified Wireless Network Solution radio resource management (RRM) identifies these coverage hole areas and reports them to the IT manager, who can fill holes based on user demand.

– MAC Addresses—Displays the MAC address of the access point, whether or not the access point is associated to a controller.

– Names—Displays the access point name. This is the default value.

– Controller IP—Displays the IP address of the controller to which the access point is associated or Not Associated for disassociated access points.

– Utilization—Displays the percentage of bandwidth used by the associated client devices (including receiving, transmitting, and channel utilization). Displays Unavailable for disassociated access points and MonitorOnly for access points in monitor-only mode.

- Profiles—Displays the load, noise, interference, and coverage components of the corresponding operator-defined thresholds. Displays Okay for thresholds not exceeded, Issue for exceeded thresholds, or Unavailable for unconnected access points.

    > **Note** Use the Profile Type drop-down list to select Load, Noise, Interference, or Coverage.

- CleanAir Status—Displays the CleanAir status of the access point, whether or not CleanAir is enabled on the access point.

- Average Air Quality—Displays the average air quality on this access point. The details include, the band, and the average air quality.

- Minimum Air Quality—Displays the minimum air quality on this access point. The details include, the band and the minimum air quality.

- Average and Minimum Air Quality—Displays the average and minimum air quality on this access point. The details include, the band, average air quality, and minimum air quality.

- Associated Clients—Displays the number of associated clients, Unavailable for unconnected access points, or MonitorOnly for access points in monitor-only mode.

    > **Note** Click the client number to view client details. See "Monitor > Clients" for more information.

- Bridge Group Names

- RSSI Cutoff—From the drop-down list, select the RSSI cutoff level. The RSSI cutoff ranges from -60 dBm to -90 dBm.

Click **OK** when all applicable filtering criteria are selected.

Filtering Client Floor Settings

> **Note** The Clients option displays only if a mobility server is added in WCS.

If you enable the Clients floor setting and click the blue arrow to the right, the Client Filter page opens (Figure 5-42).

Figure 5-42   Client Filter Page

Client filtering options include:

- **•** Show All Clients—Select the check box to display all clients on the map.

- **•** Small Icons—Select the check box to display icons for each client on the map.

✎

Note   If you click the **Show All Clients** check box and **Small Icons** check box, all other drop-down list options are unavailable.

   If you unselect the **Small Icons** check box, you can choose if the want the label to display MAC address, IP address, user name, asset name, asset group, or asset category.

   If you unselect the **Show All Clients** check box, you can specify how you want the clients filtered and enter a particular SSID.

- **•** Display Label—Select the client identifier (IP address, username, MAC address, asset name, asset group, or asset category) to display on the map.

- **•** Filter By—Select the parameter with which you want to filter the clients (IP address, username, MAC address, asset name, asset group, asset category, or controller). Then, type the specific device in the text box.

- **•** SSID—Enter the client SSID in the available text box.

- **•** Protocol—Select All, 802.11a/n, or 802.11b/g/n from the drop-down list.

   - **–** All—Displays all the access points in the area.

   - **–** 802.11a/n—Displays a colored overlay depicting the coverage patterns for the clients with 802.11a/n radios. The colors show the received signal strength from red (–35 dBm) through dark blue (–85 dBm).

   - **–** 802.11b/g/n—Displays a colored overlay depicting the coverage patterns for the clients with 802.11b/g/n radios. The colors show the received signal strength from red (–35 dBm) through dark blue (–85 dBm). This is the default value.

- **•** State—Select All, Idle, Authenticated, Probing, or Associated from the drop-down list.

Click **OK** when all applicable filtering criteria are selected.

Filtering 802.11 Tag Floor Settings

If you enable the 802.11 Tags floor setting and then click the blue arrow to the right, the Tag Filter page opens (Figure 5-43).

Figure 5-43 **Tag Filter Page**

Tag filtering options include:

- Show All Tags—Select the check box to display all tags on the map.
- Small Icons—Select the check box to display icons for each tag on the map.

> **Note** If you click the **Show All Tags** check box and **Small Icons** check box, all other drop-down list options are grayed out.
>
> If you unselect the **Small Icons** check box, you can choose if the want the label to display MAC address, asset name, asset group, or asset category.
>
> If you unselect the **Show All Tags** check box, you can specify how you want the tags filtered.

- Display Label—Select the tag identifier (MAC address, asset name, asset group, or asset category) to display on the map.
- Filter By—Select the parameter by which you want to filter the clients (MAC address, asset name, asset group, asset category, or controller). Once selected, type the specific device in the text box.

Click **OK** when all applicable filtering criteria are selected.

Filtering Rogue AP Floor Settings

If you enable the Rogue APs floor setting and then click the blue arrow to the right, the Rogue AP filter page opens.

Rogue AP filtering options include:

- Show All Rogue APs—Select the check box to display all rogue access points on the map.
- Small Icons—Select the check box to display icons for each rogue access point on the map.

> **Note** If you click the **Show All Rogue APs** check box and **Small Icons** check box, all other drop-down list options are grayed out.
>
> If you unselect the **Show All Rogue APs** check box, you can specify how you want the rogue access points filtered.

- MAC Address—If you want to view a particular MAC address, enter it in the MAC Address text box.
- State—Use the drop-down list to select from Alert, Known, Acknowledged, Contained, Threat, or Unknown contained states.
- On Network—Use the drop-down list to specify whether or not you want to display rogue access points on the network.

Click **OK** when all applicable filtering criteria are selected.

Filtering Rogue Ad hoc Floor Settings

If you enable the Rogue Adhocs floor setting and then click the blue arrow to the right, the Rogue Adhoc filter page opens.

Rogue Adhoc filtering options include:

- Show All Rogue Adhocs—Select the check box to display all rogue ad hoc on the map.
- Small Icons—Select the check box to display icons for each rogue ad hoc on the map.

Note If you click the **Show All Rogue Adhocs** check box and **Small Icons** check box, all other drop-down list options are grayed out.

   If you unselect the **Show All Rogue Adhocs** check box, you can specify how you want the rogue ad hocs filtered.

- MAC Address—If you want to view a particular MAC address, enter it in the MAC Address text box.
- State—Use the drop-down list to select from Alert, Known, Acknowledged, Contained, Threat, or Unknown contained states.
- On Network—Use the drop-down list to specify whether or not you want to display rogue ad hocs on the network.

Click **OK** when all applicable filtering criteria are selected.

Filtering Rogue Client Floor Settings

If you enable the Rogue Clients floor setting and then click the blue arrow to the right, the Rogue Clients filter page opens.

Rogue Clients filtering options include:

- Show All Rogue Clients—Select the check box to display all rogue clients on the map.
- Small Icons—Select the check box to display icons for each rogue client on the map.

Note If you click the **Show All Rogue Clients** check box and **Small Icons** check box, all other drop-down list options are grayed out.

   If you unselect the **Show All Rogue Clients** check box, you can specify how you want the rogue clients filtered.

- Assoc. Rogue AP MAC Address—If you want to view a particular MAC address, enter it in the MAC Address text box.
- State—Use the drop-down list to select from Alert, Contained, Threat, or Unknown contained states.

Click **OK** when all applicable filtering criteria are selected.

Filtering Interferer Settings

If you enable Interferer floor settings and then click the blue arrow to the right, the Interferers filter page opens.

Interferer filtering options include the following:

- Show active interferers only—Select the check box to display all active interferers.

- Small Icons—Select the check box to display icons for each interferer on the map.

- Show Zone of Impact—Displays the approximate interference impact area. The opacity of the circle denotes its severity. A solid red circle represents a very strong interferer that will likely disrupt Wi-Fi communications, a light pink circle represents a weak interferer.

- Show All Interferer Labels—Select the check box to display all interferer lables detected by the access point.

- Maximum number of Interferers per label—Select the maximum number of interferer to be displayed.

Click **OK** when all applicable filtering criteria are selected.

Viewing Floor Component Details

To view details regarding the components displayed on the Floor View, hover your mouse cursor over the applicable icon. A dialog box appears displaying detailed information.

The following table (Table 5-7) displays floor map icons.

Table 5-7   Floor Map Icons

Icon	Description
	Access point icon. The color of the circle indicates the alarm status of the Cisco radios.
	Note Each access point contains two Cisco radios. When a single protocol is selected in the Access Point filter page, the entire icon represents this radio. If both protocols are selected, the top half of the icon represents the state of the 802.11a/n radio and the bottom half represents the state of the 802.11b/g/n radio.
	Note A blinking access point icon indicates that an interference, noise, coverage, or load profile failure alarm is pending against this access point.
	Note If a Cisco radio is disabled, a small "x" appears in the middle of the icon.
	Client icon. Hold your mouse cursor over the icon to view client details. See "Client Details" for more information.
	Tag icon. Hold your mouse cursor over the icon to view tag details. See "Tag Details" for more information.

Icon	Description
	Rogue access point icon. The color of the icon indicates the type of rogue access point. For example, red indicates a malicious rogue access point and blue indicates an unknown type.
	Hold your mouse cursor over the icon to view rogue access point details. See "Rogue Access Point Details" for more information.
	Rogue ad hoc icon.
	Hold your mouse cursor over the icon to view rogue ad hoc details. See "Rogue Adhoc Details" for more information.
	Rogue client icon.
	Hold your mouse cursor over the icon to view rogue client details. See "Rogue Client Details" for more information.
	Chokepoint icon.
	Wi-Fi TDOA receiver icon.
	Interferer device icon. See "Interferer Details" for more information.

Cisco 1000 Series Lightweight Access Point Icons

The icons indicate the present status of an access point. The circular part of the icon can be split in half horizontally. The worst of the two Cisco radio colors determines the color of the large triangular pointer.

Note When the icon is representing 802.11a/n and 802.11b/n, the top half displays the 802.11a/n status, and the bottom half displays the 802.11b/g/n status. When the icon is representing only 802.11b/g/n, the whole icon displays the 802.11b/g/n status. The triangle gets whatever color is more severe.

The following table shows the icons used in the Cisco WCS user interface Map displays.

Table 5-8   Access Points Icons Description

Icon	Description
	The green icon indicates an access point (AP) with no faults. The top half of the circle represents the optional 802.11a Cisco Radio. The bottom half of the circle represents the state of the 802.11b/g Cisco Radio.
	The yellow icon indicates an access point with a minor fault. The top half of the circle represents the optional 802.11a Cisco Radio. The bottom half of the circle represents the state of the 802.11b/g Cisco Radio.
	Note A flashing yellow icon indicates that there has been an 802.11a or 802.11b/g interference, noise, coverage or load Profile Failure. A flashing yellow icon indicates that there have been 802.11a and 802.11b/g Profile Failures.

Table 5-8   Access Points Icons Description (continued)

Icon	Description
	The red icon indicates an access point (AP) with a major or critical fault. The top half of the circle represents the optional 802.11a Cisco Radio. The bottom half of the circle represents the state of the 802.11b/g Cisco Radio.
	The grayed-out icon with a question mark in the middle represents an unreachable access point. It is gray because its status cannot be determined.
	The grayed-out icon with no question mark in the middle represents an unassociated access point.
	The icon with a red "x" in the center of the circle represents an access point that has been administratively disabled.
	The icon with the top half green and the lower half yellow indicates that the optional 802.11a Cisco Radio (top) has no faults, and the 802.11b/g Cisco Radio (bottom) has a minor fault. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.
	The icon with the top half green and the lower half red indicates that the optional 802.11a Cisco Radio (top) is operational with no faults, and the 802.11b/g Cisco Radio (bottom) has a major or critical fault. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.
	The icon with the top half yellow and the lower half red indicates that the optional 802.11a Cisco Radio (top) has a minor fault, and the 802.11b/g Cisco Radio (bottom) has a major or critical fault. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.
	The icon with the top half yellow and the lower half green indicates that the optional 802.11a Cisco Radio (top) has a minor fault, and the 802.11b/g Cisco Radio (bottom) is operational with no faults. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.
	The icon with the top half red and the lower half green indicates that the optional 802.11a Cisco Radio (top) has a major or critical fault, and the 802.11b/g Cisco Radio (bottom) is operational with no faults. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.

Table 5-8   Access Points Icons Description (continued)

Icon	Description
	The icon with the top half red and the lower half yellow indicates that the optional 802.11a Cisco Radio (top) has major or critical faults, and the 802.11b/g Cisco Radio (bottom) has a minor fault. The worst of the two Cisco Radio colors determines the color of the large triangular pointer.
	The icon with a red "x" on the top half (optional 802.11a) shows that the indicated Cisco Radio has been administratively disabled. The rest of the color coding is as described previously in this table. There are six possibilities as shown.

Each of the access point icons includes a small black arrow that indicates the direction in which the internal Side A antenna points.

The following table shows some arrow examples used in the Cisco WCS user interface map displays.

Table 5-9   Arrows

Arrow Examples	Direction
	Zero degrees, or to the right of the map.
	45 degrees, or to the lower right on the map.
	90 degrees, or down on the map.

These examples show the first three 45-degree increments allowed, with an additional five at 45-degree increments.
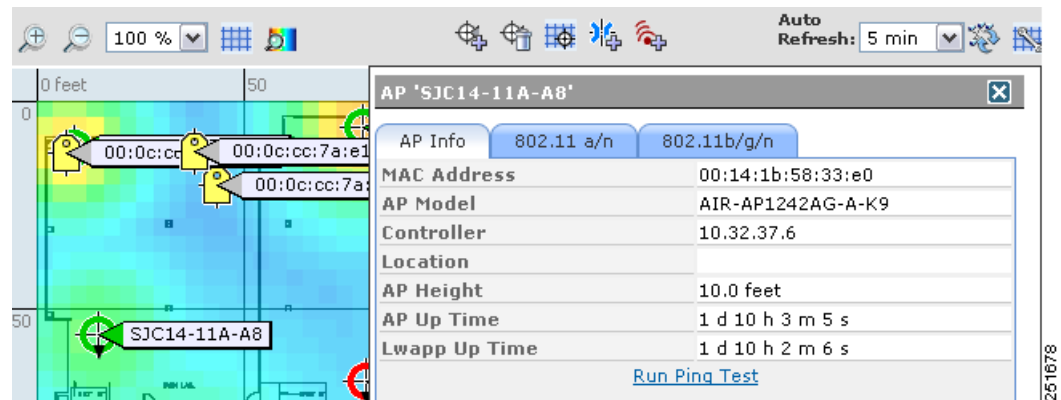
Access Point Details

Hold your mouse cursor over an access point icon to view access point details (Figure 5-44). Click the appropriate tab to view access point and radio information.

Note   Monitor mode access points are shown with gray labels to distinguish them from other access points.

Figure 5-44   Access Point Details Page

The AP Info tab includes the following access point information:

- MAC address
- Access point model
- Controller
- Location
- Access point height
- Access point uptime
- LWAPP uptime

Note   From the AP Info tab, you can run a ping test by clicking the Run Ping Test link.

The 802.11 tabs (Figure 5-45) includes the following radio information:

- Channel number
- Extension channel
- Channel width
- Transmit power level
- Client count

Note   The number of clients associated to access points may not match the total number of clients.

- Receiving and transmitting utilization percentages
- Channel utilization percentage

Note   Total utilization = (Rx + Tx + Channel utilization) scaled to 100%.

- Antenna name and angle
- Elevation angle

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> **Note**   From either of the 802.11 tabs, you can view Rx neighbors and radio details for this access point by clicking the appropriate link (**View Rx Neighbors** or **View Radio Details**).

- Dot11n Enabled.
- CleanAir Status—Displays the CleanAir status of the access point, whether or not CleanAir is enabled on the access point.
- Average Air Quality—Displays the average air quality on this access point.
- Minimum Air Quality—Displays the minimum air quality on this access point.
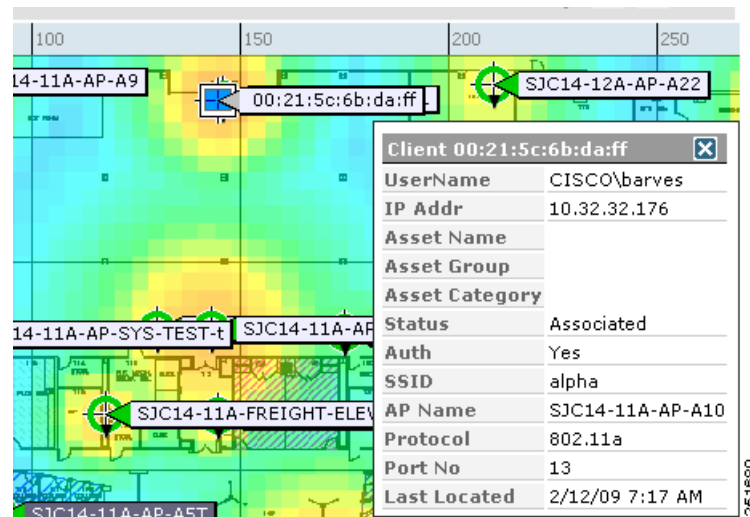
Figure 5-45   *802.11 Tabs*

Client Details

Hold your mouse cursor over a client icon to view client details (Figure 5-46).

Figure 5-46   Client Details Page

Client details information includes the following:

- Username

- IP address

- Asset name, group, and category

- Status

- Auth

- SSID

- Access point name

- Protocol

- Port number

- Last location

Tag Details

Hold your mouse cursor over a tag icon to view tag details (Figure 5-47).
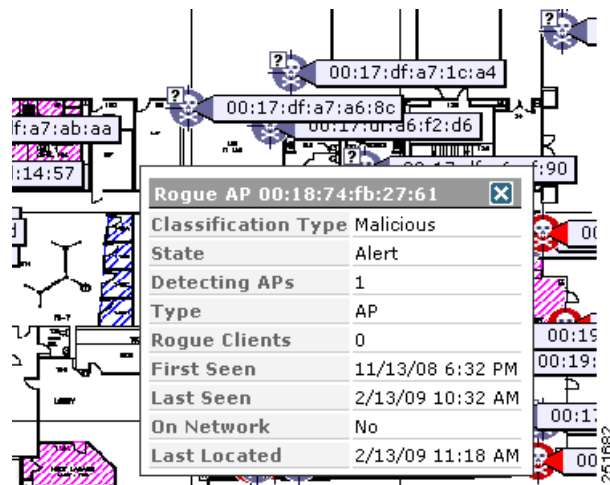
Figure 5-47   Tag Details Page

Tag details include:

- Asset name, group, and category
- Type
- Battery life
- Last located

Rogue Access Point Details

Hold your mouse cursor over an access point icon to view rogue access point details (Figure 5-48).

Figure 5-48   Rogue Access Point Details Page

Rogue access point details include:

- Classification type—Friendly, malicious, or unknown.

- State

- Detecting access points

- Type

- Rogue clients

- First seen

- Last seen

- On network

- Last located

Rogue Adhoc Details

Hold your mouse cursor over an access point icon to view rogue ad hoc details.

Rogue Client Details

Hold your mouse cursor over an access point icon to view rogue client details (Figure 5-49).

Interferer Details

Hover your mouse cursor over an interferer icon to view its details.
Interferer details include the following:

- Interferer Name—The name of the interfering device.

- Affected Channels—The channel the interfering device is affecting.

- Detected Time—The time at which the interference was detected.

- Severity—The severity index of the interfering device.

- Duty Cycle—The duty cycle (in percentage) of the interfering device.

- RSSI (dBm)—The Received Signal Strength Indicator of the interfering device.

Figure 5-49   Rogue Client Details Page
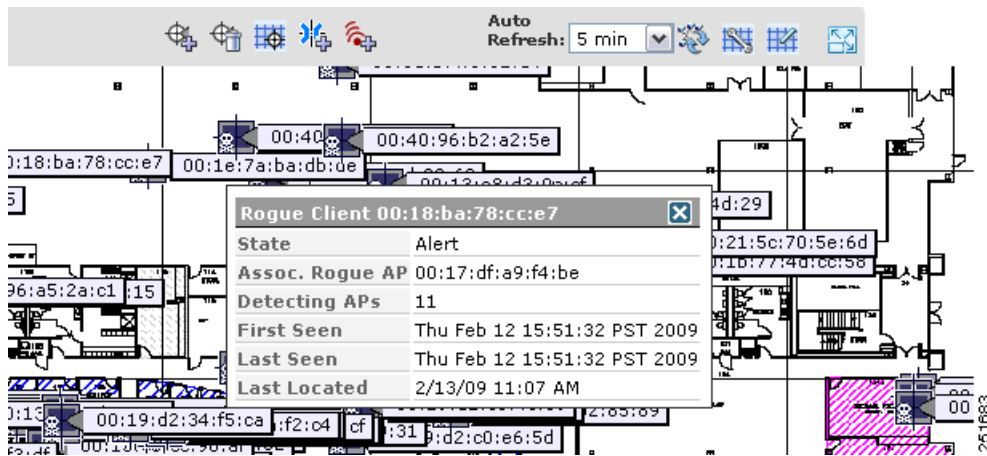
Rogue client details include:

- State
- Associated rogue access point
- Detecting access points
- First seen
- Last seen
- Last located

Floor View Navigation

The main Floor View navigation toolbar (Figure 5-50) provides access to multiple map functions.

Figure 5-50   Floor View Navigation Toolbar
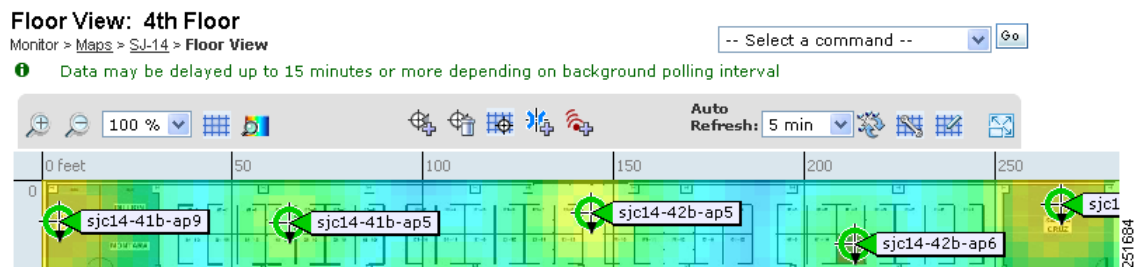
This navigation pane includes the following functionality:

- Zoom In/Zoom Out—Click the magnifying glass icon with the plus sign (+) to enlarge the map view. Click the magnifying glass icon with the minus sign (-) to decrease the size of the map view.

- Map Size—Use the map size drop-down list to manually select the map view size (ranging from 50% to 800%).

- Show Grid—Click to show or hide the grid that displays distance in feet on the map.

- RSSI Legend—Hold your mouse cursor over the RSSI Legend icon to display the RSSI color scheme (ranging from red/-35 dBm to dark blue/-90 dBm).

- Add Access Points—Click to open the Add Access Points page. See the "Adding Access Points" section on page 5-45 for more information.

- Remove Access Points—Click to open the Remove Access Points page. Select the access points that you want to remove and click **OK**.

- Position Access Points—Click to open the Position Access Points page. See "Placing Access Points" section on page 5-50 for more information.

- Add Chokepoints—Click to open the Add Chokepoints page. See the *Cisco Context-Aware Services Configuration Guide* for more information.

- Add WiFi TDOA Receivers—Click to open the Add Wi-Fi TDOA Receivers page. See the *Cisco Context-Aware Services Configuration Guide* for more information.

- Auto Refresh—From the drop-down list, select the length of time between each system refresh.

- Refresh from Network—Click to initiate an immediate refresh of the current data.

- Planning Mode—Click to open the Planning Mode page. See the "Understanding RF Heatmap Calculation" section on page 5-34 for more information.

- Map Editor—Click to open the Map Editor.

- Full Screen—Click to increase the size of the map to full screen. Once there, click **Exit Full Screen** to return to the normal view.

Select a Command for Floor Areas

The following Floor Map functions are accessible from the Select a Command drop-down list located in the Floor View page of WCS.

- Adding Access Points—Select **Add Access Points**, and click **Go**. In the Add Access Points page, select the check boxes of the access points that you want to add and click **OK**. See the "Adding Access Points" section on page 5-45 for more information.

- Positioning Access Points—Select **Position Access Points**, and click **Go** to open the Position Access Points page. Move the access points to the desired position on the map using the mouse and click **Save**. See "Placing Access Points" section on page 5-50 for more information.

- Removing Access Points—Select **Remove Access Points**, and click **Go**. In the Remove Access Points page, select the check boxes of the access points that you want to remove and click **OK**.

- Adding Chokepoints—See the *Cisco Context-Aware Services Configuration Guide* for more information.

- Adding WiFi TDOA Receivers—See the *Cisco Context-Aware Services Configuration Guide* for more information.

- Reference Tags—Select to open the Reference Tag Calibration Settings page. See the *Cisco Context-Aware Services Configuration Guide* for more information.

- Editing the Floor Area—See the "Editing Floor Areas" section on page 5-74 for more information.

- Deleting the Floor Area—See the "Deleting Floor Areas" section on page 5-74 for more information.

- Editing Location Presence Information—See the "Managing Location Presence Information" section on page 5-16 for more information.

- Recomputing the RF Prediction— Select **Recompute RF Prediction**, and click **Go**.

- Refreshing the Floor Area Map—Select **Refresh from Network**, and click **Go**.
- Map Editor—See the "Using the Map Editor" section on page 5-29 for more information.
- Planning Mode—See the "Understanding RF Heatmap Calculation" section on page 5-34 for more information.
- Inspecting Location Readiness—See "Inspecting VoWLAN Location Readiness" section on page 5-44 for more information.
- Inspecting VoWLAN Readiness—See the "Inspecting VoWLAN Location Readiness" section on page 5-44 for more information.

Editing Floor Areas

To edit a current floor area, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Click the name of the floor area to open its details page.

Step 3   From the Select a command drop-down list, choose **Edit Floor Area**.

Step 4   Make any necessary changes to Floor Area Name, Contact, Floor, Floor Height (feet), Floor Type (RF Model), Existing Image File, or Import New Image File.

Step 5   Click **OK**.

Deleting Floor Areas

To delete a current floor area, follow these steps:

Step 1   Choose **Monitor > Maps**.

Step 2   Click the check box for the applicable floor area.

Step 3   From the Select a command drop-down list, choose **Delete Maps**.

Step 4   Click **Go**.

Step 5   Click **OK** to confirm the deletion.

Refresh Options

To prepare for monitoring your wireless LANs, become familiar with the various refresh options for a map.

- Load—The Load option in the left sidebar menu refreshes map data from the WCS database on demand (see callout 1 in Figure 5-51).
- Auto Refresh—The Auto Refresh option (see callout 2 in Figure 5-51) provides an interval drop-down list to set how often to refresh the map data from the database.

- Refresh from network—By clicking the **Refresh from network** icon to the right of the Auto Refresh drop-down list (see callout 2 in Figure 5-51), you can refresh the map status and statistics directly from the controller through an SNMP fetch rather than polled data from the WCS database that is five to fifteen minutes older.

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> **Note**   If you have monitor mode access points on the floor plan, you have a choice between IDS or coverage heatmap types. A coverage heatmap excludes monitor mode access points, and an IDS heatmap includes them.

- Refresh browser—Above the map next to the Logout and Print option is another refresh option (see callout 3 in Figure 5-51). Clicking this refreshes the complete page, or the map and its status and statistics if you are on a map page.

Figure 5-51   Refresh Options
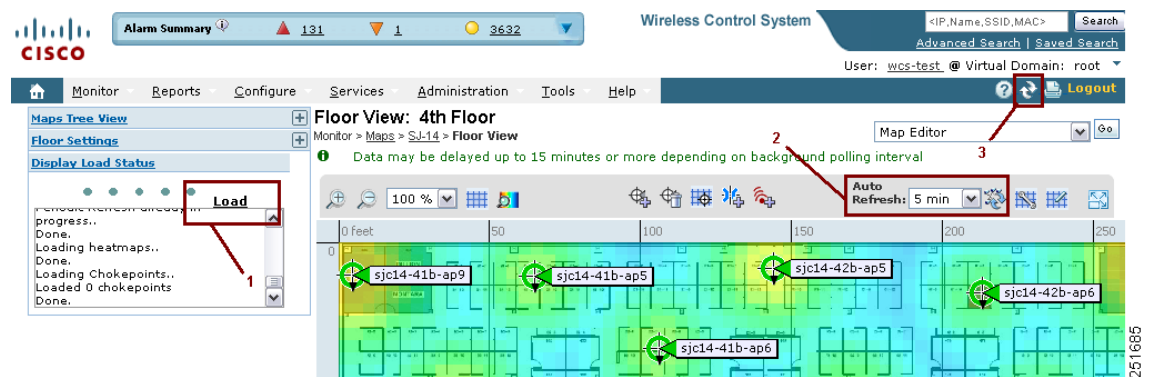
Creating a Network Design

After access points have been installed and have joined a controller, and WCS has been configured to manage the controllers, set up a network design. A *network design* is a representation within WCS of the physical placement of access points throughout facilities. A hierarchy of a single campus, the buildings that comprise that campus, and the floors of each building constitute a single network design. These steps assume that the location appliance is set to poll the controllers in that network, as well as be configured to synchronize with that specific network design, in order to track devices in that environment. The concept and steps to perform synchronization between WCS and the mobility service engine are explained in the *Cisco 3350 Mobility Services Engine Configuration Guide*.

Designing a Network

Follow these steps to design a network.

Step 1   Open the WCS web interface and log in.

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> **Note**   To create or edit a network design, you must log into WCS and have SuperUser, Admin, or ConfigManager access privileges.

Step 2   Choose **Monitor** > **Maps**.

Step 3   From the drop-down list on the right-hand side, choose either **New Campus** or **New Building**, depending on the size of the network design and the organization of maps. If you chose New Campus, continue to Step 4. To create a building without a campus, skip to Step 14.

Step 4   Click **Go**.

Step 5   Enter a name for the campus network design, a contact name, and the file path to the campus image file. .bmps and .jpgs are importable.

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> **Note**   You can use the Browse... button to navigate to the location.

Step 6   Click **Next**.

Step 7   Select the **Maintain Aspect Ratio** check box. Enabling this check box causes the horizontal span of the campus to be 5000 feet and adjusts the vertical span according to the image file's aspect ratio. Adjusting either the horizontal or vertical span changes the other field in accordance with the image ratio.

            You should unselect the Maintain Aspect Ratio check box if you want to override this automatic adjustment. You could then adjust both span values to match the real world campus dimensions.

Step 8   Click **OK**.

Step 9   On the Monitor > Maps page, click the hyperlink associated with the above-made campus map. A page showing the new campus image is displayed.

Step 10   From the drop-down list on the upper right of the page, select **New Building**, and click **Go**.

Step 11   Enter the name of the building, the contact person, the number of floors and basements in the building, and the dimensions. Click **OK**.

Step 12   Indicate which building on the campus map is the correct building by clicking the blue box in the upper left of the campus image and dragging it to the intended location (see Figure 5-52). To resize the blue box, hold down the **Ctrl** key and click and drag to adjust its horizontal size. You can also enter dimensions of the building by entering numerical values in the Horizontal Span and Vertical Span fields and click **Place**. After resizing, reposition the blue box if necessary by clicking on it and dragging it to the desired location. Click **Save**.

Figure 5-52   Repositioning Building Highlighted in Blue

Step 13   WCS is then returned to the campus image with the newly created building highlighted in a green box. Click the **green box** (see Figure 5-53).

Figure 5-53   Newly Created Building Highlighted in Green

Step 14   To create a building without a campus, choose **New Building**, and click **Go**.

Step 15 Enter the building's name, contact information, number of floors and basements, and dimension information. Click **Save**. WCS is returned to the Monitor > Maps page.

Step 16 Click the hyperlink associated with the newly created building.

Step 17 On the Monitor > Maps > [Campus Name] > [Building Name] page, go to the drop-down list and choose **New Floor Area**. Click **Go**.

Step 18 Enter a name for the floor, a contact, a floor number, floor type, and height at which the access points are installed and the path of the floor image. Click **Next**.

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> **Note**   The Floor Type (RF Model) field specifies the type of environment on that specific floor. This RF Model indicates the amount of RF signal attenuation likely to be present on that floor. If the available models do not properly characterize a floor's makeup, details on how to create RF models specific to a floor's attenuation characteristics are available in the *Cisco 3350 Mobility Services Engine Configuration Guide*.

Step 19 If the floor area is a different dimension than the building, adjust floor dimensions by either making numerical changes to the text boxes under the Dimensions heading or by holding the **Ctrl** key and clicking and dragging the blue box around the floor image. If the floor's location is offset from the upper left corner of the building, change the placement of the floor within the building by either clicking and dragging the blue box to the desired location or by altering the numerical values under the **Coordinates of top left corner** heading (see Figure 5-54). After making changes to any numerical values, click **Place**.

Figure 5-54   Repositioning Using Numerical Value Fields

Step 20   Adjust the floor's characteristics with the WCS map editor by choosing the check box next to **Launch Map Editor**. For an explanation of the map editor feature, see the "Using the Map Editor" section on page 5-29.

Step 21   At the new floor's image page (Monitor > Maps > <CampusName> > <BuildingName> > <FloorName>), go to the drop-down list on the upper right and choose **Add Access Points**. Click **Go**.

Step 22   All access points that are connected to controllers are displayed. Even controllers that WCS is configured to manage but which have not yet been added to another floor map are displayed. Select the access points to be placed on the specific floor map by checking the boxes to the left of the access point entries. Select the box to the left of the Name column to select all access points. Click **OK**.

Step 23   Each access point you have chosen to add to the floor map is represented by a gray circle (differentiated by access point name or MAC address) and is lined up in the upper left part of the floor map. Drag each access point to the appropriate location. (Access points turn blue when you click them to relocate them.)

The small black arrow at the side of each access point represents Side A of each access point, and each access point's arrow must correspond with the direction in which the access points were installed. (Side A is clearly noted on each 1000 series access point and has no relevance to the 802.11a/n radio.)

Step 24   To adjust the directional arrow, choose the appropriate orientation in the Antenna Angle drop-down list. Click **Save** when you are finished placing and adjusting each access point's direction.

> **Note**   Access point placement and direction must directly reflect the actual access point deployment or the system cannot pinpoint the device location.

Step 25   Repeat the above processes to create campuses, buildings, and floors until each device location is properly detailed in a network design.

Changing Access Point Positions by Importing and Exporting a File

You can change an access point position by importing or exporting a file. The file contains only the lines describing the access point you want to move. This option takes less time than manually changing multiple access point positions. Follow these steps to change access point positions using the importing or exporting of a file.

Step 1   Choose **Monitor > Maps**.

Step 2   From the Select a command drop-down list, choose **Import AP/WiFi TDOA Receiver/Chokepoint Placement or Export AP/WiFi TDOA Receiver/Chokepoint Placement**, and click **Go**.

Step 3   In Import Data from File or Export Data from File, click **Browse** to find the file you want to import. The file in the [BuildingName], [FloorName], [APName], (aAngle), (bAngle), [X], [Y], ([aAngleElevation, bAngleElevation, Z]), (aAntennaType, aAntennaMode, (aAntennaPattern, (aAntennaGain)), bAntennaType, bAntennaDiversity, (bAntennaPattern, bAntennaGain)) format must have already been created and added to WCS. (See the "Inspecting VoWLAN Location Readiness" section on page 5-44.)

> **Note**   The parameters in square brackets are mandatory, and those in parentheses are optional.

> **Note**   Angles must be entered in radians (X,Y), and the height is entered in feet. The aAngle and bAngle range is from –2Pi (-6.28...) to 2Pi (6.28...), and the elevation ranges from –Pi (-3.14...) to Pi (3.14...).

Step 4   Click **Import**. The RF calculation takes approximately two seconds per access point.

Importing or Exporting WLSE Map Data

When you convert an access point from autonomous to CAPWAP and from WLSE to WCS, one of the conversion steps is to manually re-enter the access point information into WCS. This can be a time-consuming step. To speed up the process, you can export the information about access points from WLSE and import it into WCS.

Note   WCS expects a .tar file and checks for a .tar extension before importing the file. If the file you are trying to import is not a .tar file, WCS displays an error message and prompts you to import a different file.

To map properties and import a tar file containing WLSE data using the WCS web interface, follow these steps. For more information on the WLSE data export functionality (WLSE version 2.15), see **http://<WLSE_IP_ADDRESS>:1741/debug/export/exportSite.jsp**.

Step 1   Choose **Monitor > Maps**.

Step 2   Choose **Properties** from the Select a command drop-down list, and click **Go**.

Step 3   In the Export/Import AP/LS/SP Placement section, click **Browse** to select the file to import.

Step 4   Find and select the .tar file to import and click **Open**.

WCS displays the name of the file in the Import From field.

Step 5   Click **Import**.

WCS uploads the file and temporarily saves it into a local directory while it is being processed. If the file contains data that cannot be processed, WCS prompts you to correct the problem and retry. After the file has been loaded, WCS displays a report of what will be added to WCS. The report also specifies what cannot be added and why.

If some of the data to be imported already exists, WCS either uses the existing data in the case of campuses or overwrites the existing data using the imported data in the cases of buildings and floors.

If there are duplicate names between a WLSE site and building combination and a WCS campus (or top-level building) and building combination, WCS displays a message in the Pre Execute Import Report indicating that it will delete the existing building.

Step 6   Click **Import** to import the WLSE data.

WCS displays a report indicating what was imported.

Note   Since a WLSE file has no floor number information, the structure of the floor index calculation after WLSE is imported into WCS is in descending order. You can click the floor image to go directly to the appropriate floor screen.

Step 7   Choose **Monitor > Maps** to verify the imported data.