CHAPTER 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. It contains these sections:

Creating Maps

With the Cisco WCS database, you can add maps and view your managed system on realistic campus, building, and floor map maps. Follow the instructions in the sections below to add a campus, buildings, outdoor areas, floor plans, and access points to maps in the Cisco WCS database:

Adding a Campus

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 Click **Monitor** > **Maps** to display the Maps page.

Step 4 From the Select a command drop-down menu, 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 or CAD file containing the map of the campus and click **Open**.

Step 7 Check 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 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.

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 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 Click **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 menu, choose **New Building** and click **GO**.

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

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.

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

f. Click on 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.

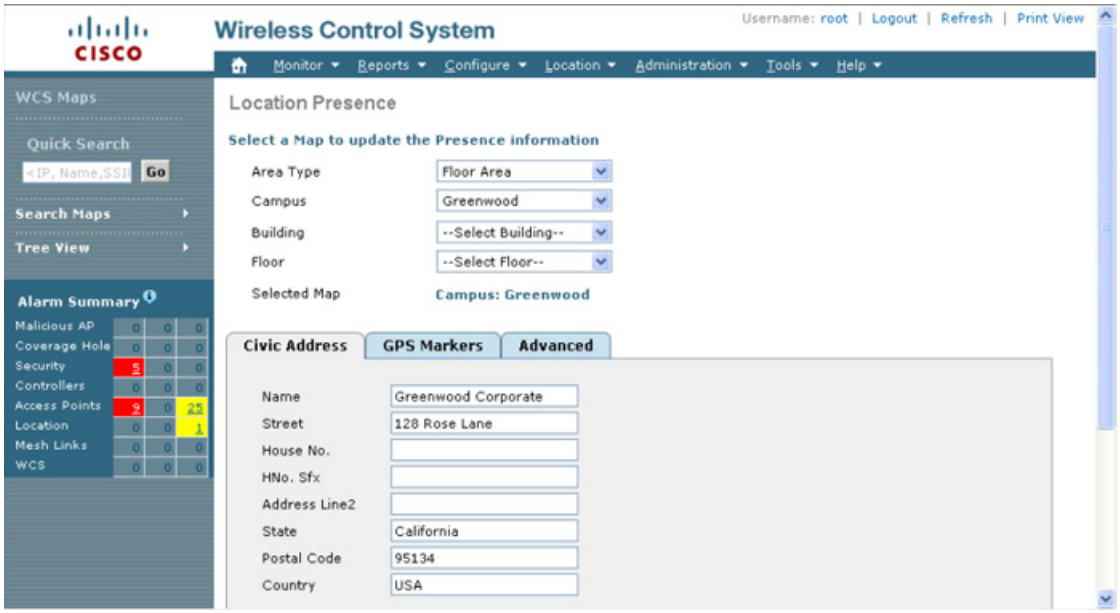
g. Click **Save** to save this building and its campus location to the database. WCS saves the building name in the building rectangle on the campus map.

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 menu. Click **GO**. The Location Presence window appears (see Figure 5-1).

Figure 5-1 Location Presence Window



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 (Administration > Location Presence).

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 checked. 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 Click **Monitor > Maps** to display the Maps page.

Step 2 From the Select a command drop-down menu, choose **New Building** and click **GO**.

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 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 **Edit Location Presence Info** from the Select a command drop-down menu. Click **GO**. The Location Presence window appears (see Figure 5-1).

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 (Administration > Location Presence).

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 checked. There is no need to alter this setting for standalone buildings.

Step 5 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 Click **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 menu, choose **New Outdoor Area** and click **GO**.

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

a. Enter the outdoor area name.

b. Enter the outdoor area contact name.

c. If desired, enter or browse to the filename of the outdoor area map.

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

Tip 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 outdoor area change to match your actions.

e. 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.

f. Click on the outdoor area rectangle and drag it to the desired position on the campus map.

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

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

Step 6 *(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 menu. Click **GO**. The Location Presence window appears (see Figure 5-1).

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 (Administration > Location Presence).

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 checked. There is no need to alter this setting for outdoor areas.

Step 7 Click **Save**.

Enabling Location Presence on a Location Server

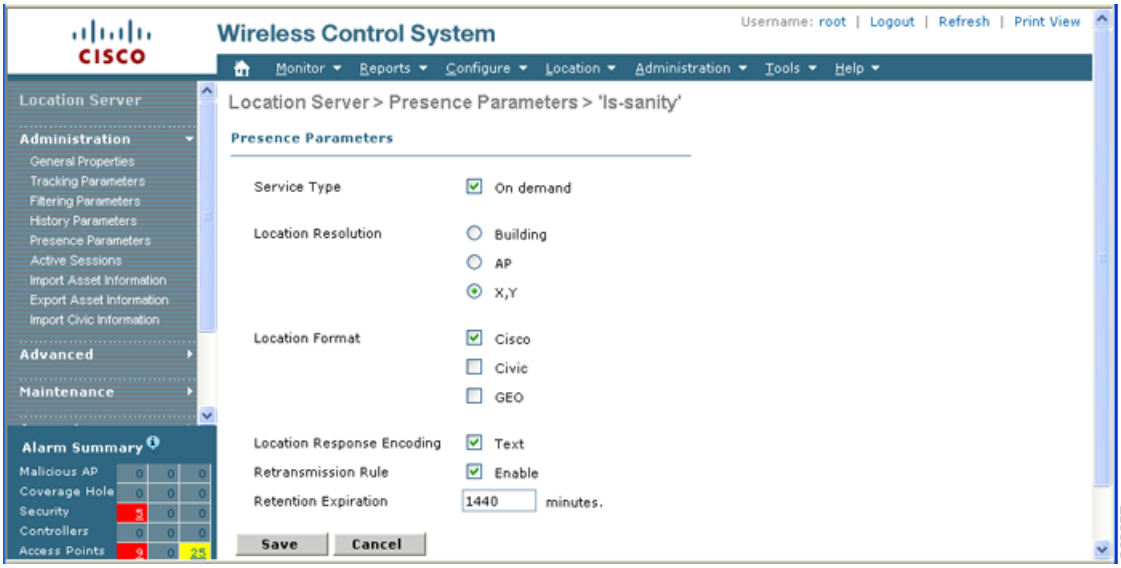
Follow these steps to enable and configure location presence on a location server. When enabled, the location server is capable of providing any requesting Cisco Compatible Extension v5 client with its location.

Note Before enabling this feature, synchronize the location server.

Step 1 Click **Mobility > Mobility Service Engines**. Choose the location server to which the campus or building is assigned.

Step 2 Choose **Presence Parameters** from the Administration menu (on the left sidebar menu). The Location Presence window appears (see Figure 5-2).

Figure 5-2 Location Server > Presence Parameters Window



Step 3 Check the **On Demand** check box to enable location presence for Cisco Compatible Extension v5 clients.

Step 4 Choose one of the Location Resolution options.

a. When *building* is selected, the location server can provide, to any requesting client, its location by building.

- For example, if a client requests its location and the client is located in Building A, the location server returns the client address as *Building A*.

b. When *ap* is selected, the location server can provide, to any requesting client, its location by its associated access point. The MAC address of the access point appears.

- 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 location server returns the client address of *3034:00hh:0adg*.

c. When *X,Y* is selected, the location server can provide, to any requesting clients, 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 location server returns the client address of *50, 200*.

Step 5 Check any or all of the location formats.

a. Check the **Cisco** check box to provide location by campus, building, and floor with X and Y coordinates. This is the default setting.

b. Check the **Civic** check box to provide the name and address (street, city, state, postal code, country) of a campus, building, floor, or outdoor area. Expanded location details can also be entered in the Advanced panel.

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

Step 6 By default the Text check box for Location Response Encoding is checked. It indicates the format of the information when received by the client. There is no need to change this setting.

Step 7 Check the **Retransmission Rule Enable** check box to allow the receiving client to retransmit the received information to another party.

Step 8 Enter a **Retention Expiration** value in minutes. This determines how long the received information is stored by the client before it is overwritten. The default value is 24 hours (1440 minutes).

Step 9 Click **Save**.

Searching Maps

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

- **New Search** drop-down menu: Opens the Search Maps window. Use the Search Maps window to configure, run, and save searches.
- **Saved Searches** drop-down menu: Lists the saved custom searches. To open a saved search, choose it from the Saved Searches list.
- **Edit Link**: Opens the Edit Saved Searches window. You can delete saved searches in the Edit Saved Searches window.
- **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 window:

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

After you click **GO**, the map search results window appears:

Table 5-1 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.

Table 5-1 Map Search Results

Parameter	Options
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.
Clients	Displays the number of clients currently associated with the controller.
Status	A colored icon indicating the campus or building status (green for Up, yellow for Warning, or red for Down).

Finding Coverage Holes

Coverage holes are areas where clients cannot receive a signal from the wireless network. The Cisco Unified Wireless Network Solution radio resource management (RRM) identifies these coverage hole areas and reports them to WCS, enabling the IT manager to fill holes based on user demand. Follow these steps to find coverage holes on your wireless LAN.

Step 1 Click the **Coverage** indicator on the bottom left of the WCS user interface page (or click **Monitor > Alarms** and search for **Coverage** under Alarm Category) to display the Coverage Hole Alarms page.

Step 2 Click **Monitor > Maps** and search for access points by name (this search tool is case sensitive). WCS displays the Maps > Search Results page, which lists the floor or outdoor area where the access point is located.

Step 3 Click the floor or outdoor area link to display the related Maps > *Building Name* > *Floor Name* page.

Step 4 Look for areas of low signal strength near the access point that reported the coverage hole. These areas are the most likely locations of coverage holes. If areas of weak signal strength are detected, make sure that the floor plan map is accurate.

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.

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

Step 4 Click the desired campus. WCS displays the Maps > *Campus Name* page.

Step 5 Move 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.

Step 6 Click on the building name to display the Maps > *Campus Name* > *Building Name* page.

Step 7 From the Select a command drop-down menu, choose **New Floor Area** and click **GO**.

Step 8 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.

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

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

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. Either leave the **Maintain Aspect Ratio** check box checked to preserve the original image aspect ratio or uncheck 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 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 > *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 9 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 "Inspect VoWLAN Readiness" section on page 5-22 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.

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

Step 4 Click the desired building. WCS displays the Maps > *Building Name* page.

Step 5 From the Select a command drop-down menu, 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.

f. Check 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 checked to preserve the original image aspect ratio or uncheck 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 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 "Inspect VoWLAN Readiness" section on page 5-22 for instructions.

Using the Map Editor to Enhance Floor Plans

You can use the WCS map editor to define, draw, and enhance floor plan information. The map editor enables you to create obstacles so that they can be taken into consideration when computing RF prediction heat maps for access points. You can also add coverage areas for location appliances that locate clients and tags in that particular area. Follow these general guidelines to use the map editor.

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 menu, click **GO**, check 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 location appliance uses no more than 50 heavy walls in its calculations, and the location appliance 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 Click **Monitor > Maps** to display the Maps page.

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

Step 3 Click on a campus building.

Step 4 Click on 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 menu, 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 Choose the desired 802.11 standard from the Radio Type drop-down menu.

Step 9 Choose the antenna model from the Antenna drop-down menu.

Step 10 Determine the propogation pattern at the Antenna Mode drop-down menu.

Step 11 Make antenna adjustments by sliding the antenna orientation bar to the desired degree of direction.

Step 12 Choose the desired access point.

Step 13 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 In Cisco WCS, add the floor plan if it is not already represented in WCS (refer to the "Adding and Enhancing Floor Plans" section on page 5-9).

Step 2 Choose **Monitor > Maps**.

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

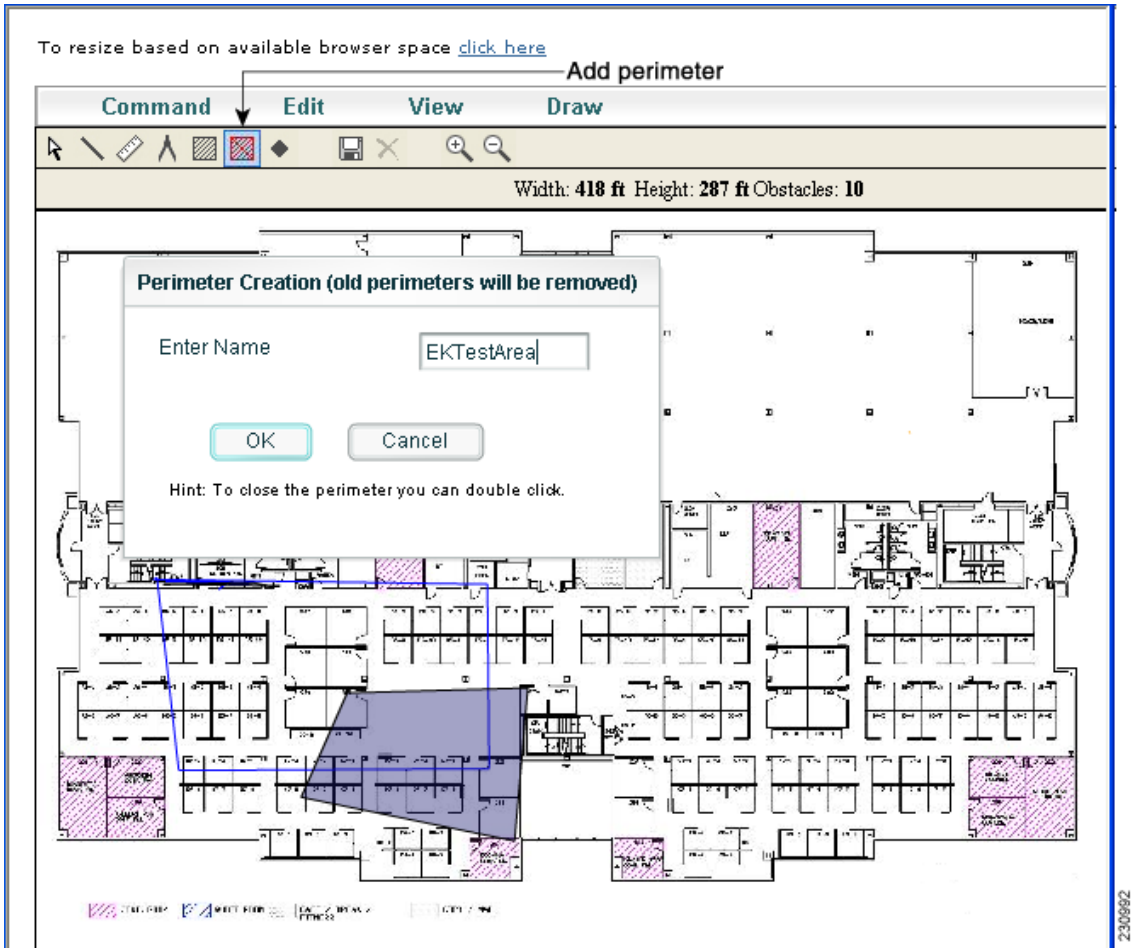
Step 4 From the Select a command drop-down menu, choose **Map Editor** and click **GO**.

Step 5 At the Map Editor screen, click the **Add Perimeter** icon on the tool bar (see Figure 5-3).

A pop-up window appears.

Note An example of a polygon-shaped area is seen in Figure 5-3.

Figure 5-3 Map Editor Page



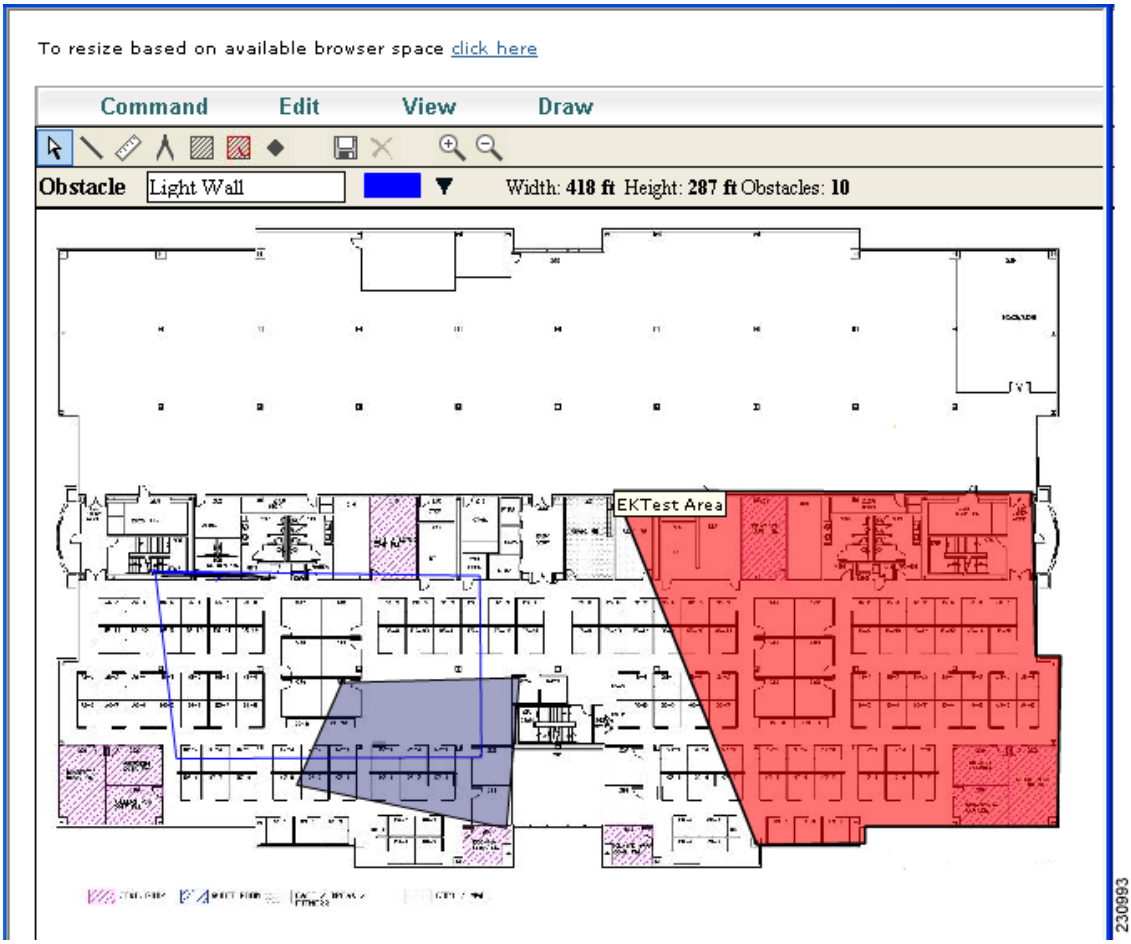
Step 6 Enter the name of the area that you are defining. Click **OK**.

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 5-4).
- The outlined area must be a closed object to highlight on the map.

Figure 5-4 Polygon Area



Step 8 Click the disk icon in the tool bar to save the newly drawn area.

Step 9 Choose **Command > Exit** to close the window. 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 window when you add elements.

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

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

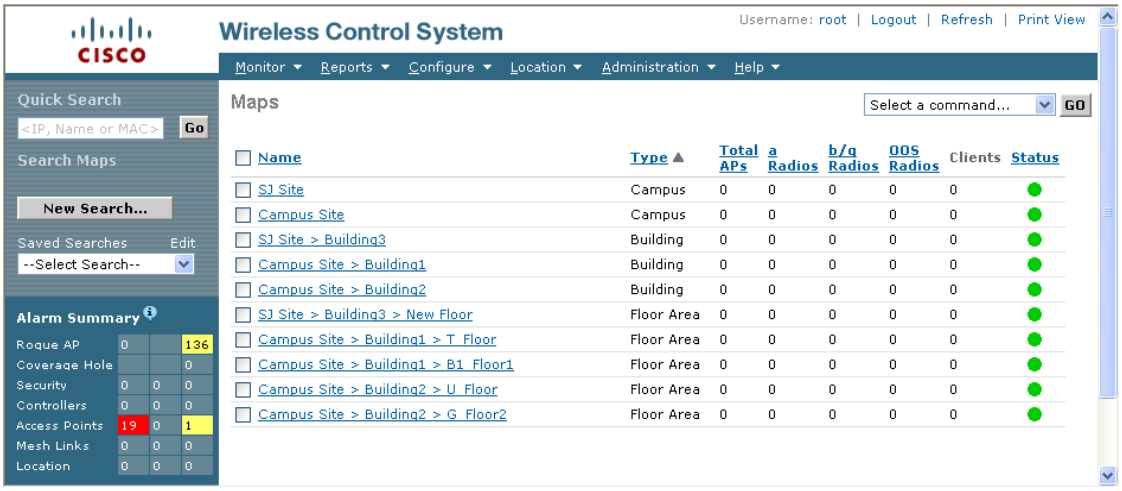
- location accuracy requirements
- number of active users
- number of users per square footage

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

Step 1 Choose **Monitor > Maps.**

The window appears (see Figure 5-5).

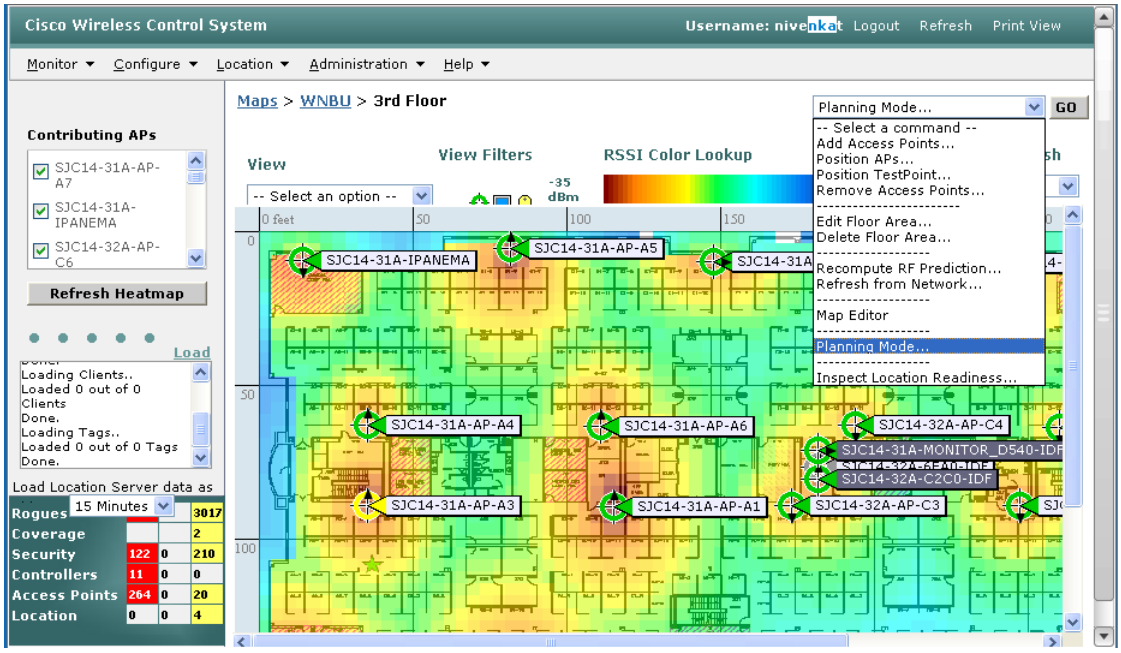
Figure 5-5 Monitor > Maps Page



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 5-6).

Figure 5-6 Selected Floor Area Showing Current Access Point Assignments



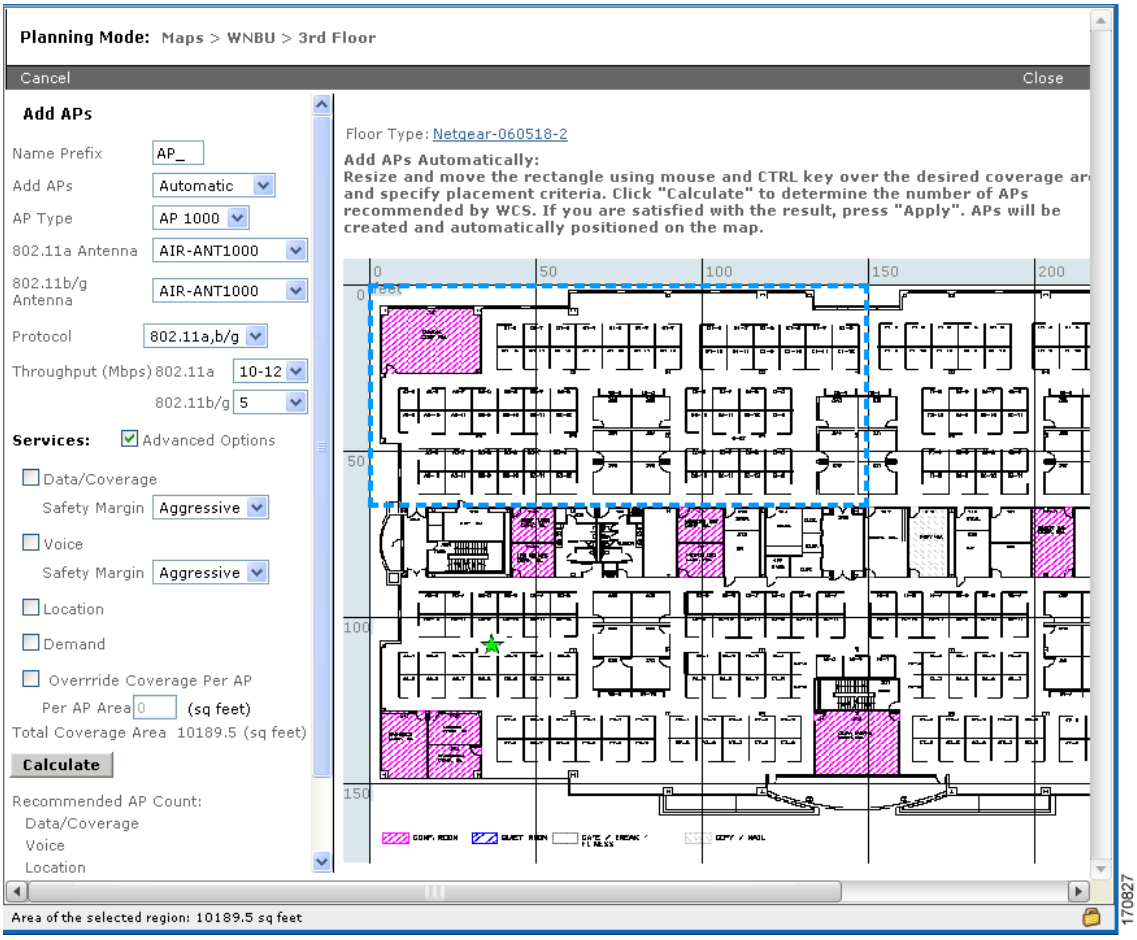
Step 3 Choose **Planning Mode** from the Select a command drop-down menu (top-right) and click **GO.** A blank floor map appears.

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 5-7).

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 5-7 Add APs Page



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

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 Check the box(es) next to the **service(s)** that will be used on the floor. Options are Data/Coverage (default), Voice, and Location (Table 5-2).

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

Note If you check 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 service options (Table 5-3).

Table 5-2 Definition of Service Options

<table>
<tr><th>Service Options</th><th>Description</th></tr>
<tr><td>Data/Coverage</td><td>Select if data traffic is transmitted on the wireless LAN. The following densities are used depending on the band and data rates:
<table>
<tr><th>Band</th><th>Path Loss Model (dBm)</th><th>Date Rate (Mbps)</th><th>Area (Sq. ft.)</th></tr>
<tr><td>802.11a/n</td><td>–3.3</td><td>10-12</td><td>6000</td></tr>
<tr><td>802.11a/n</td><td>–3.3</td><td>15-18</td><td>4500</td></tr>
<tr><td>802.11a/n</td><td>–3.5</td><td>10-12</td><td>5000</td></tr>
<tr><td>802.11a/n</td><td>–3.5</td><td>15-18</td><td>3250</td></tr>
<tr><td>802.11b/g/n</td><td>–3.3</td><td>5</td><td>6500</td></tr>
<tr><td>802.11b/g/n</td><td>–3.3</td><td>6</td><td>4500</td></tr>
<tr><td>802.11b/g/n</td><td>–3.5</td><td>5</td><td>5500</td></tr>
<tr><td>802.11b/g/n</td><td>–3.5</td><td>6</td><td>3500</td></tr>
</table>
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)</td></tr>
<tr><td>Voice</td><td>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/n)]
• Safe = Medium [–75 dBm (802.11a/b/g/n)]
• Very Safe = Maximum [(–72 dBm (802.11a/b/g/n)]
• 7920_enabled = [(–72 dBm (802.11a/n); –67 dBm (802.11b/g/n)]</td></tr>
<tr><td>Location</td><td>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 colocated 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 check the Location box, the calculation considers data/coverage, voice, and location in determining the optimum number of access points required.</td></tr>
</table>

Table 5-3 Definition of Advanced Options

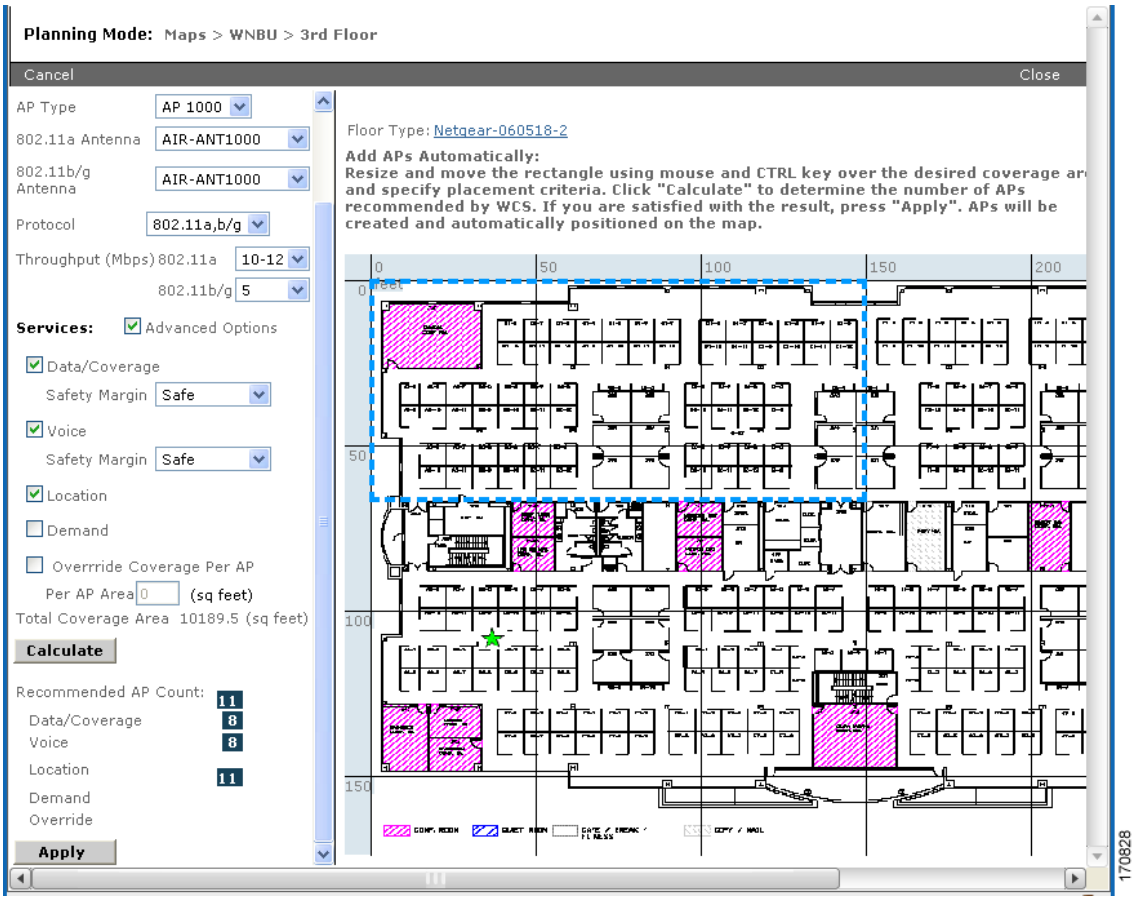
Advanced Options	Description
Demand	Select if you want to use the total number of users or user ratio per access point as a basis for the access point calculation.

Advanced 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 5-8).

Figure 5-8 Recommended Number of Access Points Given Selected Services and Parameters

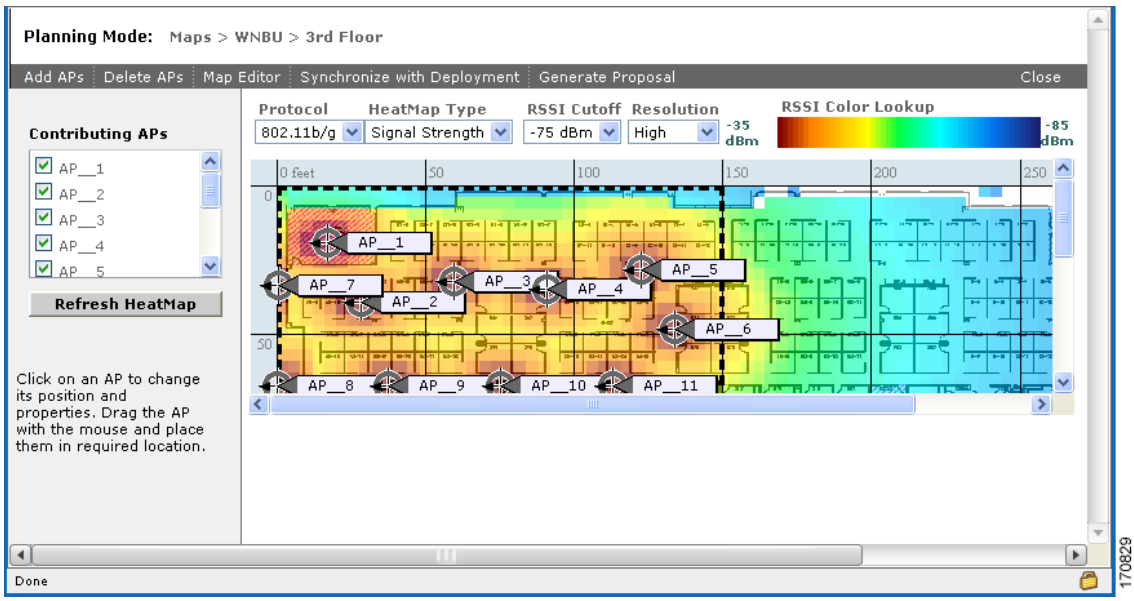


Note Recommended calculations assume the need for consistently strong signals unless adjusted downward by the **safety margin** advanced option. In some cases, the recommended number of access points is higher than what is required.

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.

Figure 5-9 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.

Inspect VoWLAN Location Readiness

The Inspect Location Readiness feature is a distance-based predictive tool that can point out problem areas with access point placement.

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 menu, click **Inspect Location Readiness**.

Inspect VoWLAN Readiness

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.

To access the VoWLAN Readiness Tool (VRT), 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 menu, click **Inspect VoWLAN Readiness**.

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

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 Click the desired floor plan or outdoor area map in the Coverage Areas component of the General tab. WCS displays the associated coverage area map.

Step 2 From the Select a command drop-down menu, choose **Add Access Points** and click **GO**.

Step 3 On the Add Access Points page, choose the access points to add to the map.

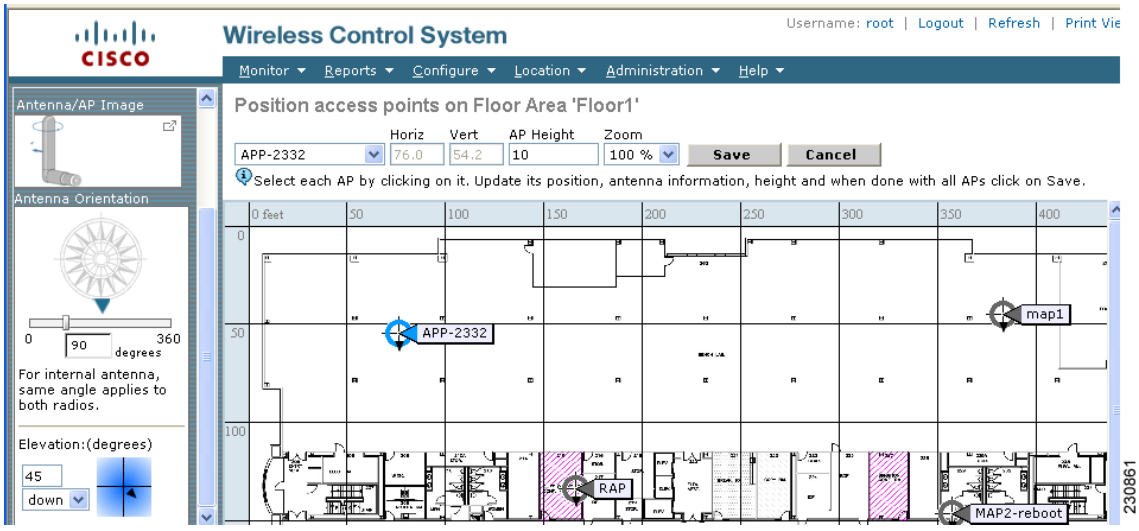
Step 4 Click **OK** to add the access points to the map and display the Position Access Points map.

Note The access point icons appear in the upper left area of the map.

Step 5 Click and drag the icons to indicate their physical locations.

Step 6 Click each icon and choose the antenna orientation in the sidebar (see Figure 5-10).

Figure 5-10 Antenna Sidebar



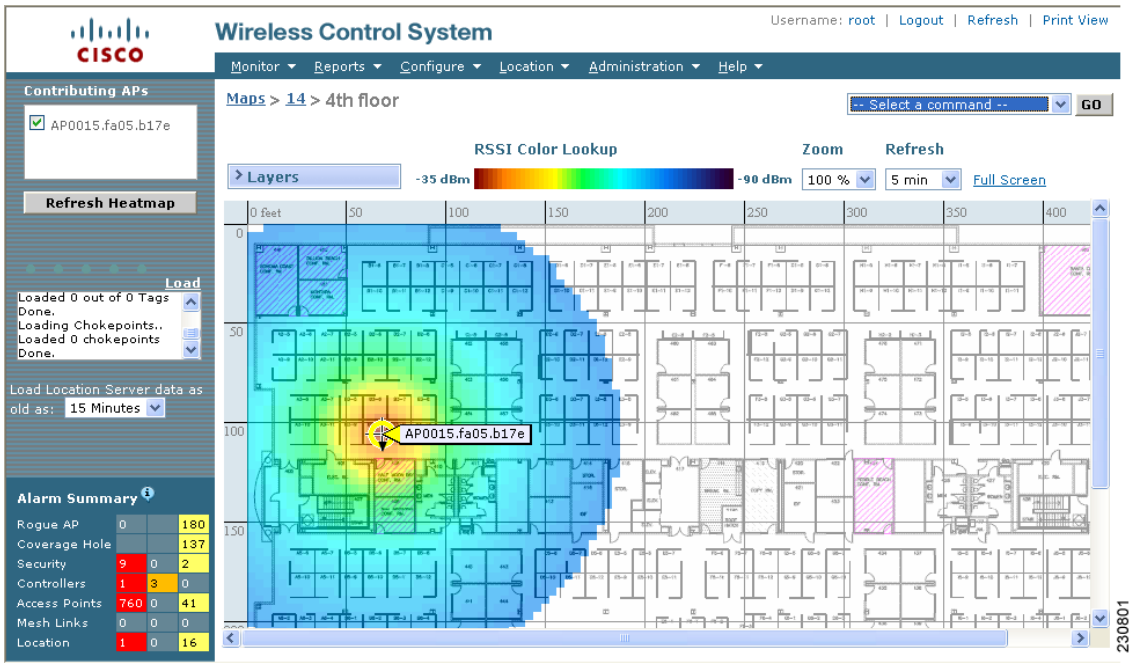
Note

- 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.
- 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.
- Refer to http://www.cisco.com/en/US/products/hw/wireless/ps469/tsd_products_support_series_home.html for further information about antenna elevation and azimuth patterns.

Step 7 Click **Save** to store the access point locations and orientations. 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 5-11 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 5-11 RF Prediction Heat Map



Placing Access Points

To determine the optimum 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.

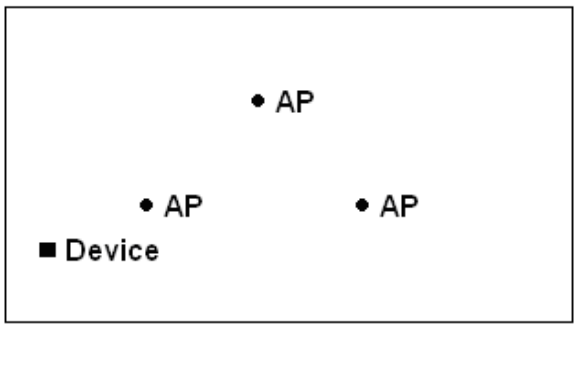
Note Devices must be detected at signals greater than –75 dBm for the controllers to forward information to the location appliance. No fewer than three access points should be able to detect any device at signals below –75 dBm.

Guidelines for Placing Access Points

Follow these rules for placing access points accurately:

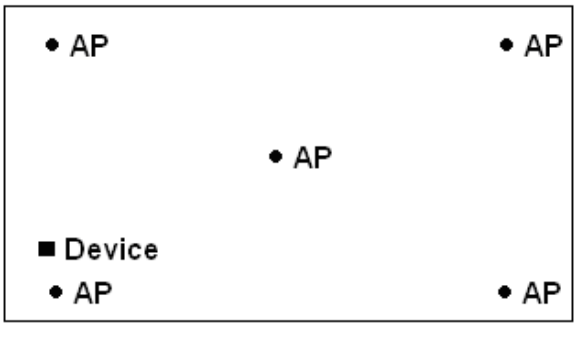
1. Place access points along the periphery of coverage areas in order to keep devices close to the exterior of rooms and buildings (see Figure 5-12). Access points placed in the center of these coverage areas provide good data on devices that would otherwise appear equidistant from all other access points.

Figure 5-12 Access Points Clustered Together



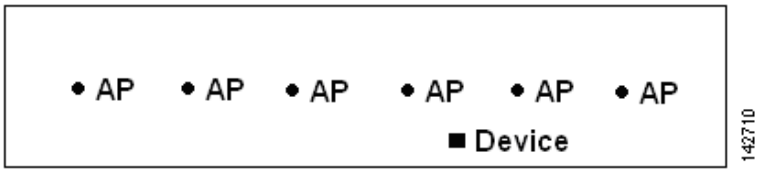
2. By increasing overall access point density and moving access points towards the perimeter of the coverage area, location accuracy is greatly improved (see Figure 5-13).

Figure 5-13 Improved Location Accuracy by Increasing Density



3. In long and narrow coverage areas, avoid placing access points in a straight line (see Figure 5-14). Stagger them so that each access point is more likely to provide a unique snapshot of a device's location.

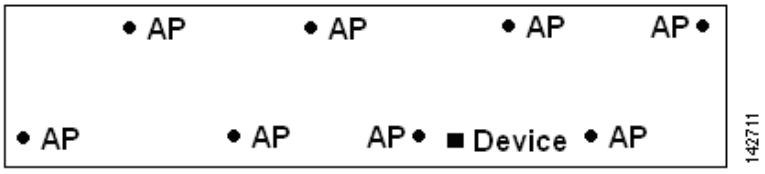
Figure 5-14 Refrain From Straight Line Placement



Although the design in Figure 5-14 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.

4. 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 5-15).

Figure 5-15 Improved Location Accuracy by Staggering Around Perimeter

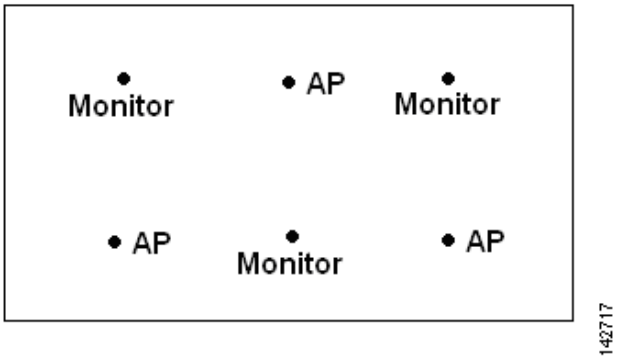


5. Designing a location-aware wireless LAN, while planning for voice as well, is better done with a few things in mind. Most current wireless handsets support only 802.11b/n, which offers only three non-overlapping channels. Therefore, wireless LANs designed for telephony tend to be less dense than those 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 5-16).

Figure 5-16 Less Dense Wireless LAN Installations



6. 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%).

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 location appliance are explained in the "Importing the Location Appliance into WCS" section on page 12-7.

Designing a Network

Follow these steps to design a network.

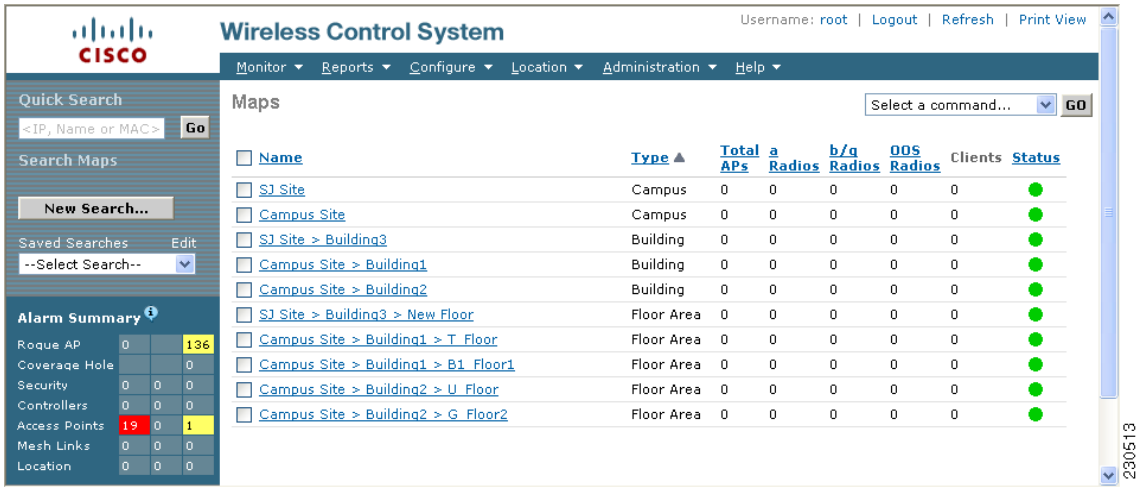
Step 1 Open the WCS web interface and log in.

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

Step 2 Click the **Monitor** tab and choose the **Maps** subtab (see Figure 5-17).

Step 3 From the drop-down menu 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 13.

Figure 5-17 Creating a New Network Design



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.

Step 6 Check 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.

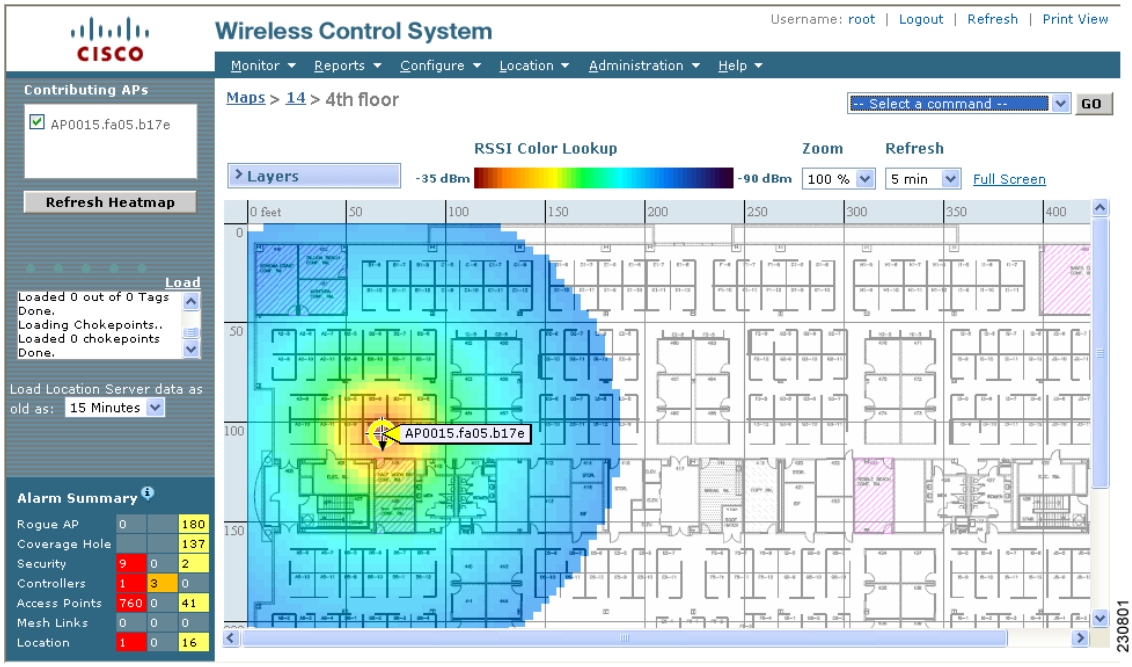
You should uncheck the Maintain Aspect Ratio check box if you want to override this automatic adjustment. You could then adjust both span values to match the real world campus dimensions.

Step 7 Click **OK**.

Step 8 On the Monitor > Maps subtab, click the hyperlink associated with the above-made campus map. A window showing the new campus image is displayed.

Step 9 From the drop-down menu on the upper right of the window, select **New Building** and click **GO** (see Figure 5-18).

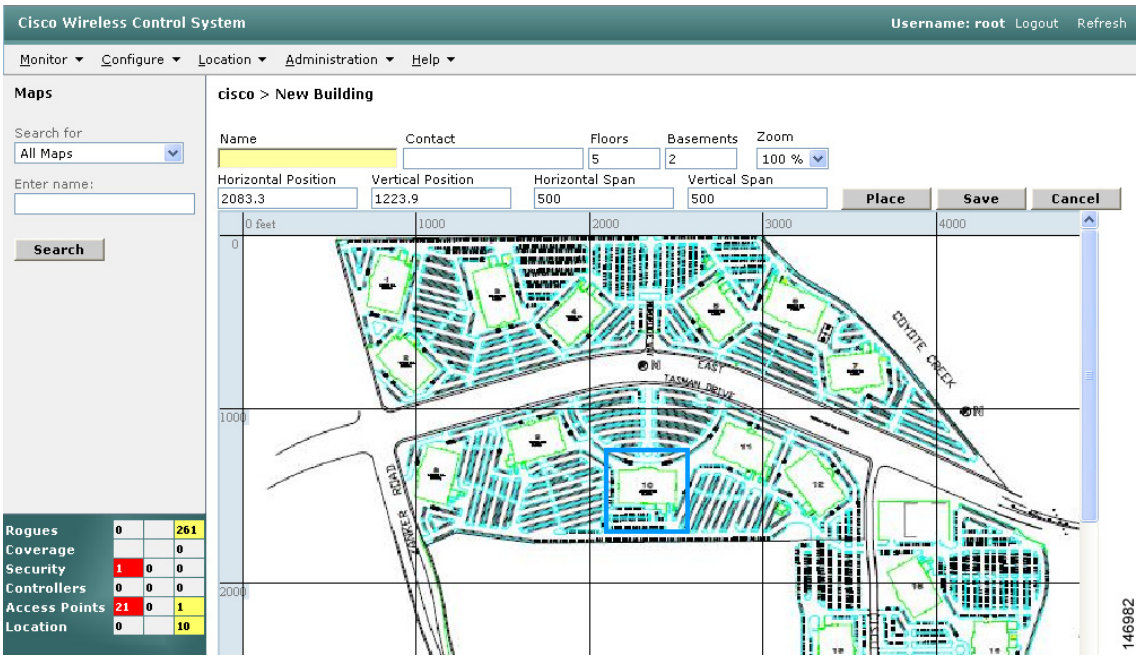
Figure 5-18 New Building



Step 10 Enter the name of the building, the contact person, and the number of floors and basements in the building.

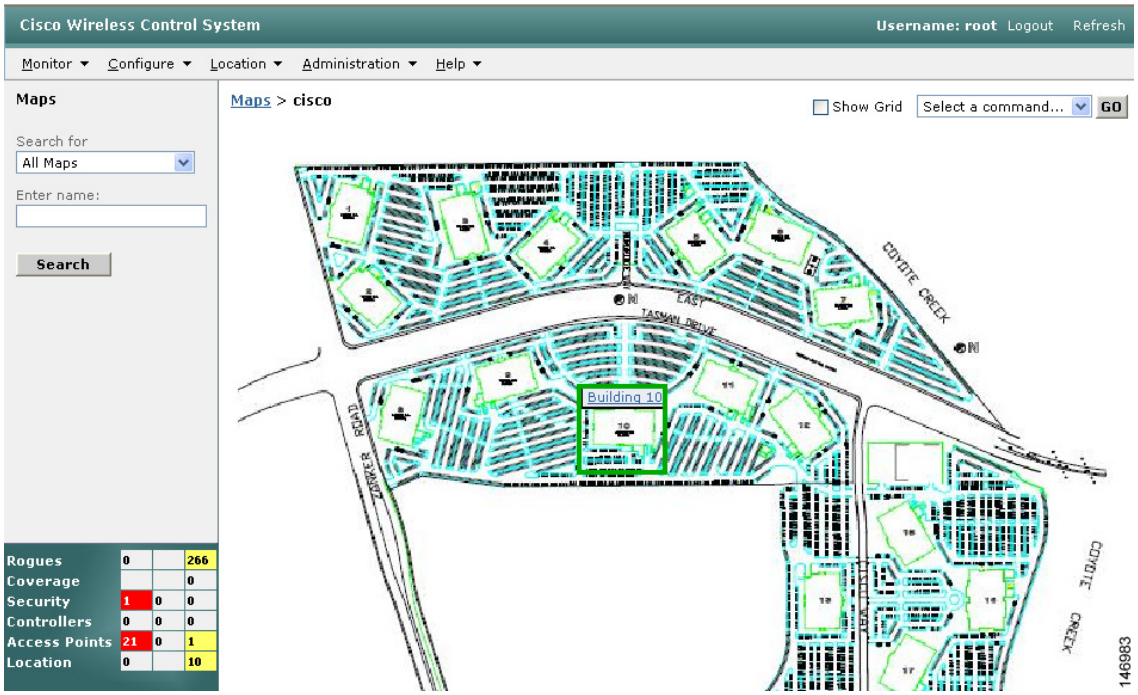
Step 11 Indicate which building on the campus map is the correct building by clicking the blue box in the upper left of the campus image and dragging it to the intended location (see Figure 5-19). To resize the blue box, hold down the **Ctrl** key and click and drag to adjust its horizontal size. You 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 5-19 Repositioning Building Highlighted in Blue



Step 12 WCS is then returned to the campus image with the newly created building highlighted in a green box. Click the **green box** (see Figure 5-20).

Figure 5-20 Newly Created Building Highlighted in Green



Step 13 To create a building without a campus, choose **New Building** and click **GO**.

Step 14 Enter the building's name, contact information, number of floors and basements, and dimension information. Click **Save**. WCS is returned to the Monitor > Maps window.

Step 15 Click the hyperlink associated with the newly created building.

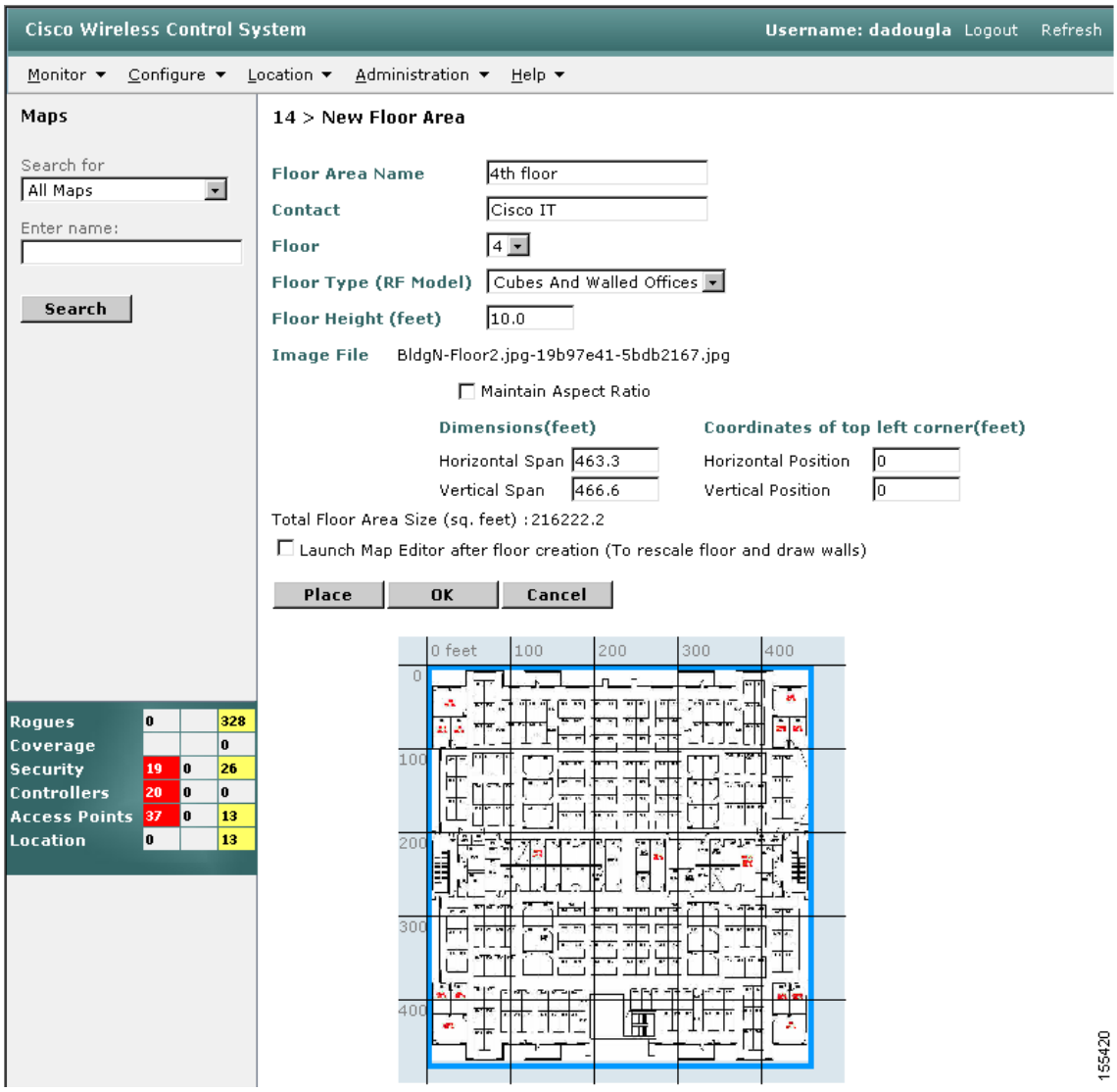
Step 16 On the Monitor > Maps > [Campus Name] > [Building Name] window, go to the drop-down menu and choose **New Floor Area**. Click **GO**.

Step 17 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**.

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 "Creating and Applying Calibration Models" section on page 5-57.

Step 18 If the floor area is a different dimension than the building, adjust floor dimensions by either making numerical changes to the text fields 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 5-21). After making changes to any numerical values, click **Place**.

Figure 5-21 Repositioning Using Numerical Value Fields



Step 19 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 to Enhance Floor Plans" section on page 5-12.

Step 20 At the new floor's image window (Monitor > Maps > [CampusName] > [BuildingName] > [FloorName]), go to the drop-down menu on the upper right and choose **Add Access Points**. Click **GO**.

Step 21 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. Check the box to the left of the Name column to select all access points. Click **OK**.

Step 22 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 on 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 23 To adjust the directional arrow, choose the appropriate orientation in the Antenna Angle drop-down menu. 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 24 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 menu, choose **Properties**.

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

Step 4 The **Advanced Debug** option must be enabled on both the location appliance and WCS so the location accuracy testpoint is correct.

Step 5 In the Import/Export AP Placement portion of the window, 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. (Refer to the "Inspect VoWLAN Readiness" section on page 5-22.)

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

Using Chokepoints to Enhance Tag Location Reporting

Installation of chokepoints provides enhanced location information for RFID tags. When an active Cisco Compatible Extensions version 1 compliant RFID tag enters the range of a chokepoint, it is stimulated by the chokepoint. The MAC address of this chokepoint is then included in the next beacon sent by the stimulated tag. All access points that detect this tag beacon then forward the information to the controller and location appliance.

Using chokepoints in conjunction with active compatible extensions compliant tags provides immediate location information on a tag and its asset. When a Cisco Compatible Extension's tag moves out of the range of a chokepoint, its subsequent beacon frames do not contain any identifying chokepoint information. Location determination of the tag defaults to the standard calculation methods based on RSSIs reported by the access point associated with the tag.

Adding Chokepoints to the WCS Database and Map

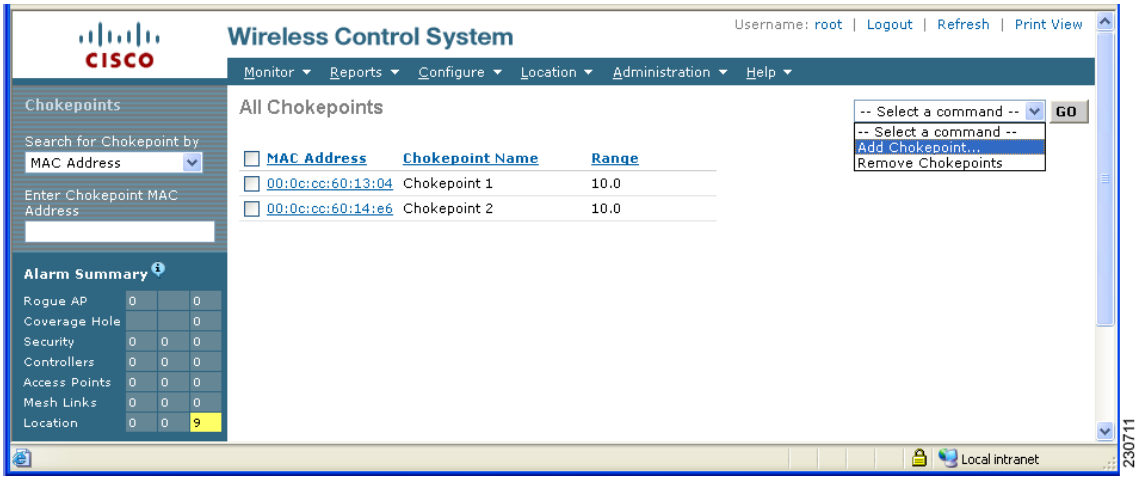
Chokepoints are installed and configured as recommended by the Chokepoint vendor. After the chokepoint installation is complete and operational, the chokepoint is added to WCS and placed on floor maps. They are forwarded to the location server during synchronization.

Follow these steps to add a chokepoint to the WCS database and appropriate map:

Step 1 Choose **Configure > Chokepoints** from the main menu.

The All Chokepoints summary window appears (see Figure 5-22).

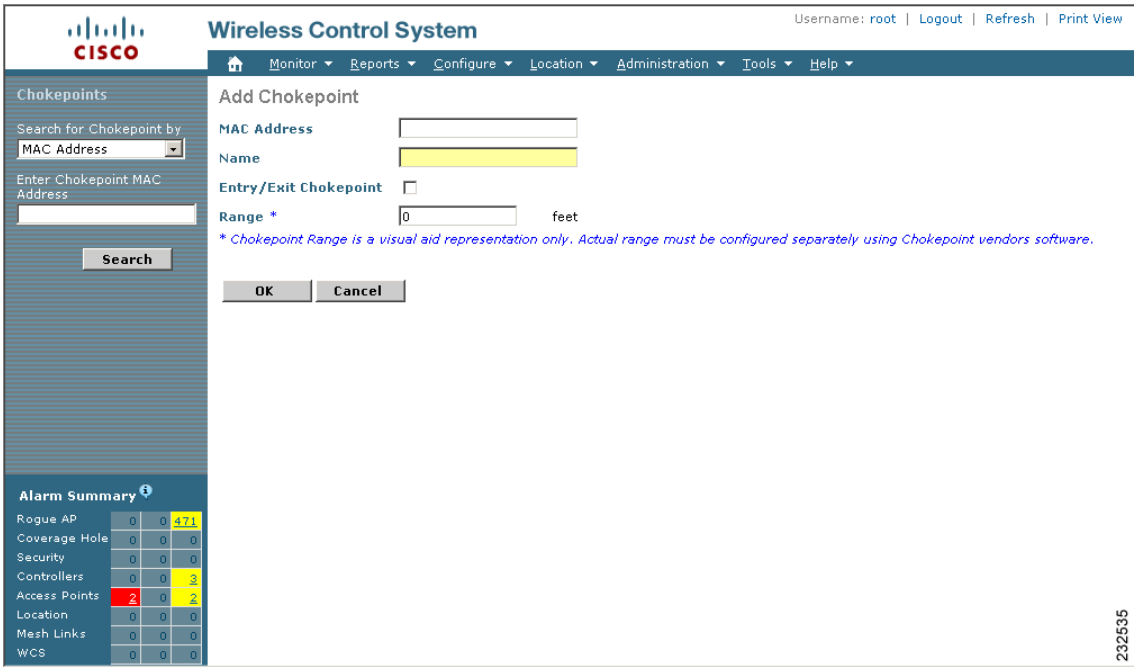
Figure 5-22 Configure > Chokepoints



Step 2 Select **Add Chokepoints** from the Select a command menu (Figure 5-22). Click **GO.**

The Add Chokepoint entry window appears (see Figure 5-23).

Figure 5-23 Add Chokepoint Configuration Page



Step 3 Enter the MAC address, name, and coverage range for the chokepoint.

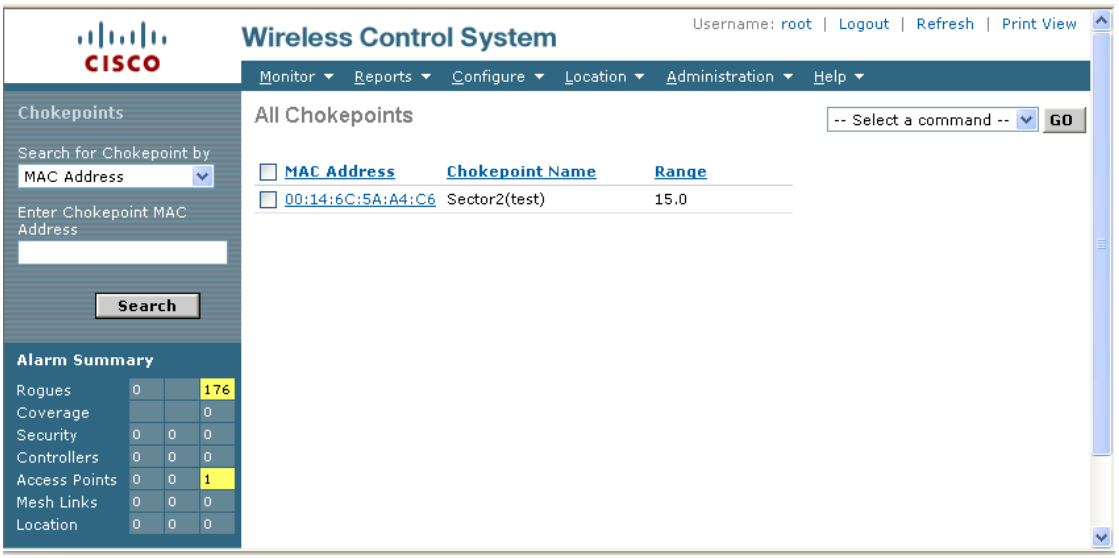
Note The chokepoint range is product-specific and is supplied by the chokepoint vendor.

Step 4 Specify whether the chokepoint is an entry or exit chokepoint.

Step 5 Click **OK** to save the chokepoint entry to the database.

The All Chokepoints summary page appears with the new chokepoint entry listed (Figure 5-24).

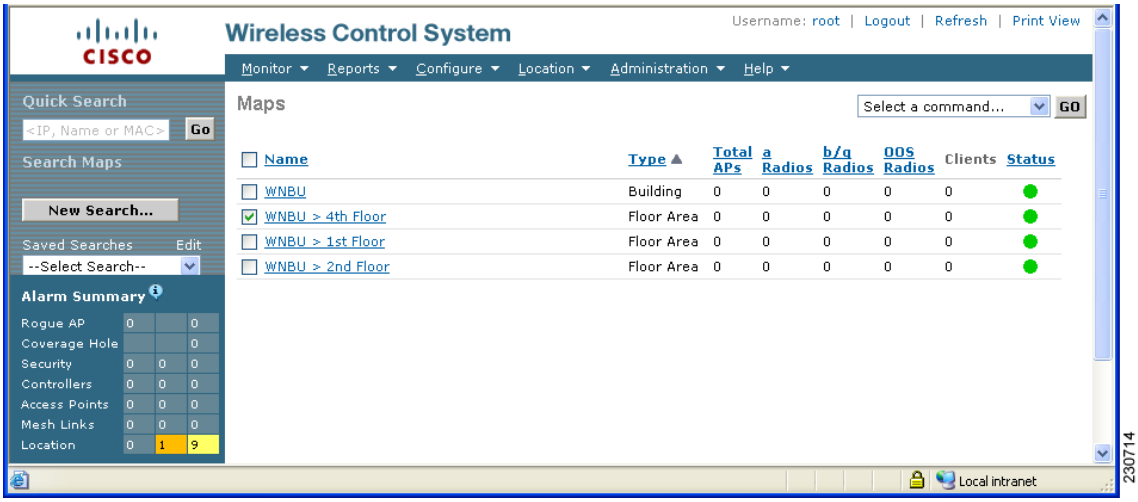
Figure 5-24 All Chokepoints Summary Page



Note After the chokepoint is added to the database, place it on the appropriate WCS floor map.

Step 6 To add the chokepoint to a map, choose **Monitor > Maps** (Figure 5-25).

Figure 5-25 Monitor > Maps



Step 7 On the Maps page, choose the link that corresponds to the floor location of the chokepoint. The floor map appears (Figure 5-26).

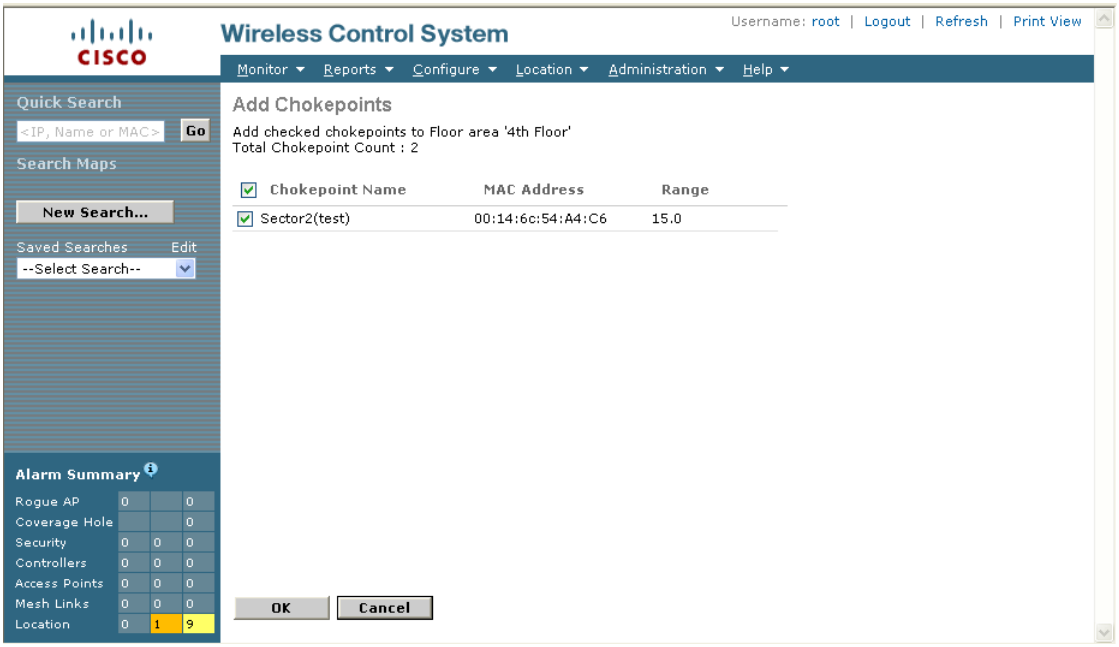
Figure 5-26 Selected Floor Map

Step 8 Select **Add Chokepoints** from the Select a command menu. Click **GO**.

The Add Chokepoints summary page appears (see Figure 5-27).

Note The Add Chokepoints summary page lists all recently added chokepoints that are in the database but not yet mapped.

Figure 5-27 Add Chokepoints Summary Page



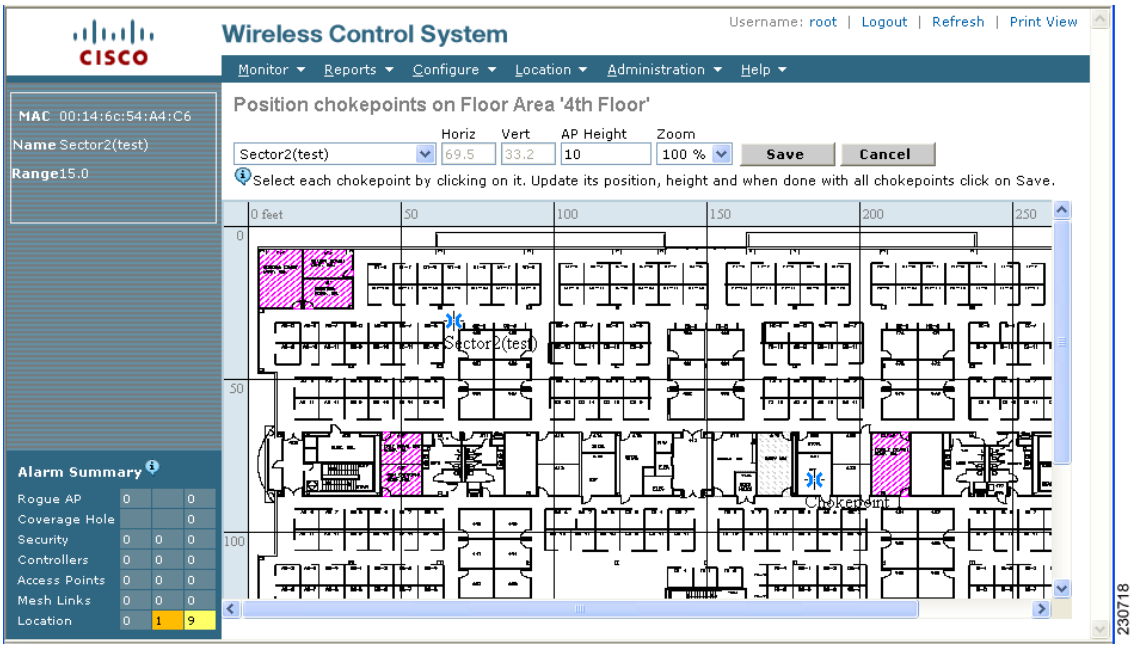
Step 9 Check the box next to the chokepoint to be added to the map. Click **OK**.

A map appears with a chokepoint icon located in the top-left hand corner (Figure 5-28). You are now ready to place the chokepoint on the map.

Figure 5-28 Map for Positioning Chokepoint

Step 10 Left click on the chokepoint icon and drag and place it in the proper location (see Figure 5-29).

Figure 5-29 Chokepoint Icon Positioned on the Floor Map



Note The MAC address, name, and coverage range of the chokepoint appear in the left panel when you click on the chokepoint icon for placement.

Step 11 Click **Save** when the icon is correctly placed on the map.

You are returned to the floor map and the added chokepoint appears on the map.

Note The newly created chokepoint icon may or may not appear on the map depending on the display settings for that floor. If the icon did not appear, proceed with Step 12.

Figure 5-30 New Chokepoint Appears on Floor Map

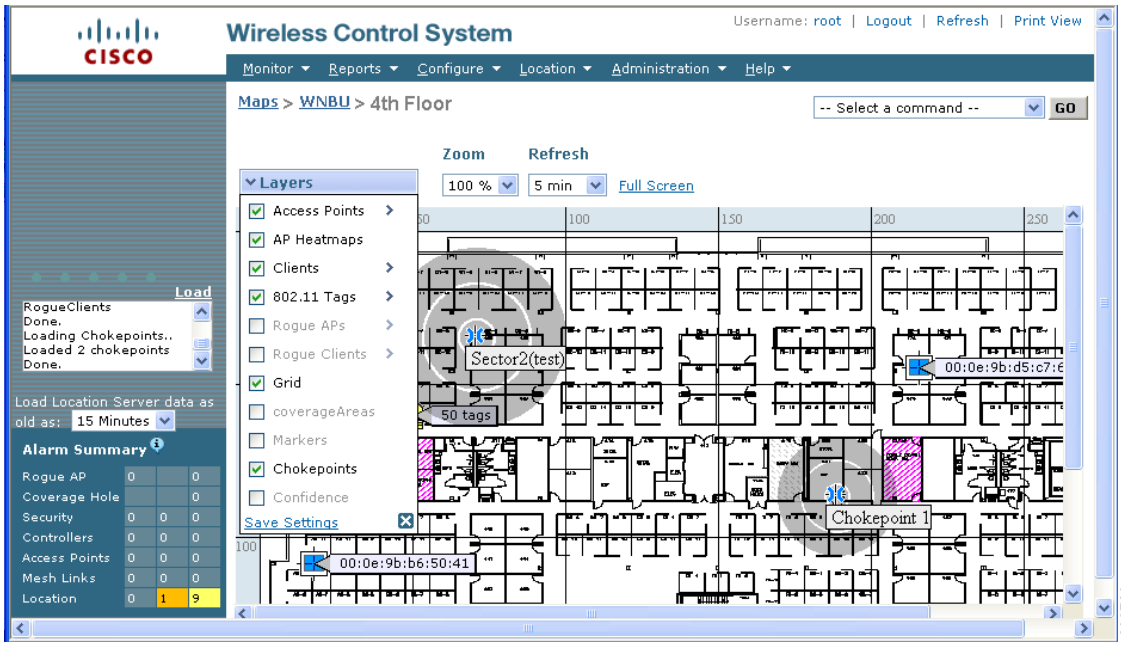
Note The rings around the chokepoint icon indicate the coverage area. When a Cisco Compatible Extensions tag and its asset passes within the coverage area, location details are broadcast, and the tag is automatically mapped on the chokepoint coverage circle. The chokepoint range is given as a visual only, but chokepoint vendor software is required to actually configure the range. When the tag moves out of the chokepoint range, its location is calculated as before and is no longer mapped on the chokepoint rings. In Figure 5-30, the tag is currently out of range of the chokepoint.

Note MAC address, name, and range of a chokepoint display when you pass a mouse over its map icon.

Step 12 If the chokepoint does not appear on the map, click **Layers** to collapse a selection menu of possible elements to display on the map. Click the **Chokepoints** box.

The chokepoint appears on the map (Figure 5-31).

Figure 5-31 Display Chokepoints on Map



Step 13 Click **X** to close the Layers window.

Note Do not select **Save Settings** unless you want to save this display criteria for all maps.

Removing Chokepoints from the WCS Database and Map

You can remove one or multiple chokepoints at a time.

Follow these steps to delete a chokepoint.

Step 1 Choose **Configure > Chokepoints**. The All Chokepoints page appears.

Step 2 Check the box(es) next to the chokepoint(s) to be deleted.

Step 3 Choose **Remove Chokepoints** from the Select a command drop-down menu. Click **GO**.

Step 4 To confirm chokepoint deletion, click **OK** in the pop-up window that appears.

You are returned to the All Chokepoints page. A message confirming deletion of the chokepoint appears. The deleted chokepoint(s) is no longer listed on the page.

Monitoring Chokepoints

Chokepoints are installed and configured as recommended by the chokepoint vendor. Chokepoints are added to WCS and placed on floor maps, and then they are pushed to the location server during synchronization. Choose **Monitor > Chokepoints** to display a list of found chokepoints. Clicking the link under Map Location for a particular chokepoint displays a map that shows the location of the chokepoint. The following parameters are displayed:

- MAC Address—The MAC address of the chokepoint.
- Chokepoint Name—The user-defined name of the chokepoint.
- Entry/Exit Chokepoint—Specifies whether the chokepoint is an entry or exit chokepoint.
- Range—The range of the chokepoint in feet.
- Map Location—A link to a map showing the location of the chokepoint.

Monitoring Maps

This section describes how to use maps to monitor your wireless LANs and predict coverage. You can use maps to do the following:

- Monitoring Predicted Coverage, page 5-43
- Monitoring Transmit Power Levels on a Floor Map, page 5-50
- Monitoring Coverage Holes on a Floor Map, page 5-51
- Monitoring Clients on a Floor Map, page 5-52
- Monitoring Outdoor Areas, page 5-53

In preparation for monitoring your wireless LANs, familiar yourself with the various refresh options for a map.

- Refresh from network—By clicking **Refresh Heatmap** in the left sidebar menu (see callout 1 in Figure 5-32), 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.

  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 5-32). Clicking this refreshes the complete page, or the map and its status and statistics if you are on a map page.
- Load—The Load option in the left sidebar menu refreshes map data from the WCS database on demand (see callout 2 in Figure 5-32). Otherwise, the Refresh option (by the Zoom option on the upper right of the map) provides an interval drop-down menu to set how often to refresh the map data from the database.

Figure 5-32 Monitoring Maps

Note All three options refresh the data based on the layer selection.

Monitoring Predicted Coverage

Follow these steps to monitor the predicted wireless LAN coverage on a map.

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

Step 2 Click an item in the Name column.

Step 3 Click **Layers** to see a check list of the available layers to view. Choosing some layers results in a popup window to further choose what content gets shown in the map. Those layers with popups are described in the next sections. The layer options are as follows:

- Access Points
- AP Heatmaps
- AP Mesh Info —Displays only if mesh access points are present in outdoor areas.
- Clients —Displays data only if a location server was added in WCS.
- 802.11 Tags
- Rogue APs —Displays data only if a location server was added in WCS.
- Rogue Adhocs —Displays data only if a location server was added in WCS.
- Rogue Clients —Displays only if a location server was added in WCS.
- Grid

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

Note If you click the arrow to the right of these layers, more filter options are provided.

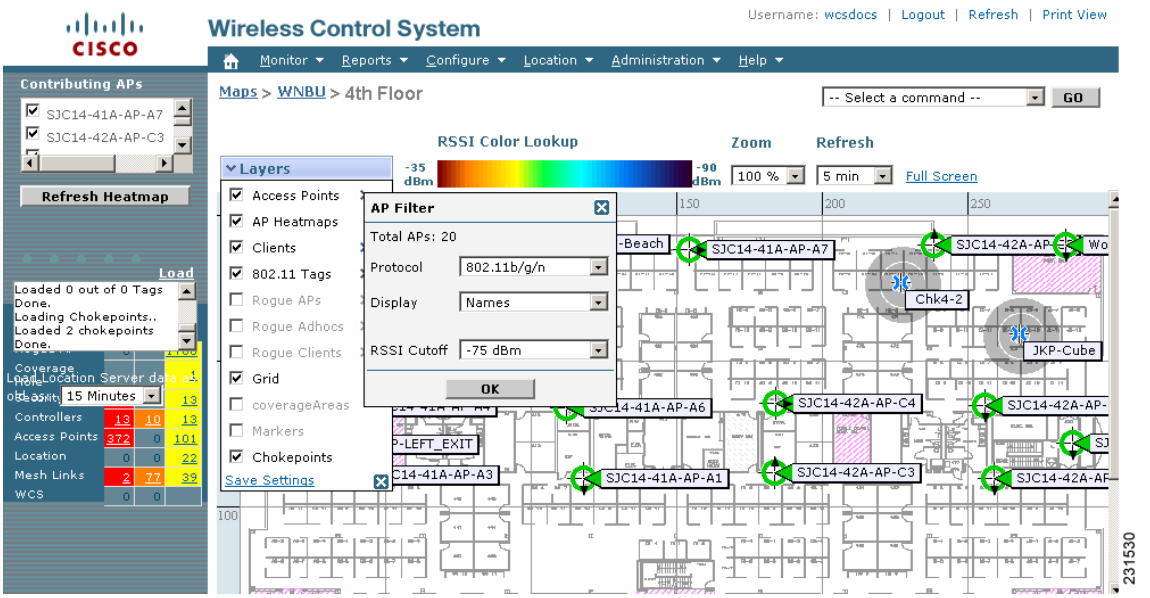
The enabled layers are checked, and the disabled ones are unavailable.

Note When you mouse over the various locations, a popup with general, 802.11a/n, and 802.11b/g/n data appears. It provides the channel, transmit power level, user count, utilization count, antenna name, antenna angle, and elevation angle (for the 802.11a/n and 802.11b/g/n windows), and access point MAC address, model, controller IP address, location, and height in the General tab.

Access Point Layer

If you enable the Access Point layer and then click on the arrow to the right of these layers, an access point filter window appears with further menu options (see Figure 5-33).

Figure 5-33 AP Filter Window



Step 1 From the Protocol drop-down menu, choose one of the following 802.11 protocols to display on the coverage map:

- **802.11a/n & b/g/n**—Displays all the access points in the area.
- **802.11a/n**—Displays a colored overlay depicting the coverage patterns for the 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 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.

Step 2 From the Display drop-down menu, choose one of the following options to specify the information that appears in the flag next to each access point on the map:

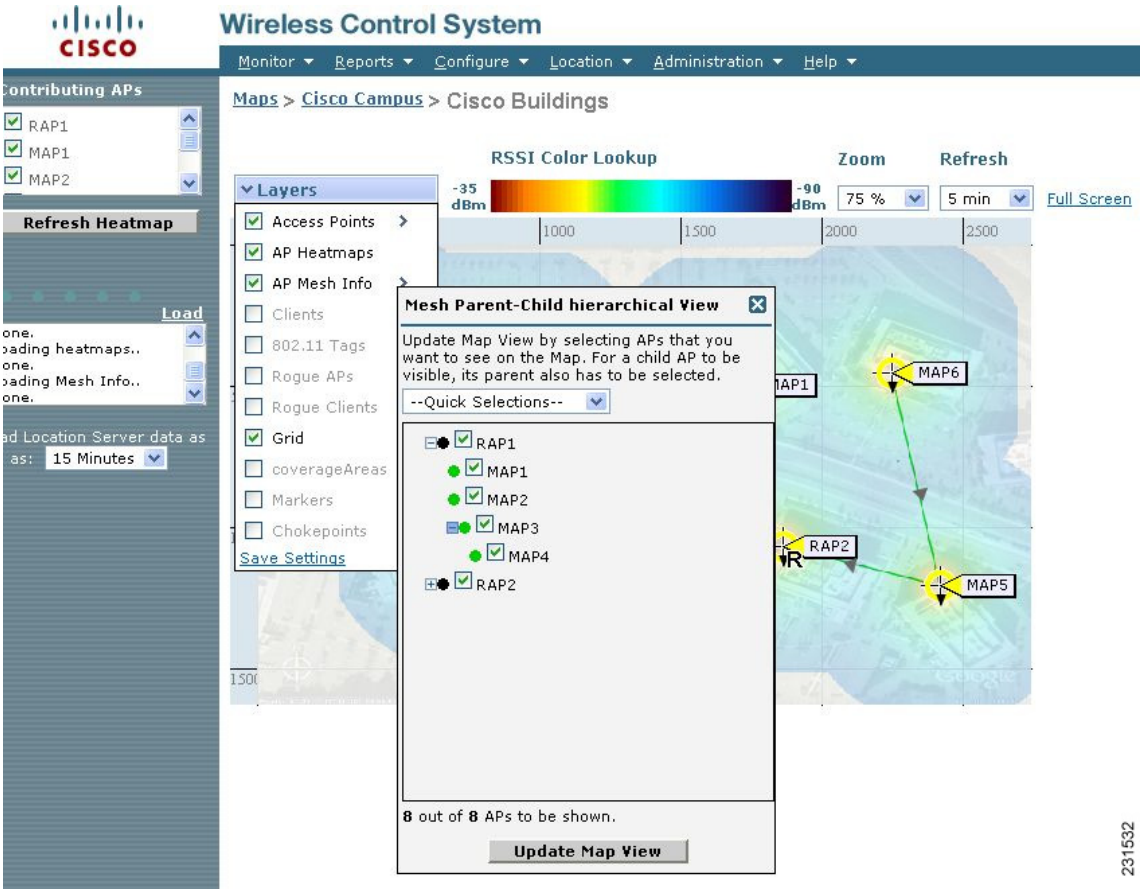
- **Channels**—Shows the Cisco Radio channel number as `Ch#nn`, where *nn* is the channel number, or shows *Unavailable* for unconnected access points.
- **TX Power Level**—Shows the current Cisco Radio transmit power level as Tx Power n, where *n* is power level 1 (high) through 5 (low) or shows *Unavailable* for unconnected access points.
- **Coverage Holes**—Shows the percentage of clients whose signal has become weaker until the client lost its connection, shows *Unavailable* for unconnected access points, or shows *MonitorOnly* for access points in Monitor-Only mode.
- **MAC Addresses**—Displays the MAC address of the access point, regardless of whether 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, "Unavailable" for disassociated access points, or "MonitorOnly" for access points in monitor-only mode.
- **Profiles**—Shows the Load, Noise, Interference and Coverage components of the corresponding operator-defined thresholds: *Okay* for thresholds not exceeded, *Issue* for exceeded thresholds, or *Unavailable* for unconnected access points. You must also then specify the profile type as load, noise, interference, or coverage.
- **Users**—Shows the number of Cisco WLAN Solution clients, shows *Unavailable* for unconnected access points, or shows *MonitorOnly* for access points in Monitor-Only mode.
- Bridge Group Names

Step 3 Click **OK**.

AP Mesh Info Layer

If you enable the AP Mesh Info layer and then click on the arrow to the right of these layers, a Mesh Parent-Child Hierarchical View window appears with further menu options (see Figure 5-34).

Figure 5-34 Mesh Parent-Child Hierarchical View Window



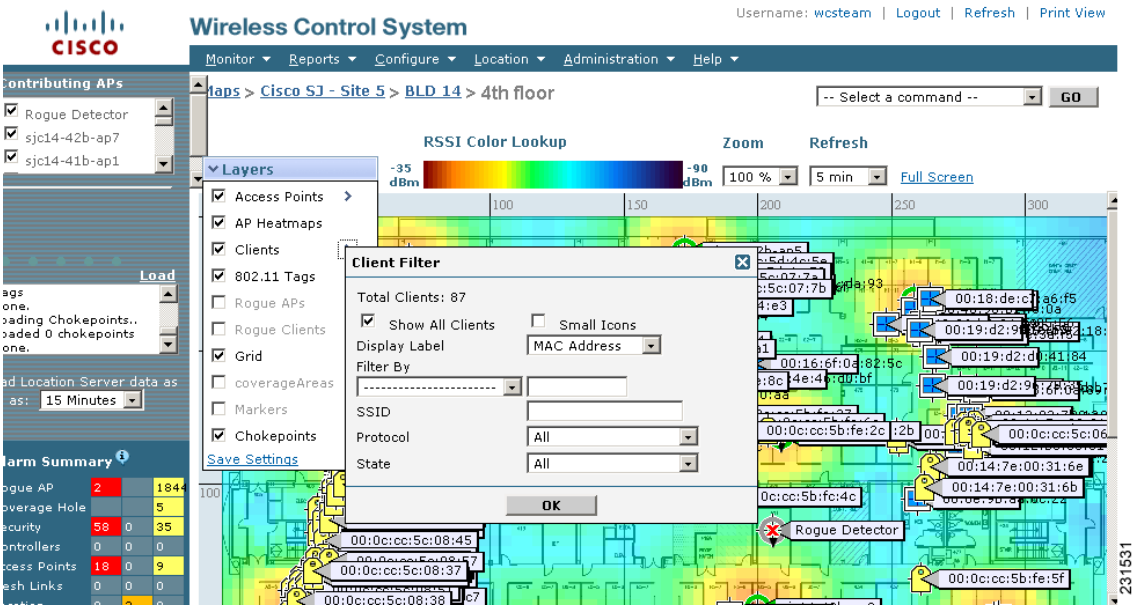
You can update the map view by choosing the access points you want to see on the map. From the Quick Selections drop-down menu, choose to select only root access point, various hops between the first and the fourth, or select all access points.

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

Clients Layer

If you enable the Clients layer and then click on the arrow to the right of these layers, a Client Filter window appears with further menu options (see Figure 5-35).

Figure 5-35 Client Filter Window



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

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

The Protocol drop-down menu options are as follows:

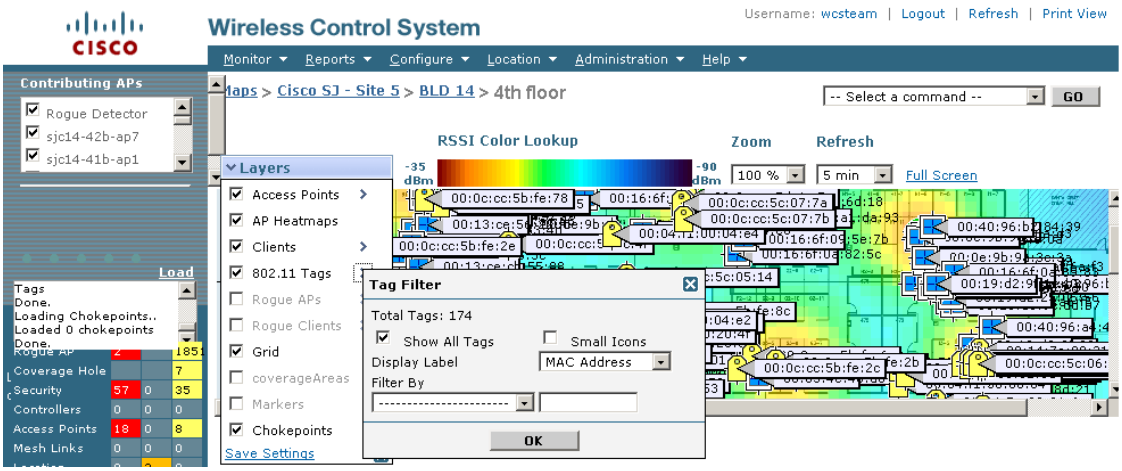
- **All**—Displays all the access points in the area.
- **802.11a/n**—Displays a colored overlay depicting the coverage patterns for the clients with 802.11a/n radios. The colors show the received signal strength from red (–35 dBm) through dark blue (–85 dBm).
- **802.11b/g/n**—Displays a colored overlay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

You can further choose to show clients in all states or specifically idle, authenticated, probing, or associated clients.

802.11 Tags Layer

If you enable the 802.11 Tags layer and then click on the arrow to the right of these layers, a Tag Filter window appears with further menu options (see Figure 5-36).

Figure 5-36 Tag Filter Window



If you click the **Show All Tags** check box and **Small Icons** check box, all other drop-down menu options are grayed out.

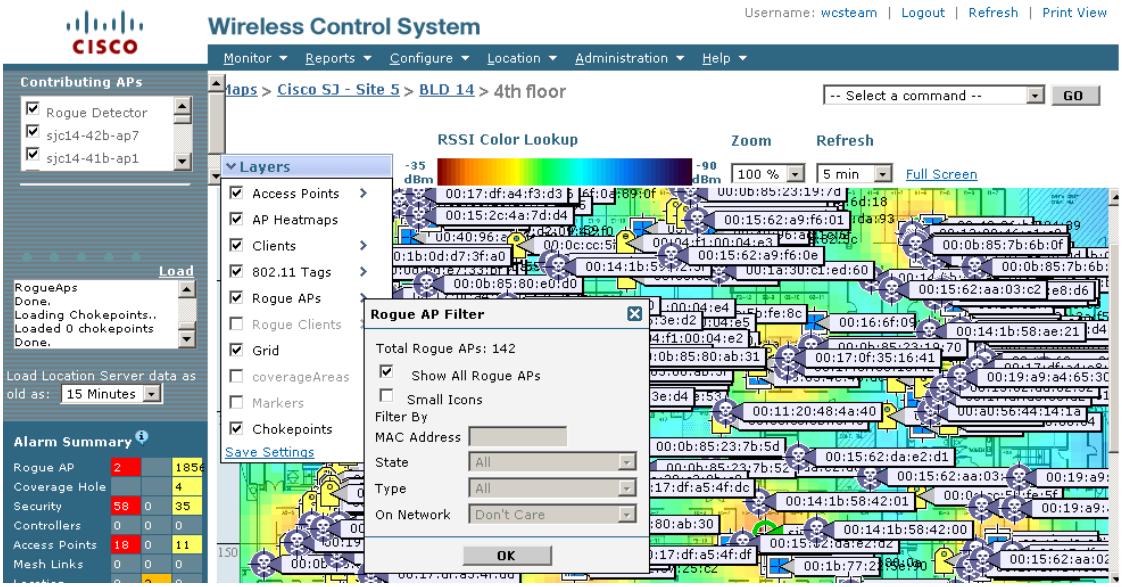
If you uncheck the **Small Icons** check box, you can choose if the want the label to display MAC address, asset name, asset group, or asset category.

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

Rogue APs Layer

If you enable the Rogue APs layer and then click on the arrow to the right of these layers, a Rogue AP Filter window appears with further menu options (see Figure 5-37).

Figure 5-37 Rogue AP Filter Window



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

If you uncheck the **Show All Rogue APs** check box, you can specify how you want the rogue access points filtered. Follow these steps to define the filter.

Step 1 If you want to view a particular MAC address, enter it in the MAC Address field.

Step 2 From the State drop-down menu, choose if you want to display rogues in the alert, known, acknowledged, contained, threat, or unknown contained state.

Step 3 Specify if you want to display all rogues, access point rogues, or ad hoc rogues.

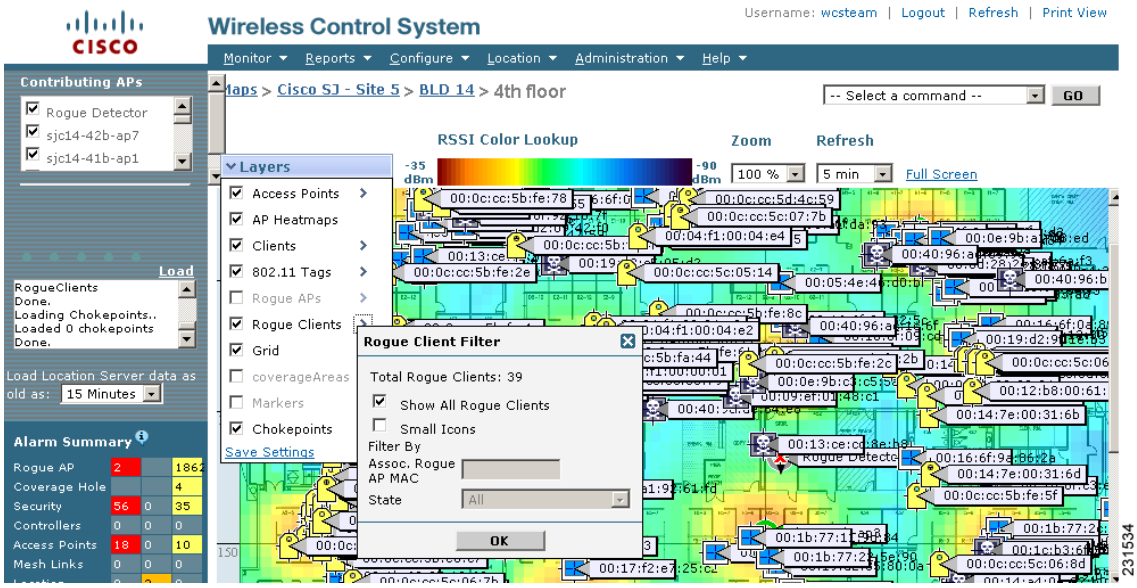
Step 4 Specify whether or not you want to display rogue access points on the network.

Step 5 Click **OK**.

Rogue Clients Layer

If you enable the Rogue Clients layer and then click on the arrow to the right of these layers, a Rogue Client Filter window appears with further menu options (see Figure 5-38).

Figure 5-38 Rogue Client Filter Window



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

If you uncheck the **Show All Rogue Clients** check box, you can specify how you want the rogue clients filtered. Follow these steps to define the filter.

Step 1 Provide the MAC address of an associated rogue access point.

Step 2 Specify if you want to display all rogue clients or those in the alert, contained, or threat state.

Monitoring Channels on a Floor Map

Follow these steps to monitor channels on a floor map.

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

Step 2 Click an item in the Name column.

Step 3 Click **>Layers**.

Note When you mouse over the various locations, a popup with general, 802.11a/n, and 802.11b/g/n data appears. It provides the channel, transmit power level, user count, utilization count, antenna name, antenna angle, and elevation angle (for the 802.11a/n and 802.11b/g/n windows), and access point MAC address, model, controller IP address, location, and height in the General tab.

Step 4 Click the **Access Points** check box.

Step 5 Click the **>** beside Access Point.

Step 6 From the Display drop-down menu, choose **Channels**.

The number of the channel being used by each radio appears in the flag next to each access point. "Unavailable" appears for disassociated access points.

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

Monitoring Transmit Power Levels on a Floor Map

Follow these steps to monitor transmit power levels on a floor map.

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

Step 2 Click an item in the Name column.

Step 3 Click **Layers**.

Note When you mouse over the various locations, a popup with general, 802.11a/n, and 802.11b/g/n data appears. It provides the channel, transmit power level, user count, utilization count, antenna name, antenna angle, and elevation angle (for the 802.11a/n and 802.11b/g/n windows), and access point MAC address, model, controller IP address, location, and height in the General tab.

Step 4 Click the Access Point check box.

Step 5 Click the **arrow** beside Access Point.

Step 6 Choose **Tx Power Level** from the Display drop-down menu.

Step 7 The number of the transmit power level being used by each radio appears in the flag next to each access point. “Unavailable” appears for disassociated access points.

Table 5-4 lists the transmit power level numbers and their corresponding power settings:

Table 5-4 Transmit Power Level Values

Transmit Power Level Number	Power Setting
1	Maximum power allowed per country code setting
2	50% power
3	25% power
4	12.5 to 6.25% power
5	6.25 to 0.195% power

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

Monitoring Coverage Holes on a Floor Map

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.

Follow these steps to monitor coverage holes on a floor map.

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

Step 2 Click an item in the Name column.

Step 3 Click **Layers**.

Note When you mouse over the various locations, a popup with general, 802.11a/n, and 802.11b/g/n data appears. It provides the channel, transmit power level, user count, utilization count, antenna name, antenna angle, and elevation angle (for the 802.11a/n and 802.11b/g/n windows), and access point MAC address, model, controller IP address, location, and height in the General tab.

Step 4 Click the **Access Points** check box.

Step 5 Click the **arrow** beside Access Point.

Step 6 Choose **Coverage Holes** from the Display drop-down menu.

The percentage of clients that have lost their connection to the wireless network appears in the flag next to each access point. “Unavailable” appears for disassociated access points, and “MonitorOnly” appears for access points in monitor-only mode.

Monitoring Clients on a Floor Map

Follow these steps to monitor client devices on a floor map.

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

Step 2 Click an item in the Name column.

Step 3 Click **Layers**.

Note When you mouse over the various locations, a popup with general, 802.11a/n, and 802.11b/g/n data appears. It provides the channel, transmit power level, user count, utilization count, antenna name, antenna angle, and elevation angle (for the 802.11a/n and 802.11b/g/n windows), and access point MAC address, model, controller IP address, location, and height in the General tab.

Step 4 Click the **Access Points** check box.

Step 5 Click the **arrow** beside Access Point.

Step 6 Choose **Users** from the Display drop-down menu.

The number of client devices associated to each radio appears in the flag next to each access point. “Unavailable” appears for disassociated access points, and “MonitorOnly” appears for access points in monitor-only mode.

Step 7 Click the number of clients to display a list of specific client devices and parameters. Table 5-5 lists the parameters that appear.

Table 5-5 Client Parameters

Parameter	Description
User	The username of the client
Vendor	The manufacturer of the client
IP Address	The IP address of the client
MAC Address	The MAC address of the client
Access Point	The name of the access point to which the client is associated
Controller	The IP address of the controller to which the access point is connected
Port	The port number of the controller to which the access point is connected
802.11 State	Indicates whether the client is associated or disassociated
SSID	The service set identifier (SSID) being broadcast by the access point
Authenticated	Indicates whether authentication is enabled or disabled
Protocol	Indicates whether the 802.11a/n or 802.11b/g/n protocol is being used

Monitoring Outdoor Areas

Follow these steps to add outdoor areas to a campus.

Step 1 Choose **Monitor > Maps**.

Step 2 Click a campus name in the Name column. Verify in the Type column that it is a campus and not a building, floor area, or outdoor area.

Step 3 From the Select a command drop-down menu, choose **New Outdoor Area** and click **GO**.

Step 4 Enter the user-defined name of the new outdoor area.

Step 5 Provide a contact name.

Step 6 Use the drop-down menu to choose what type of structures exist in this area. You can choose cubes and walled offices, drywall office only, or outdoor open space.

Step 7 Enter the height in feet where the access point is mounted.

Step 8 Enter the name of the file containing the outdoor area map or use the **Browse** button to locate the file. Click **Next** to continue with the new outdoor area process.

Step 9 A blue rectangle appears in the upper right-hand corner, superimposed on the map of the campus. Using the mouse, drag this rectangle to the desired outdoor location. To resize the blue rectangle, use Ctrl+Left+Click.

Step 10 The name and contact information carries over to this window. Use the zoom to get a different view of the map.

Step 11 Click the **Maintain Image Aspect Ratio** check box if you want to maintain the ratio of horizontal and vertical pixels of the map image. Maintaining the aspect ratio prevents visual distortion of the map.

Step 12 Enter the horizontal distance from the corner of the outdoor area rectangle to the left edge of the campus map in feet or meters.

Step 13 Enter the vertical distance from the corner of the outdoor area rectangle to the top edge of the campus map in feet or meters.

Step 14 Enter the left to right horizontal span of the outdoor area rectangle in feet or meters.

Step 15 Enter the up and down vertical span of the outdoor area rectangle in feet or meters.

Note To change the unit of measurement (feet or meters), choose **Monitor > Maps** and then choose **Properties** from the Select a command drop-down menu and click **GO**. The first drop-down menu on the Maps > Properties window allows you to choose between feet or meters as a unit of dimension.

Step 16 Choose **Place** to fix the changes on the display or **Save** to add them to the database.

Importing or Exporting WLSE Map Data

When converting from autonomous to LWAPP and from WLSE to WCS, one of the conversion steps is to manually re-enter the access point-related 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), go to http://<WLSE_IP_ADDRESS>:1741/debug/export/exportSite.jsp.

Step 1 Choose **Monitor > Maps**.

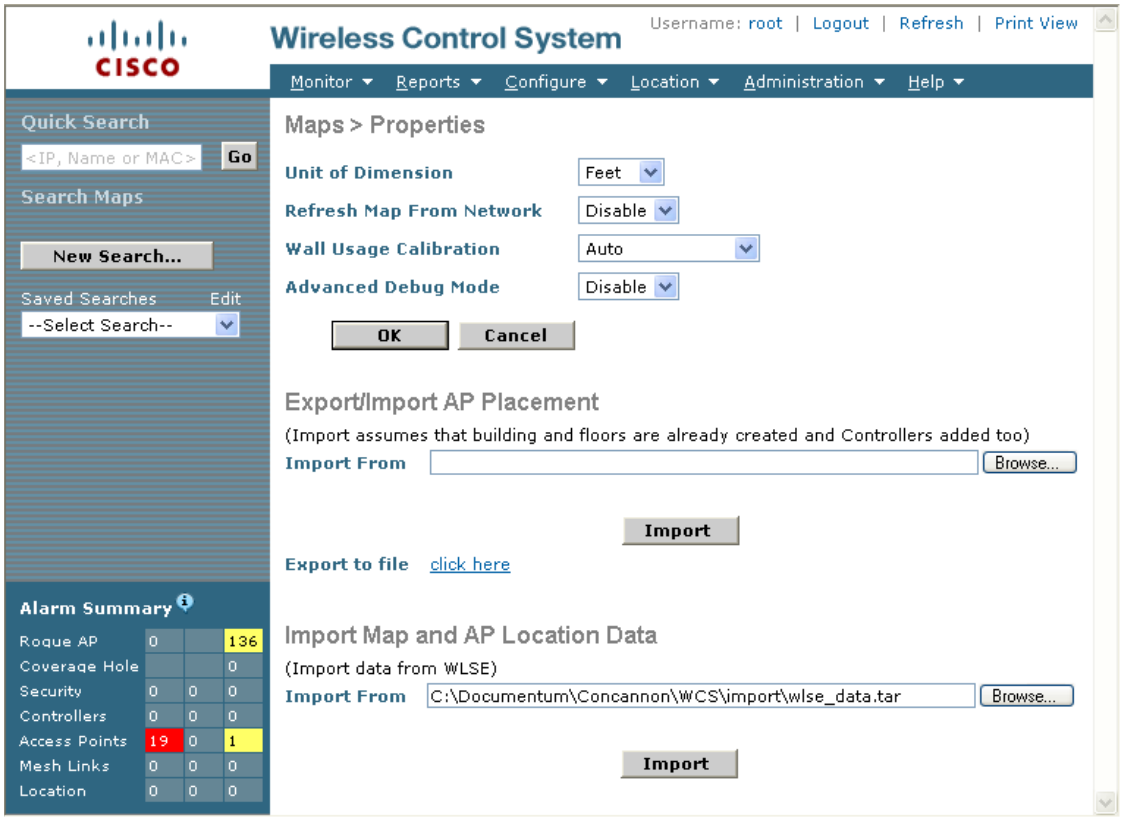
Step 2 Choose **Properties** from the Select a command drop-down menu and click **GO**.

Step 3 In the Import Map and AP Location 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 (see Figure 5-39).

Figure 5-39 Maps > Properties Window



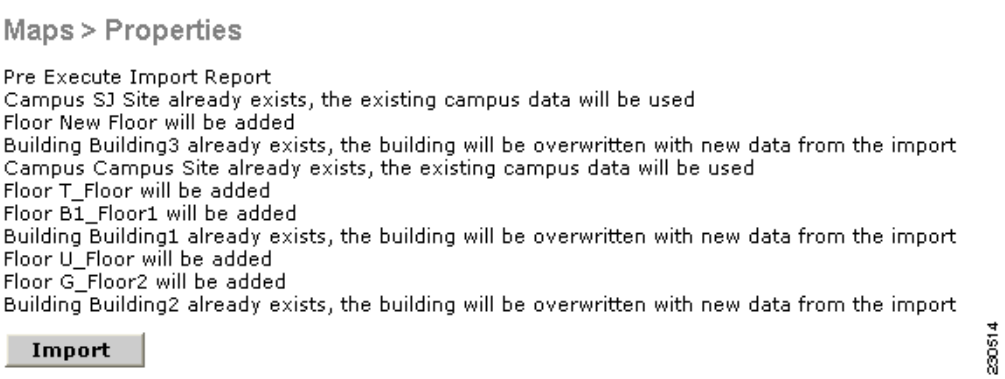
Step 5 Click **Import**.

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 (see Figure 5-40). The report also specifies what cannot be added and why.

Figure 5-40 Pre Execute Import Report

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 (see Figure 5-41).

Figure 5-41 Pre Execute Import Report — Duplicate Data Handling



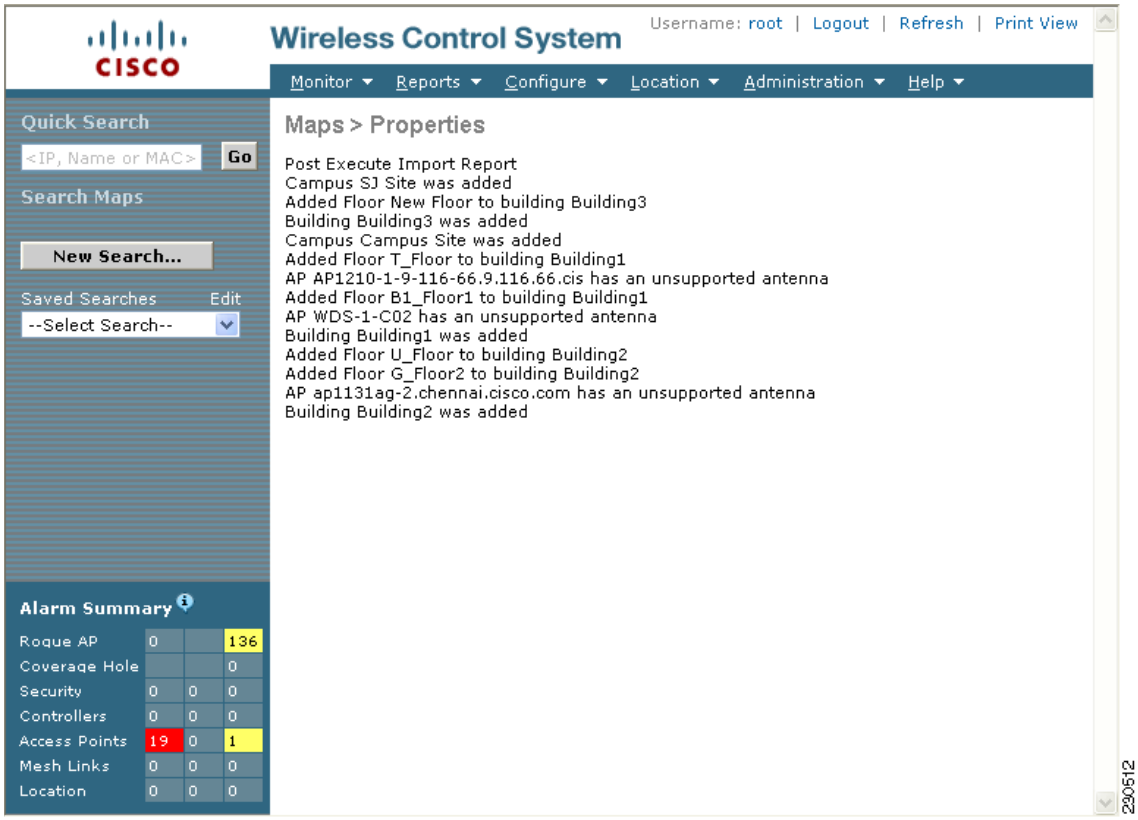
Note If there are duplicate names between a WLSE site and building combination and a WCS campus (or top-level building) and building combination, WCS displays a message in the Pre Execute Import Report indicating that it will delete the existing building.

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

WCS displays a report indicating what was imported (see Figure 5-42).

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 on the floor image to go directly to the appropriate floor screen.

Figure 5-42 Post Execute Import Report



Step 7 Click **Monitor > Maps** to view the imported data (see Figure 5-42).

Creating and Applying Calibration Models

If the provided RF models do not sufficiently characterize the floor layout, you can create a calibration model that is applied to the floor and better represents the attenuation characteristics of that floor. In environments in which many floors share common attenuation characteristics (such as in a library), one calibration model can be created and then applied to floors with the same physical layout and same deployment.

The calibration models are used as RF overlays with measured RF signal characteristics that can be applied to different floor areas. This enables the Cisco WLAN solution installation team to lay out one floor in a multi-floor area, use the RF calibration tool to measure, save the RF characteristics of that floor as a new calibration model, and apply that calibration model to all the other floors with the same physical layout.

You can collect data for a calibration using one of two methods:

- Data point collection—Calibration points are chosen and their coverage area is calculated one location at a time.
- Linear point collection—A series of linear paths are chosen and then calculated as you traverse the path. This approach is generally faster than the data point collection. You can also employ data point collection to augment data collection for locations missed by the linear paths.

Note A client device that supports both 802.11a/n and 802.11b/g/n radios is recommended to expedite the calibration process for both spectrums.

Use a laptop or other wireless device to open a browser to the WCS server and perform the calibration process.

Step 1 Navigate to **Monitor > Maps** and choose **RF Calibration Models** from the Select a command drop-down menu. Click **GO**.

Step 2 Choose **Create New Model** from the Select a command drop-down menu. Click **GO**.

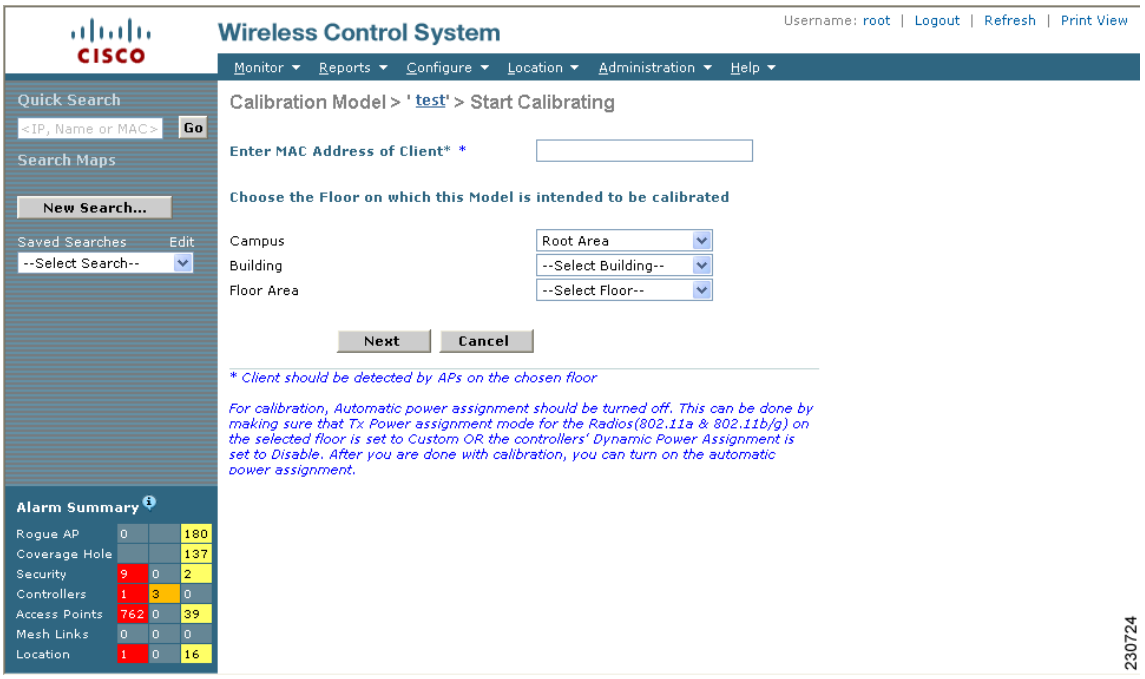
Step 3 Assign a name to the model and click **OK**.

Step 4 The new model appears along with the other RF calibration models, but its status is listed as Not Yet Calibrated. To start the calibration process, click on the hyperlink associated with the new model name. A new window appears which indicates the details of the new model. In the upper right-hand corner, choose **Add Data Points** from the Select a command drop-down menu and click **GO**.

Step 5 If this process is being performed from a mobile device connected to WCS through the Cisco Centralized architecture, the MAC address field is automatically populated with the device's address. Otherwise, you can manually enter the MAC address of the device being used to perform the calibration. MAC addresses that are manually entered must be delimited with colons (such as FF:FF:FF:FF:FF:FF).

Step 6 Choose the appropriate campus, building, and floor where the calibration is performed (see Figure 5-43). Click **Next**.

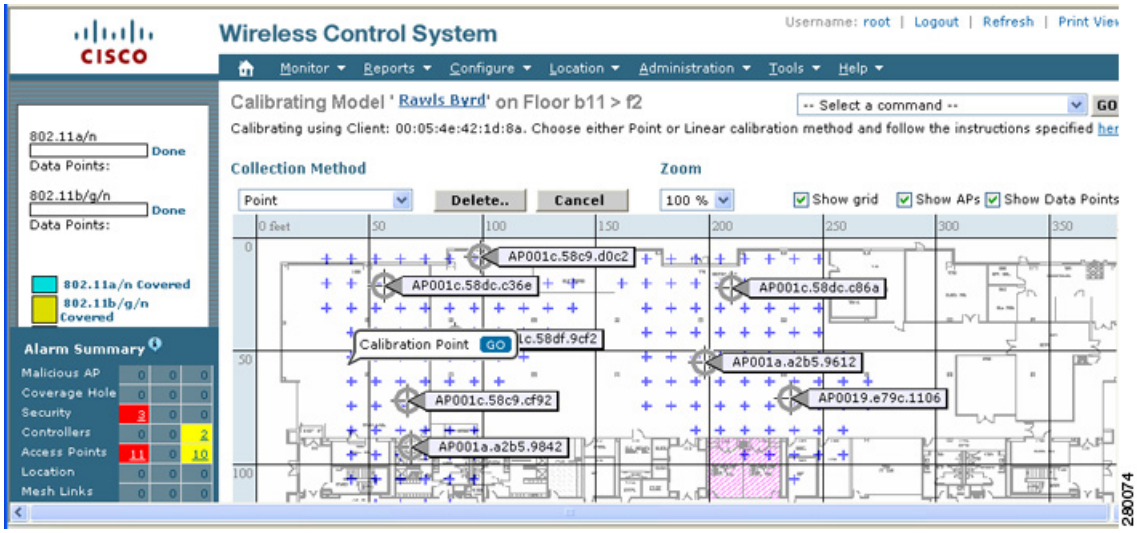
Figure 5-43 Starting to Calibrate



Step 7 When the chosen floor map and access point locations display, a grid of plus marks (+) indicates the locations where data collection for calibration is performed.

Using these locations as guidelines, you can perform either a point or linear collection of data by appropriate placement of either the Calibration Point pop-up (point) or the Start and Finish pop-ups (linear) that display on the map when the respective options are displayed. Figure 5-44 shows the starting window for a point calibration.

Figure 5-44 Positioning Calibration Points



a. If you want to do a point collection of data for the calibration, do the following:

1. Choose **Point** from the Collection method drop-down menu and check the **Show Data points** check box if not already checked. A calibration point pop-up displays on the map.
2. Position the tip of the calibration point pop-up at a data point (+) and click **GO**. A panel appears showing the progress of the data collection.

Note Rotate the calibrating client laptop during data collection so that the client is heard evenly by all access points in the vicinity.

3. When the data collection is complete for a selected data point and the coverage area is plotted on the map, move the calibration point pop-up to another data point and click **GO**.

Note The coverage area plotted on the map is color-coded and corresponds with the specific wireless LAN standard used to collect that data. Information on color-coding is provided in the legend on the left-hand side of the window. Additionally, the progress of the calibration process is indicated by two status bars above the legend, one for 802.11a/n and one for 802.11b/g/n.

Note To delete data points for locations selected in error, click **Delete** and move the black square that appears over the appropriate data points. Resize the square as necessary by pressing **Ctrl** and moving the mouse.

4. Repeat steps a1 to a3 until the calibrations status bar of the relevant spectrums (802.11a/n, 802.11b/g/n) display as *done*.

Note The calibration status bar indicates data collection for the calibration as done, after roughly 50 distinct locations and 150 measurements have been gathered. For every location point saved in the calibration process, more than one data point is gathered. The progress of the calibration process is indicated by two status bars above the legend, one for 802.11b/g/n and one for 802/11a/n.

b. If you want to do a linear collection of data for the calibration, do the following:

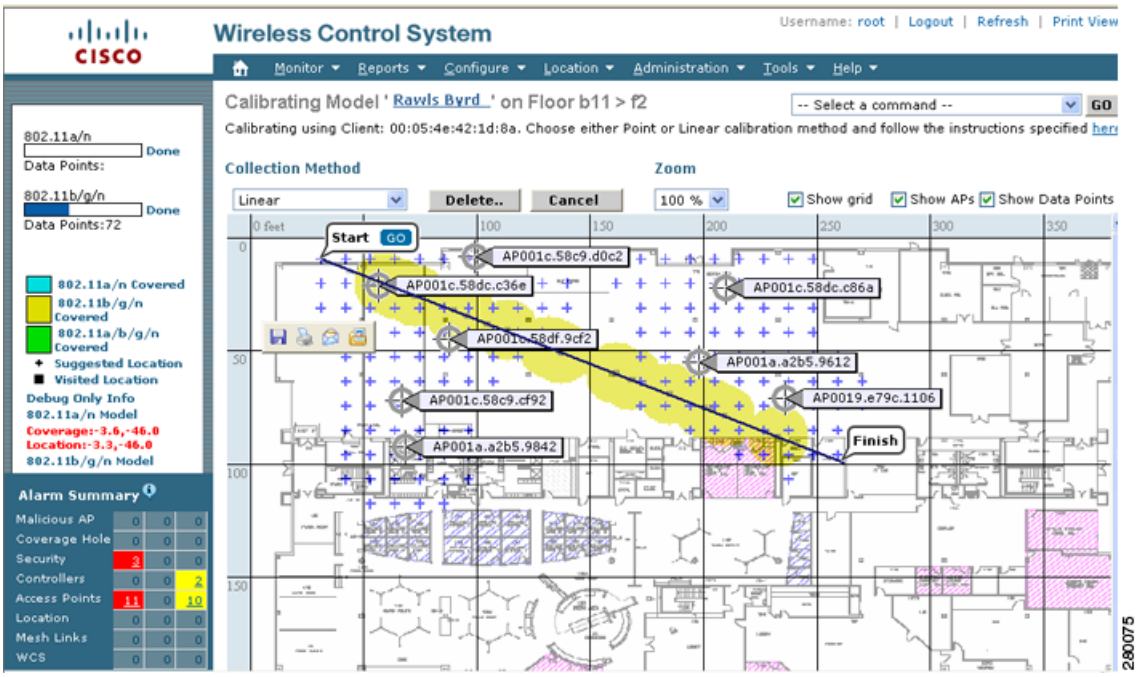
1. Choose **Linear** from the Collection Method drop-down menu and check the **Show Data** points check box if not already checked. A line appears on the map with both Start and Finish pop-ups.
2. Position the tip of the Start pop-up at the starting data point.
3. Position the Finish pop-up at the ending data point.
4. Position yourself with your laptop at the starting data point and click **GO**. Walk steadily towards the end point along the defined path. A panel displays to show that data collection is in process.

Note Do not stop data collection until you reach the end point even if the data collection bar indicates completion.

5. Press the space bar (or **Done** on the data collection panel) when you reach the end point. The collection panel displays the number of samples taken before it closes to reveal the map. The map displays all the coverage areas where data was collected (see Figure 5-45).

Note To delete data points for locations selected in error, click **Delete** and move the black square that appears over the appropriate data points. Resize the square as necessary by pressing **Ctrl** and moving the mouse.

Figure 5-45 Linear Data Collection



Note The coverage area is color-coded and corresponds with the specific wireless LAN standard used to collect that data. Information on color-coding is provided in the legend on the left-hand side of the window.

6. Repeat Steps b2 to b5 until the status bar for the respective spectrum is filled in (done).

Note You can augment linear collection with data point collection to address missed coverage areas.

Step 8 Click on the name of the calibration model at the top of the window to return to the main screen for that model. You can then calibrate the data points.

Step 9 Choose **Calibrate** from the Select a command drop-down menu and click **GO**.

Step 10 Click the **Inspect Location Quality** link when calibration completes. A map displays showing RSSI readings.

Step 11 To use the newly created calibration model, you must apply the model to the floor on which it was created (and on any other floors with similar attenuation characteristics as well). Navigate to **Monitor > Maps** and find the specific floor to which the model is applied. At the floor map interface, choose **Edit Floor Area** from the drop-down menu and click **GO**.

Step 12 From the Floor Type (RF Model) drop-down menu, choose the newly created calibration model. Click **OK** to apply the model to the floor.

Note This process can be repeated for as many models and floors as needed. After a model is applied to a floor, all location determination performed on that floor is done using the specific collected attenuation data from the calibration model.

Analyzing Element Location Accuracy Using Testpoints

You can analyze the location accuracy of rogue and non-rogue clients and asset tags by entering testpoints on an area or floor map. You can use this feature to validate location information generated either automatically by access points or manually by calibration.

Note By checking for location accuracy, you are checking the ability of the existing access point deployment to estimate the true location of an element within 10 meters at least 90% of the time.

Note Before starting this process, record the MAC addresses and locations for all elements within the area or floor to be analyzed. You need this information when placing the testpoints on the map. If analyzing location after calibration, you should analyze the location accuracy of at least as many elements entered during calibration.

Note The **Advanced Debug** option must be enabled on both the location appliance and WCS to allow use of the location accuracy testpoint feature.

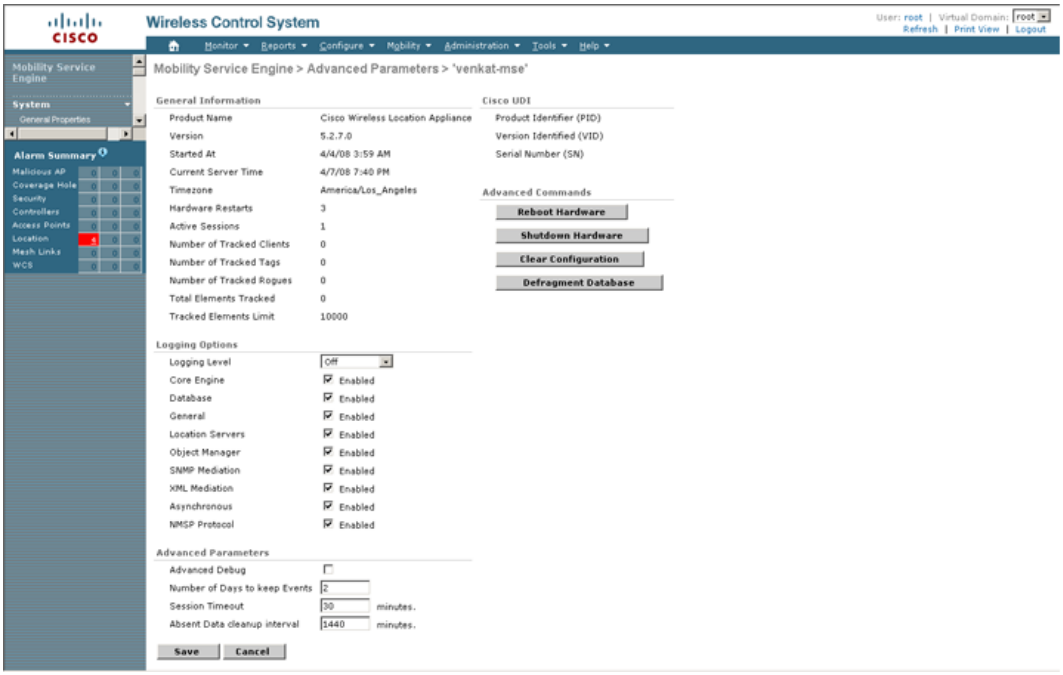
Follow these steps to enable the advanced debug option and assign testpoints to a floor map to check location accuracy.

Step 1 Choose **Mobility > Mobility Service Engines**.

Step 2 Select a server from the All Location Servers page that appears.

Step 3 At the General Properties page for that location server, choose the **System > Advanced Parameters** option from the left sidebar menu (see Figure 5-46).

Figure 5-46 Mobility Service Engine > Advanced Parameters



Step 4 On the page that appears, scroll down to the Advanced Parameters section. Check the **Advanced Debug** box to enable the feature. Click **Save**.

Note If the **Advanced Debug** check box is already checked, you do not need to do anything further. Click **Cancel**.

Assigning Testpoints to a Selected Area

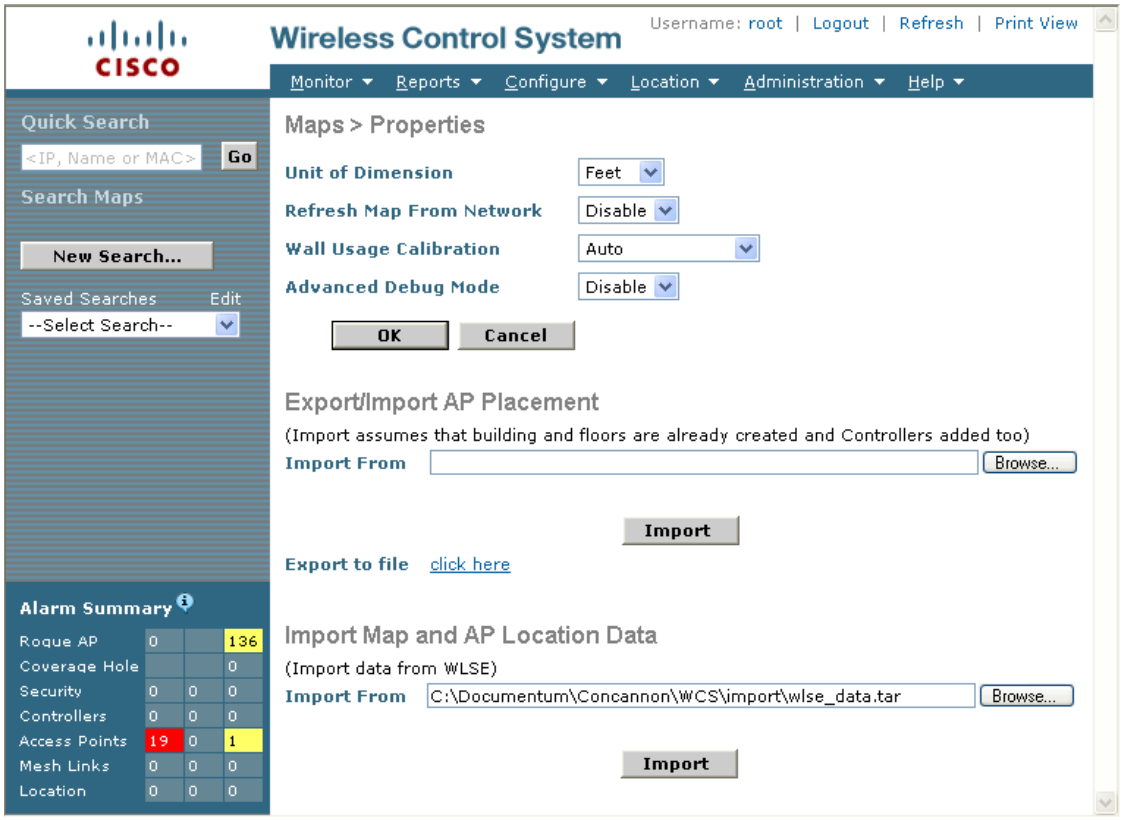
You now must enable the Advanced debug level at the Maps level and begin assigning testpoints to a selected area or map.

Step 1 Choose **Monitor > Maps.**

Step 2 Select **Properties** from the Select a command drop-down menu.

Step 3 On the Maps > Properties page (see Figure 5-47), select **Enable** from the Advanced Debug drop-down menu. Click **OK**.

Figure 5-47 Map > Properties Page

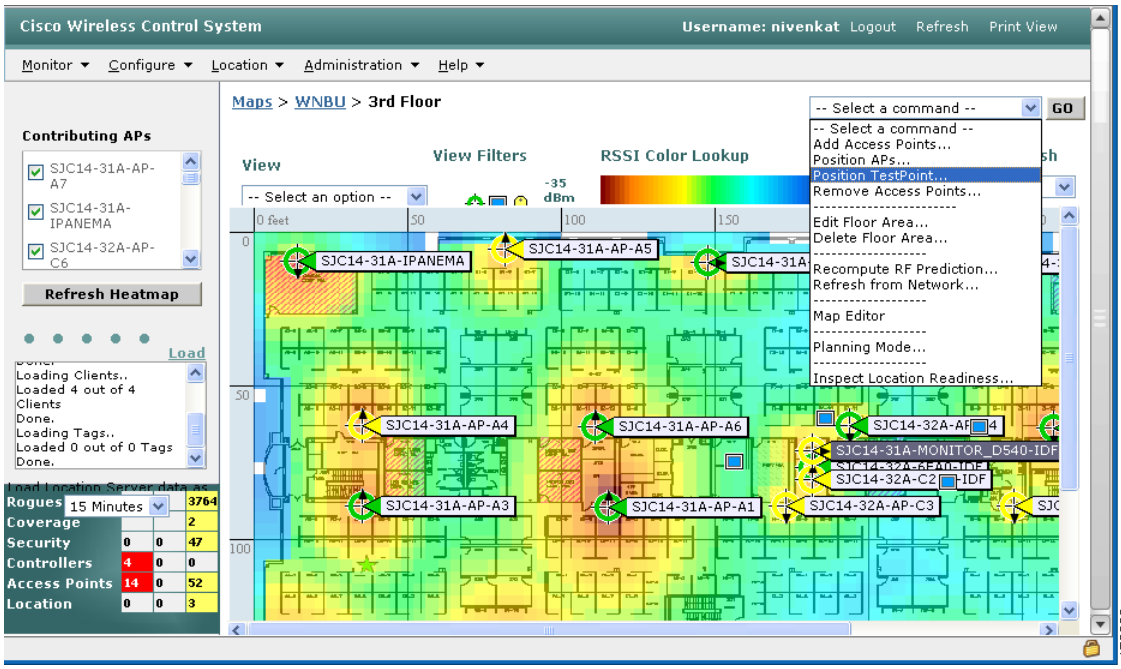


You are returned to the Maps summary window. You are now ready to assign testpoints to a selected area or map.

Step 4 Choose **Monitor > Maps**. Select the area or floor you want to analyze from the map summary that appears.

The page seen in Figure 5-48 appears.

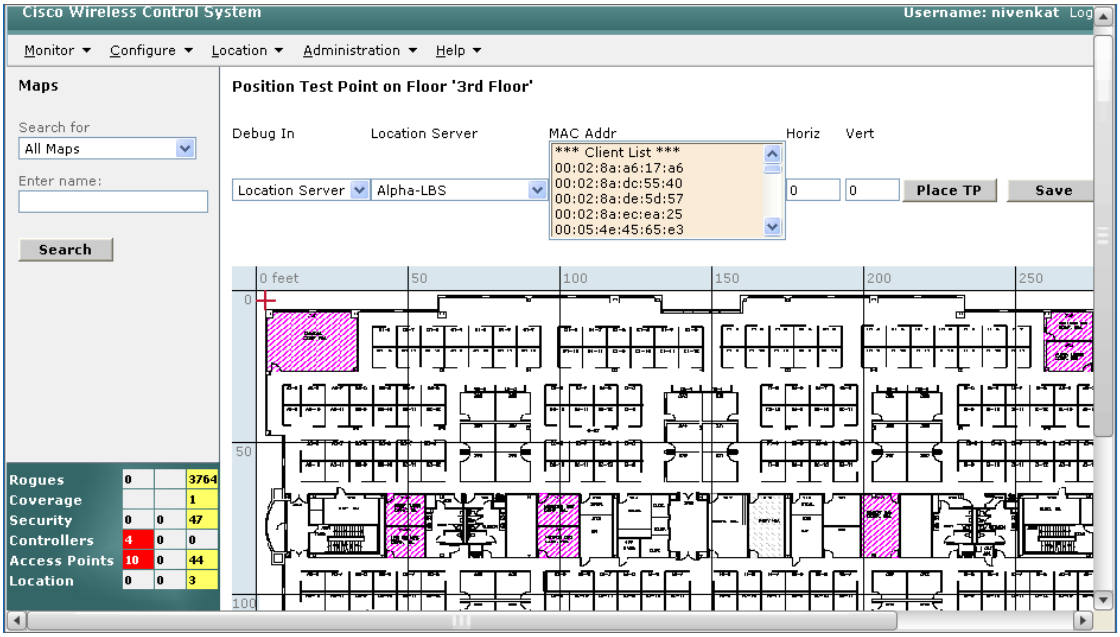
Figure 5-48 Selected Area or Floor Map Chosen at Monitor > Maps Page



Step 5 Select **Position TestPoint** from the Select a command drop-down menu (top-right). Click **GO.**

A blank map of the selected area or floor appears for testpoint assignment (see Figure 5-49).

Figure 5-49 Position TestPoint Assignment Page



Step 6 On the Position Test Point page, select the location server from the drop-down menu and choose a MAC address from the list of MAC addresses (for clients, tags, rogue access point, rogue clients, and so on).

Note If you entered horizontal and vertical coordinates, click **Place TP** instead of Save.

Step 7 Move the red cross-hair cursor (top-left) to the map location that corresponds to the actual position of the element and click **Save**.

Note Instead of using the cursor, you can enter the horizontal (**Horz**) and vertical (**Vert**) coordinates of the asset tag or client to mark its location.

A pop up box appears noting successful addition of the testpoint for the element and its MAC address.

The red cross hair cursor returns to the upper left-band corner after placement is confirmed. You are ready to mark additional testpoints.

Step 8 Wait 2 minutes to collect enough data to analyze. After waiting at least 2 minutes, click **Stop**.

Note If you wait less than 2 minutes before clicking Stop, the accuracy of the data is deteriorated.

Step 9 Repeat Steps 6 and 7 for each client or asset tag you want to add to the map.

Step 10 Click **Analyze** (far-right) to determine location accuracy of the entered testpoints.

A pop up window appears providing accuracy percentage and the number of sample points gathered during that interval.

You can perform this test for multiple elements by selecting multiple MAC addresses from the list of MAC addresses and repeating the above procedure.

Using the Accuracy Tool to Conduct Accuracy Testing

There are two methods of conducting location accuracy testing:

- Scheduled Accuracy Testing—Employed when clients and tags are already deployed and associated to the wireless LAN infrastructure. Scheduled tests can be configured and saved when clients and tags are already pre-positioned so that the test can be run on a regularly scheduled basis.
- On demand Accuracy Testing—Employed when elements are associated but not pre-positioned. On demand testing allows you to test the location accuracy of clients and tags at a number of different locations. It is generally used to test the location accuracy for a small number of clients and tags.

Both are configured and executed through a single window.

Note The Advanced Debug option must be enabled in Cisco WCS to allow use of both the Scheduled and On-demand location accuracy testing features.

Follow these steps to enable the advanced debug option in Cisco WCS.

Step 1 In Cisco WCS, click **Monitor > Map**s.

Step 2 Choose **Properties** from the Select a command drop-down menu and click **GO**.

Step 3 Choose **Enabled** from the Advanced Debug drop-down menu. Click **OK**.

Note If Advanced Debug is already enabled, you do not need to do anything further. Click **Cancel**.

You can now run location accuracy tests on the location appliance using the Accuracy Tool.

Using Scheduled Accuracy Testing to Verify Accuracy of Current Location

To configure a scheduled accuracy test, do the following:

Step 1 Click **Tools > Accuracy Tool**.

Step 2 Choose **New Scheduled Accuracy Test** from the Select a command drop-down menu.

Step 3 Enter a test name.

Step 4 Choose the area type from the drop-down menu.

Campus is configured as root area, by default. There is no need to change this setting.

Step 5 Choose the building from the drop-down menu.

Step 6 Choose the floor from the drop-down menu.

Step 7 Choose the begin and end time of the test by entering the days, hours, and minutes. Hours are entered using a 24-hour clock.

Note When entering the test start time, be sure to allow enough time prior to the test start to position testpoints on the map.

Step 8 You should e-mail the report or download the test results from the Accuracy Tests > Results window because the data in the Results tab is only stored for seven days. Reports are in PDF format.

Note Only the entries for the last seven days appear in the Results window. After seven days, the Results tab disappears.

Note If you select the e-mail option, a SMTP Mail Server must first be defined for the target e-mail address. Click **Administrator > Settings > Mail Server** to enter the appropriate information.

Step 9 Click **Position Testpoints**. The floor map appears with a list of all clients and tags on that floor with their MAC addresses.

Step 10 Click the check box next to each client and tag for which you want to check the location accuracy.

When you check a MAC address check box, two icons overlaying each other appear on the map.

One icon represents the actual location and the other the reported location.

Note To enter a MAC address for a client or tag that is not listed, check the **Add New MAC** check box and enter the MAC address and click **GO**. An icon for the element appears on the map. If the newly added element is on the location server but on a different floor, the icon appears in the left-most corner (0, 0 position).

Step 11 If the actual location for an element is not the same as the reported location, drag the actual location icon for that element to the correct position on the map. Only the actual location icon can be dragged.

Step 12 Click **Save** when all elements are positioned. A panel appears confirming successful accuracy testing.

Step 13 Click **OK** to close the confirmation panel. You are returned to the Accuracy Tests summary window.

Note The accuracy test status displays as Scheduled when the test is about to execute. A status of Running appears when the test is in process and Idle when the test is complete. A Failure status appears when the test is not successful.

Step 14 To view the results of the location accuracy test, click the test name and then choose the **Results** tab on the page that appears.

Step 15 At the Results panel, click the **Download** link under the Saved Report heading to view the report.

The Scheduled Location Accuracy Report includes the following information:

- A summary location accuracy report that details the percentage of elements that fall within various error ranges.
- An error distance histogram
- A cumulative error distribution graph
- An error distance over time graph
- A summary of each MAC address whose location accuracy was tested noting its actual location and error distance, and a map showing its spatial accuracy (actual vs. calculated location) and error distance over time for each MAC.

Using On-Demand Accuracy Testing to Test Location Accuracy

An on-demand accuracy test is run when elements are associated but not pre-positioned. On-demand testing allows you to test the location accuracy of clients and tags at a number of different locations. It is generally used to test the location accuracy for a small number of clients and tags.

Follow these steps to run an on-demand accuracy test.

Step 1 Click **Tools > Accuracy Tool**.

Step 2 Choose **New On demand Accuracy Test** from the Select a command drop-down menu.

Step 3 Enter a test name.

Step 4 Choose the area type from the drop-down menu.

Campus is configured as root area, by default. There is no need to change this setting.

Step 5 Choose the building from the drop-down menu.

Step 6 Choose the floor from the drop-down menu.

Step 7 Tests results are viewed at the Accuracy Tests > Results window. Reports are in .pdf format.

Step 8 Click **Position Testpoints**. The floor map appears with a red cross hair at the (0,0) coordinate.

Step 9 To test the location accuracy and RSSI of a particular location, choose either **client** or **tag** from the drop-down menu on the left. A list of all MAC addresses for the selected option (client or tag) appears in a drop-down menu to its right.

Step 10 Choose a MAC address from the drop-down menu and move the red cross hair to a map location and client the mouse to place it.

Step 11 Click **Start** to begin collection of accuracy data.

Step 12 Click **Stop** to finish collection. You should allow the test to run for at least two minutes before clicking Stop.

Step 13 Repeat Step 9 to Step 12 for each testpoint that you want to plot on the map.

Step 14 Click **Analyze** when you are finished mapping the testpoints.

Step 15 Choose the **Results** tab on the panel that appears.

The On-demand Accuracy Report includes the following information:

- A summary location accuracy report that details the percentage of elements that fell within various error ranges.
- An error distance histogram
- A cumulative error distribution graph

Note You can download logs for accuracy tests from the Accuracy Tests summary page.

To do so, check the listed test check box and select either **Download Logs** or **Download Logs for Last Run** from the Select a command drop-down menu and click **GO**.

The Download Logs option downloads the logs for all accuracy tests for the selected test(s).

The Download Logs for Last Run option downloads logs for only the most recent test run for the selected test(s).