CHAPTER 7

Location Planning and Verification

This chapter describes addresses a number of tools and configurations that can be used to enhance location accuracy of elements (clients, tags, rogue clients, and rogue access points) within an indoor or outdoor area.

You can plan for new access point deployment based on applications employed.

You can check the ability of an existing access point deployment to estimate the true location of an element within 10 meters at least 90% of the time using a location readiness calculation based on the number and placement of access points.

You can use calibration data to examine location quality, as an alternative to using the location readiness calculation.

You can analyze the location accuracy of non-rogue and rogue clients and asset tags using testpoints on an area or floor map; or use chokepoints to enhance location accuracy for tags.

Additionally, you can specify areas to include or exclude in location calculations.

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Deployment Planning for Data, Voice, and Location

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

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

Step 1 In Cisco WCS, click **Monitor > Maps.**

Step 2 **Click** on the appropriate map name from the list that displays.

A map appears showing placement of all installed elements (access points, clients, tags) and their relative signal strength (RSSI).

Step 3 Select **Planning Mode** from the Select a command menu. Click **GO.**

Step 4 In the window that appears, click **Add AP**. A window appears with an access point entry panel (left) and map (right).

Step 5 Drag the dashed rectangle over the map location for which you want to calculate the recommended access points.

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.

Step 6 In the access point entry panel on the left, check the check box next to the service (applications) that will be used on the floor. Options are Data/Coverage (default), Voice, Location and Location with Monitor Mode APs. Click **Calculate**.

The recommended number of access points given the services requested displays in the panel.

Note Each service option is inclusive of all services that are listed above it. For example, if you check the Location box, the calculation will consider data/coverage, voice and location in determining the optimum number of access points required.

Note Recommended calculations assume the need for consistently strong signals. In some cases, fewer access points may be required than recommended.

Step 7 Click **Apply** to generate a map based on the recommendations to see recommended placement of the access points in the selected area.

Note Check the Location services option to ensure that the recommended access points will provide the true location of an element within 10 meters at least 90% of the time.

Creating and Applying Calibration Models

If the provided radio frequency (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 selected and their coverage area is calculated one location at a time.
- Linear point collection–A series of linear paths are selected 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.

To create and apply calibration models, follow these steps:

Step 1 Click **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 and click **GO**.

Step 3 Assign a name to the model and click **OK**. The new model name appears along with the other RF calibration models in the window that appears, but its status is listed as Not Yet Calibrated.

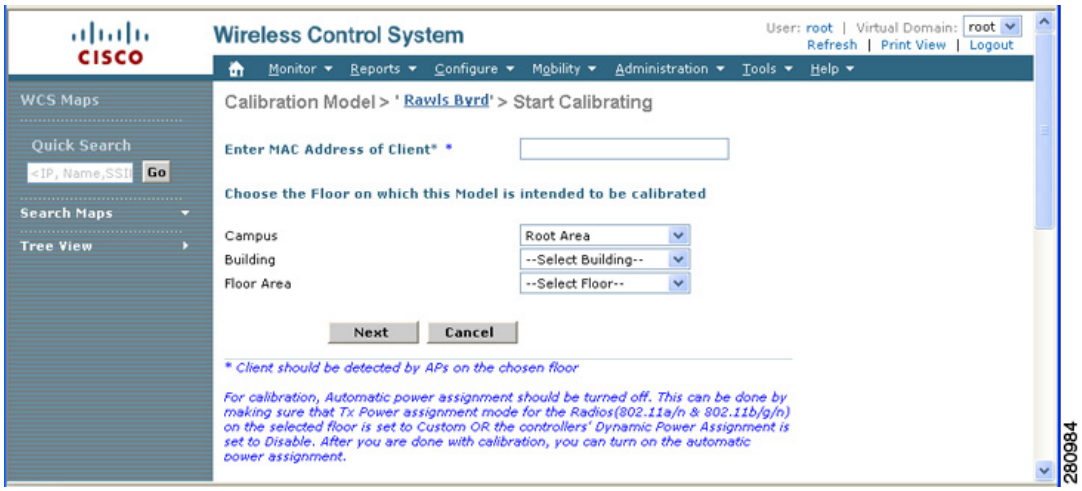
Step 4 To start the calibration process, click on the hyperlink associated with the new model name in the RF calibration model window.

Step 5 In the window that appears, which indicates the details of the new model, choose **Add Data Points** from the Select a command drop-down menu and click **GO**.

Step 6 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 7 Choose the appropriate campus, building, and floor where the calibration is to be performed (see Figure 7-1). Click **Next**.

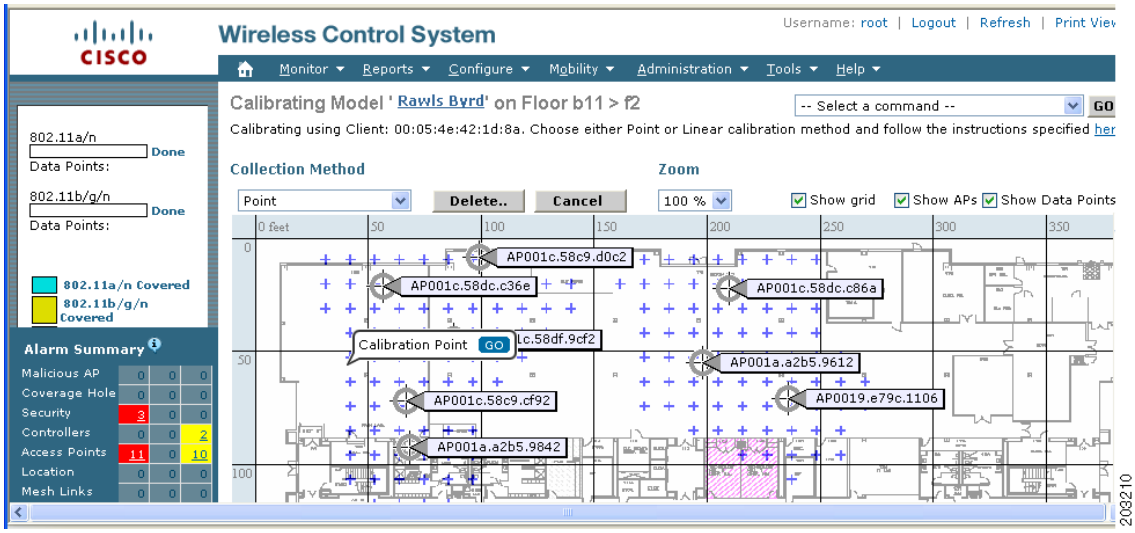
Figure 7-1 Starting to Calibrate



Step 8 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 7-2 shows the starting window for a point calibration.

Figure 7-2 Positioning Calibration Points



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

1. Select 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 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.’ b/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:

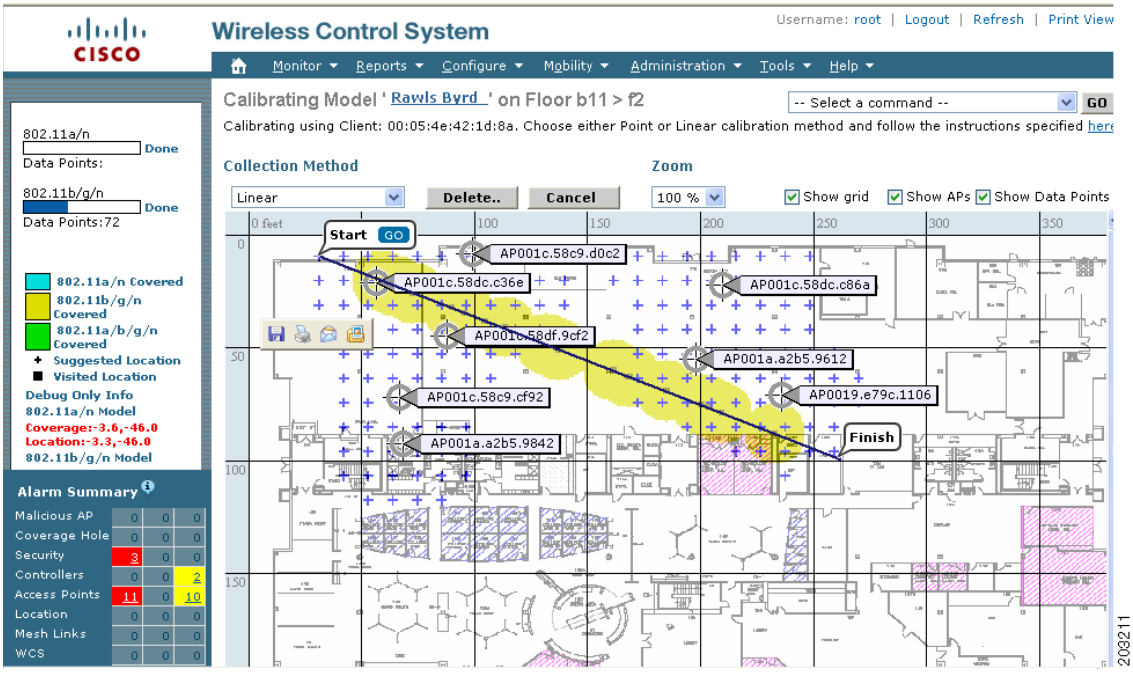
1. Select Linear from the Collection Method drop-down menu and check the Show Data points check box if not already checked. A line appears on the map with both Start and Finish pop-ups.
2. Position the tip of the Start pop-up at the starting data point.
3. Position the Finish pop-up at the ending data 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 7-3).

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 the Ctrl and moving the mouse.

Figure 7-3 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 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 9 Click on the name of the calibration model at the top of the window to return to the main screen for that model to calibrate the data points.

Step 10 Select **Calibrate** from the Select a command drop-down menu and click **GO**.

Step 11 Click the Inspect Location Quality link when calibration completes. A map displays showing RSSI readings displays.

Step 12 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 13 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.

Inspecting Location Readiness and Quality

You can configure Cisco WCS to verify the ability of the existing access point deployment to estimate the true location of a client, rogue client, rogue access point, or tag within 10 meters at least 90% of the time. The location readiness calculation is based on the number and placement of access points.

You can also check the location quality and the ability of a given location to meet the location specification (10 m, 90%) based on data points gathered during a physical inspection and calibration.

Inspecting Location Readiness Using Access Point Data

To inspect location readiness using access point data, follow these steps:

Step 1 In Cisco WCS, click **Monitor > Maps.**

Step 2 Click on the appropriate floor location link from the list that displays.

A map displays showing placement of all installed elements (access points, clients, tags) and their relative signal strength (RSSI).

Note If RSSI is not displayed, you can enable AP Heatmaps under the Layer menu (top-left).

Step 3 Select **Inspect Location Readiness** from the Select a command menu. Click **GO.**

A color-coded map appears showing those areas that do (Yes) and do not (No) meet the 10 meter, 90% location specification.

Inspecting Location Quality Using Calibration Data

After completing a calibration model based on data points generated during a physical tour of the area, you can inspect the location quality of the access points. To inspect location quality based on calibration, follow these steps:

Step 1 In Cisco WCS, click **Monitor > Maps.**

Step 2 Choose **RF Calibration Models** from the from the Select a command menu.Click **GO.**

A list of calibration models appears.

Step 3 Click the appropriate calibration model.

Details on the calibration including date of last calibration, number of data points by signal type (802.11a, 802.11 b/g) used in the calibration, location, and coverage are displayed.

Step 4 At the same window, click the **Inspect Location Quality** link found under the Calibration Floors heading.

A color-coded map noting percentage of location errors appears.

Note You can modify the distance selected to see the effect on the location errors.

Verifying Location Accuracy

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.

You can analyze the location accuracy of non-rogue and rogue clients and asset tags by using the Accuracy Tool.

The Accuracy Tool enables you to run either a scheduled or on-demand location accuracy test. Both tests are configured and executed through a single window.

Using the Location Accuracy Tool to Conduct Accuracy Testing

There are two methods of conducting location accuracy testing using the location accuracy tool:

- 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. Additionally, the Accuracy Tool does not appear as an option under the Tools menu when the Advanced Debug option is not enabled.

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

Step 1 In Cisco WCS, click **Monitor > Maps**.

Step 2 Select Properties from the Select a command drop-down menu and click **GO**. The Maps Properties window appears.

Step 3 Select Enabled from the Advanced Debug Mode 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 either scheduled or on-demand location accuracy tests on the location appliance using the Location Accuracy Tool.

Using Scheduled Accuracy Testing to Verify Accuracy of Current Location

To configure a scheduled accuracy test, do the following:

Step 1 In Cisco WCS, click **Tools > Location Accuracy Tool**.

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

Step 3 In the window that appears, enter a Test Name.

Step 4 Select the Area Type from the drop-down menu.

Step 5 Campus is configured as Root Area, by default. There is no need to change this setting.

Step 6 Select the Building from the drop-down menu.

Step 7 Select the Floor from the drop-down menu.

Step 8 Select 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 9 Select the Destination point for the test results. You can have the report emailed to you or download the test results from the Accuracy Tests > Results window. Reports are in PDF format.

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

Step 10 Click **Position Testpoints**. The floor map appears with a list of all clients and tags on that floor with their MAC addresses.

Step 11 Click the check box next to each client and tag for which you want to check the location accuracy.

As you check a MAC address check box, two icons which overlay each other appear on the map.

One icon represents the actual location (shaded icon) and the other the reported (solid icon) location. Key for actual and reported icons are shown at the top of the floor map.

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 displays in the left-most corner (0,0 position).

Step 12 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 13 Click **Save** when all elements are positioned. A panel appears confirming successful accuracy testing.

Step 14 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 displays when the test is in process and Idle when the test is complete. A Failure status appears when the test is not successful.

Step 15 To view the results of the location accuracy test, click the test name and then select the Results tab on the page that displays.

Step 16 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 fell within various error ranges.
- An error distance histogram
- A cumulative error distribution graph
- An error distance over time graph
- A summary by each MAC address whose location accuracy was tested noting its actual location, 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.

To run an On-demand Accuracy Test, do the following:

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

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

Step 3 Enter a Test Name.

Step 4 Select the Area Type from the drop-down menu.

Step 5 Campus is configured as Root Area, by default. There is no need to change this setting.

Step 6 Select the Building from the drop-down menu.

Step 7 Select the Floor from the drop-down menu.

Step 8 Tests results are viewed at the Accuracy Tests > Results window. Reports are in PDF format.

Step 9 Click Position Testpoints. The floor map appears with a red cross hair at the (0,0) coordinate.

Step 10 To test the location accuracy and RSSI of a particular location, select 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) displays in a drop-down menu to its right.

Step 11 Select a MAC address from the drop-down menu and move the red cross hair to a map location and click the mouse to place it.

Step 12 Click **Start** to begin collection of accuracy data.

Step 13 Click **Stop** to finish collection. You should allow the test to run for at least two minutes before clicking Stop.

Step 14 Repeat Step 10 to Step 13 for each testpoint that you want to plot on the map.

Step 15 Click **Analyze** when you are finished mapping the testpoints.

Step 16 Select 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 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).

Using Chokepoints to Enhance Tag Location Reporting

Installing chokepoints provides enhanced location information for active RFID tags. When an active Cisco CX 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 Cisco CX compliant tags provides immediate location information on a tag and its asset. When a Cisco CX 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 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. When the chokepoint is installed and operational, you can add the chokepoint to the location database and positioned on a Cisco WCS map.

Note Chokepoints are managed by the chokepoint vendor's application.

To add a chokepoint to the WCS database and appropriate map, follow these steps:

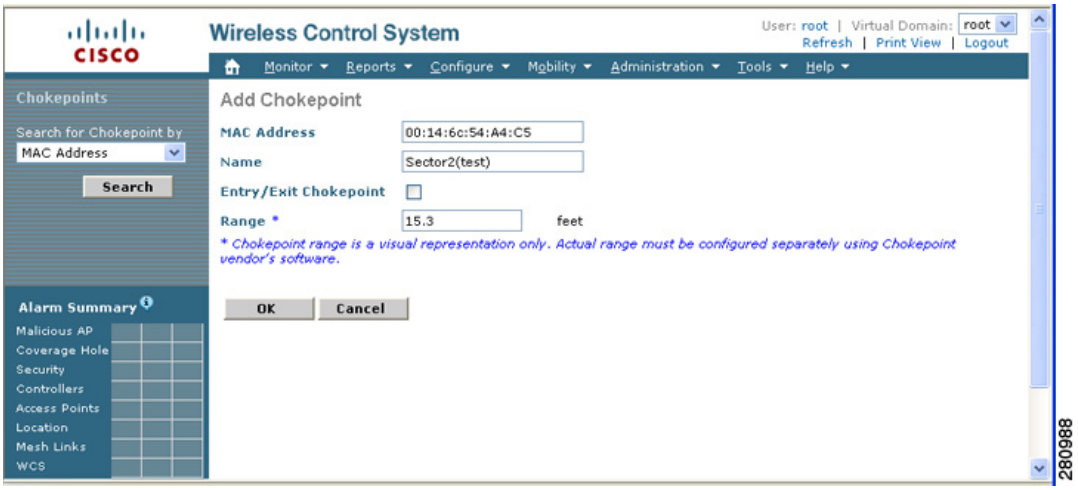
Step 1 Click **Configure > Chokepoints** from the main menu (top).

The All Chokepoints summary window appears.

Step 2 Select **Add Chokepoint** from the Select a command menu (Figure 7-4). Click **GO.**

The Add Chokepoint entry screen appears.

Figure 7-4 Add Chokepoint Window



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.

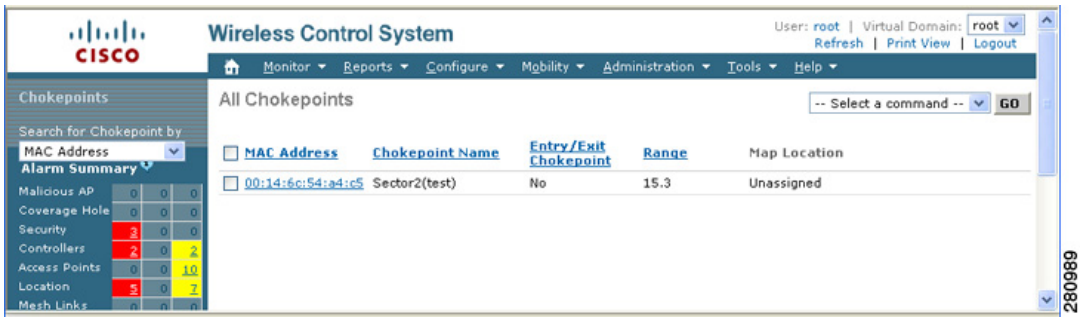
Step 4 Check the Entry/Exit Chokepoint check box if you want the chokepoint to function as an perimeter chokepoint. Its function is to track the entry and exit of clients and tags from an area or floor.

Note If a tag shows strong RSSIs on two floors, you can check for the last perimeter chokepoint the tag passed to determine its current floor.

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

The All Chokepoints summary window appears with the new chokepoint entry listed (Figure 7-5).

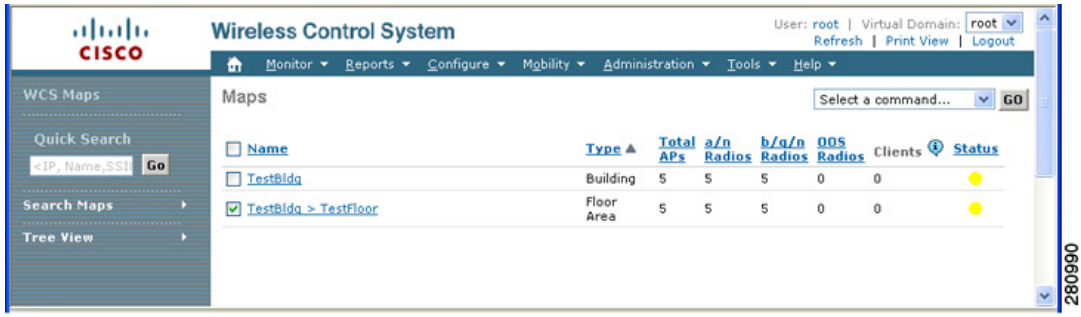
Figure 7-5 All Chokepoints Summary Window



Note After you add the chokepoint to the database, you can place the chokepoint on the appropriate WCS floor map.

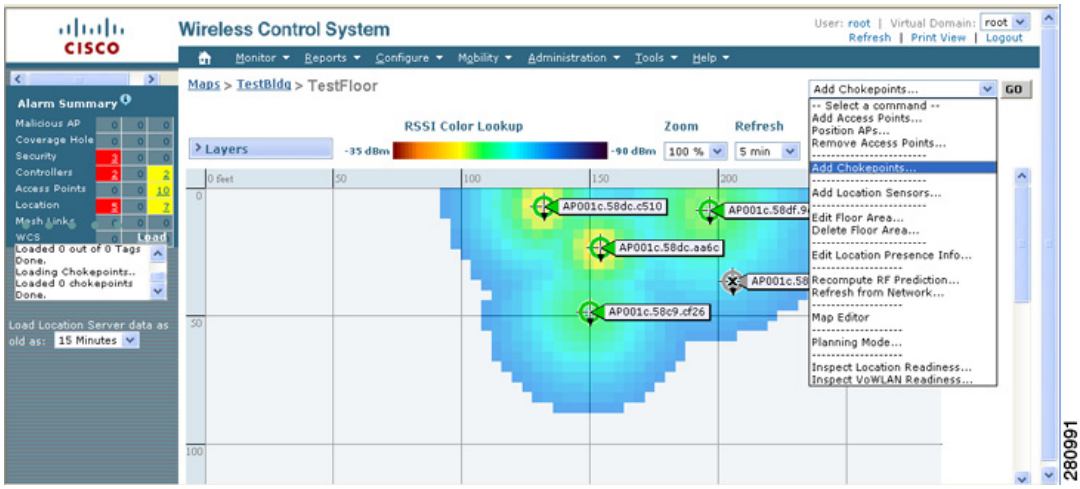
Step 6 To add the chokepoint to a map, click **Monitor > Maps** (Figure 7-6).

Figure 7-6 Monitor > Maps Window



Step 7 At the Maps window, select the link that corresponds to the floor location of the chokepoint. The floor map appears (Figure 7-7).

Figure 7-7 Selected Floor Map

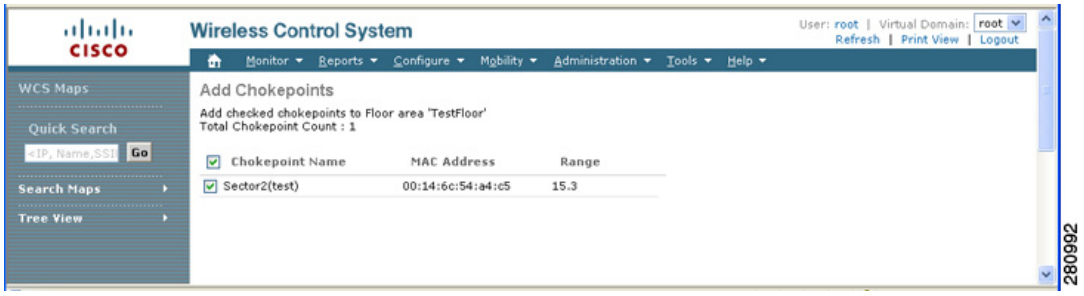


Step 8 Select **Add Chokepoints** from the Select a command menu. Click **GO**.

The Add Chokepoints summary window appears (Figure 7-8).

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

Figure 7-8 Add Chokepoints Summary Window

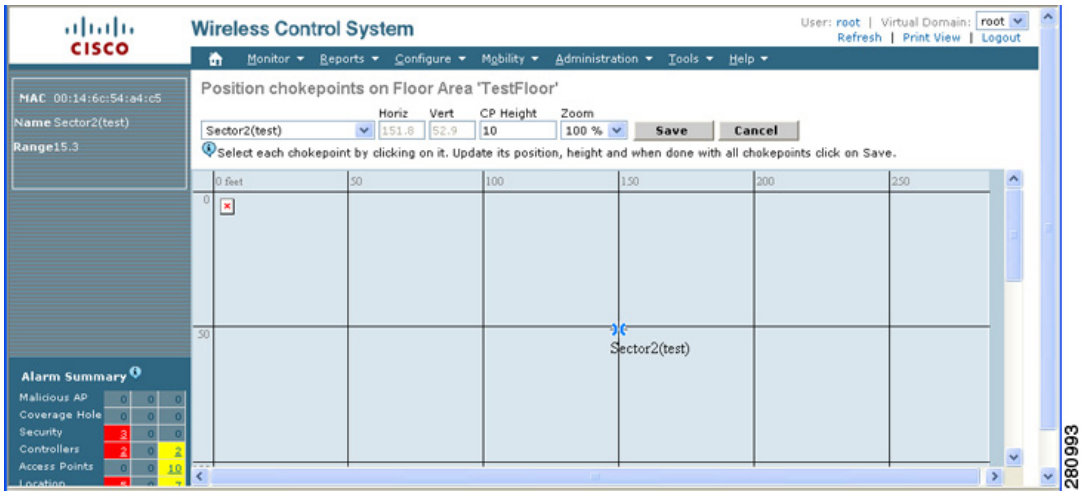


Step 9 Check the box next to the chokepoint to be added to the map. Click **OK**.

A map appears with a chokepoint icon located in the top-left hand corner. You can now place the chokepoint on the map.

Step 10 Left click on the chokepoint icon and drag and place it in the proper location (Figure 7-9).

Figure 7-9 Map for Positioning Chokepoint



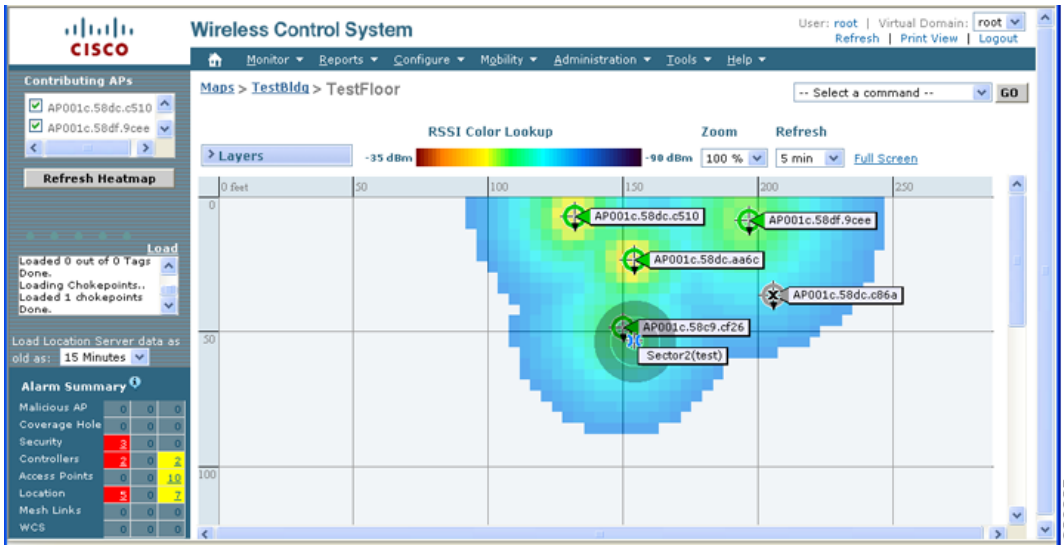
Note The MAC address, name, and coverage range of the chokepoint appear in the left panel when you click on the chokepoint icon for placement.

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

You are returned to the floor map and the added chokepoint appears on the map (Figure 7-10).

Note The icon for the newly added chokepoint 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 11.

Figure 7-10 New Chokepoint Displayed on Floor Map



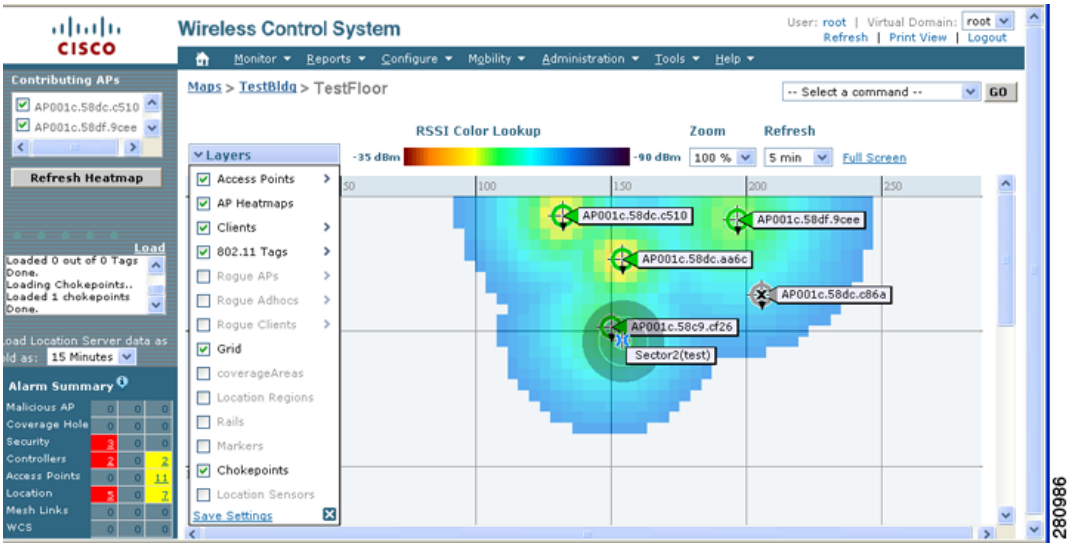
Note The rings around the chokepoint icon indicate the coverage area. When a Cisco CX tag and its asset passes within the coverage area, location details are broadcast and the tag is automatically mapped on the chokepoint coverage circle. When the tag moves out of the chokepoint range, its location is calculated as before and it is no longer mapped on the chokepoint rings.

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** check box.

The chokepoint appears on the map (Figure 7-11).

Figure 7-11 Chokepoints Displayed 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 Click **Configure > Chokepoints**. The All Chokepoints window appears.

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

Step 3 Select **Remove Chokepoints** from the Select a command drop-down menu. Click **GO** (Figure 7-12).

Figure 7-12 Removing a Chokepoint

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

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

Using Location Optimized Monitor Mode to Enhance Tag Location Reporting

To optimize monitoring and location calculation of tags, you can enable LOMM on up to four channels within the 2.4GHz band (802.11b/g radio) of an access point. This allows you to focus channel scans only on those channels on which tags are usually programmed to operate (such as channels 1, 6, and 11).

After enabling Monitor Mode at the access point level, you must then enable LOMM and assign monitoring channels on the 802.11 b/g radio of the access point.

Note For details on enabling Monitor Mode on an access point, refer to Step 5 in the "Configuring Access Points" section in Chapter 9 of the *Cisco Wireless Control System Configuration Guide*, Release 5.1.

Follow the steps below to set enable LOMM and assign monitoring channels on the access point radio.

Step 1 After enabling Monitor Mode at the access point level, click **Configure > Access Points**.

Step 2 At the All Access Points Summary window, select the 802.11 b/g Radio link for the appropriate access

Step 3 At the Radio parameters window, disable Admin Status by unchecking the check box. This disables the radio.

Step 4 Check the Location Optimized Channel Assignment check box. Drop-down menus for each of the four configurable channels display.

Step 5 Select the four channels on which you want the access point to monitor tags.

Note You can configure fewer than four channels for monitoring. To eliminate a monitoring channel, select None from the channel drop-down menu.

Step 6 Click **Save**. Channel selection is saved.

Step 7 At the Radio parameters window, re-enable the radio by checking the Admin Status check box.

Step 8 Click **Save**. The access point is now configured as a LOMM access point.

The AP Mode display as Monitor/LOMM on the **Monitor > Access Points** window.

Defining Inclusion and Exclusion Regions on a Floor

To further refine location calculations on a floor, you can define the areas that are included (inclusion areas) in the calculations and those areas that are not included (exclusion areas).

For example, you might want to exclude areas such as an atrium or stairwell within a building but include a work area (such as cubicles, labs, or manufacturing floors).

Note In Cisco WCS, inclusion and exclusion regions are only calculated for clients.

Guidelines

Inclusion and exclusion areas can be any polygon shape and must have at least three points.

You can only define one inclusion region on a floor. By default, an inclusion region is defined for each floor when it is added to Cisco WCS. The inclusion region is indicated by a solid aqua line, and generally outlines the region.

You can define multiple exclusion regions on a floor.

Newly defined inclusion and exclusion regions appear on heatmaps only after the location server recalculates location.

Defining an Inclusion Region on a Floor

Follow the steps below to define an inclusion area.

Step 1 Click **Monitor > Maps**.

Step 2 Click on the name of the appropriate floor area.

Step 3 Select **Map Editor** from the Select a command drop-down menu.Click **GO**.

Step 4 At the map, click the aqua box in the tool bar.

Note A message box appears reminding you that only one inclusion area can be defined at a time. Defining a new inclusion region automatically removes the previously defined inclusion region. By default, an inclusion region is defined for each floor when it is added to Cisco WCS. The inclusion region is indicated by a solid aqua line and generally, outlines the region (Figure 7-13).

Figure 7-13 Map Editor Window

Step 5 Click **OK** in the message box that appears. A drawing icon appears to outline the inclusion area.

Step 6 To begin defining the inclusion area, move the drawing icon to a starting point on the map and click once.

Step 7 Move the cursor along the boundary of the area you want to include and click to end a border line. Click again to define the next boundary line.

Step 8 Repeat Step 7 until the area is outlined and then double click the drawing icon. A solid aqua line defines the inclusion area.

Step 9 Select **Save** from the Command menu or click the disk icon on the tool bar to save the inclusion region.

Note If you made an error in defining the inclusion area, click on the area. The selected area is outlined by a dashed aqua line. Next, click on the *X* icon in the tool bar. The area is removed from the floor map.

Step 10 To return to the floor map to enable inclusion regions on heatmaps, select **Exit** from the Command menu.

Step 11 At the floor map, click the **Layers** drop-down menu.

Step 12 Check the Location Regions check box if it is not already checked and then click **Save settings** and close the Layers configuration panel when complete.

Step 13 To resynchronize the Cisco WCS and location databases, click **Mobility > Synchronize Servers**.

Step 14 At the Synchronize window, select **Network Designs** from the Synchronize drop-down menu and then click **Synchronize**.

Check the Sync. Status column to ensure the synchronization is successful (two green arrows).

Note Newly defined inclusion and exclusion regions appear on heatmaps only after the location server recalculates location.

Defining an Exclusion Region on a Floor

To further refine location calculations on a floor, you can define areas that are excluded (exclusion areas) in the calculations.

For example, you might want to exclude areas such as an atrium or stairwell within a building.

As a rule, exclusion areas are generally defined within the borders of an inclusion area.

Follow the steps below to define an exclusion area.

Step 1 Click **Monitor > Maps**.

Step 2 Click on the name of the appropriate floor area.

Step 3 Select **Map Editor** from the Select a command drop-down menu.Click **GO**.

Step 4 At the map, click the purple box in the tool bar.

Step 5 Click **OK** in the message box that appears. A drawing icon appears to outline the exclusion area.

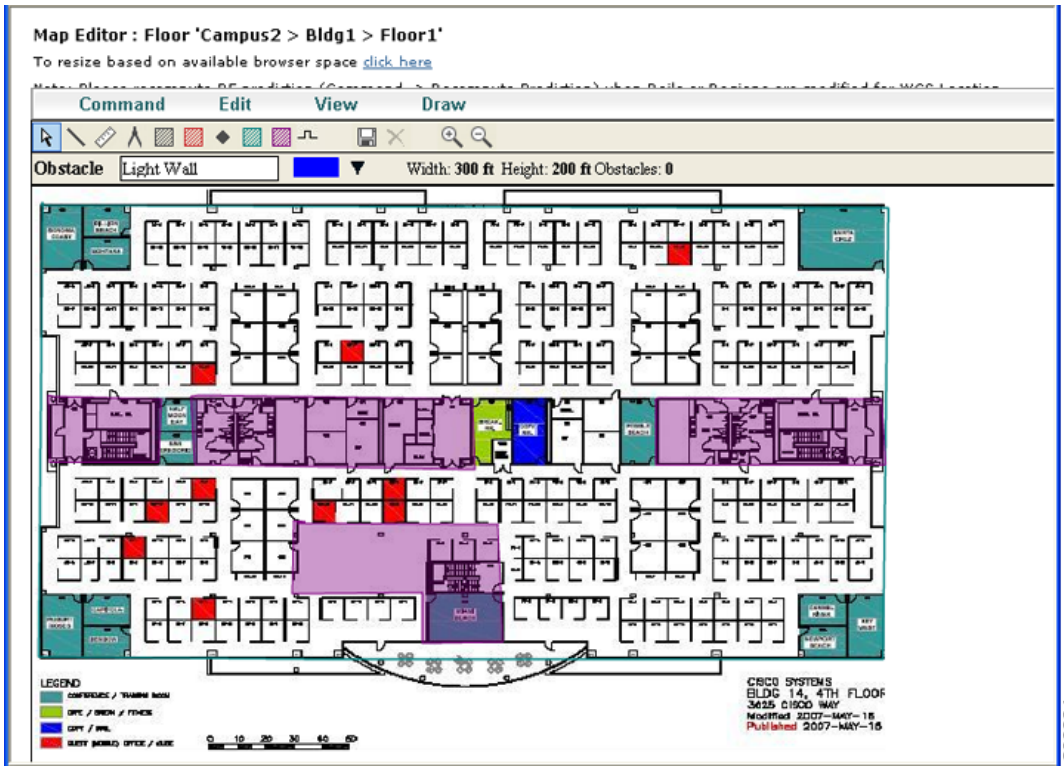
Step 6 To begin defining the exclusion area, move the drawing icon to the starting point on the map and click once.

Step 7 Move the drawing icon along the boundary of the area you want to exclude and click once to start a boundary line and click again to end the boundary line.

Step 8 Repeat Step 7 until the area is outlined and then double click the drawing icon. The defined exclusion area is shaded in purple. when the area is completely defined. The excluded area is shaded in purple.

Step 9 To define additional exclusion regions, repeat Step 4 to Step 8 (see Figure 7-14).

Figure 7-14 Defining Exclusion Areas on Floor Map



Step 10 When all exclusion areas are defined, select Save from the Command menu or the disk icon on the tool bar to save the exclusion region.

Note To delete an exclusion area, click on the area to be deleted. The selected area is outlined by a dashed purple line. Next, click on the ***X*** icon in the tool bar. The area is removed from the floor map.

Step 11 To return to the floor map to enable exclusion regions on heatmaps, select **Exit** from the Command menu.

Step 12 At the floor map, click the **Layers** drop-down menu.

Step 13 Check the Location Regions check box if it is not already checked and then click **Save settings** and close the Layers configuration panel when complete.

Step 14 To resynchronize the Cisco WCS and location databases, click **Mobility > Synchronize Servers**.

Step 15 At the Synchronize window, select **Network Designs** from the Synchronize drop-down menu and then click Synchronize.

Check the Sync. Status column to ensure the synchronization is successful (two green arrows).

Defining a Rail Line on a Floor

You can define a rail line on a floor that represents a conveyor belt. Additionally, you can define an area around the rail area known as the snap-width to further assist location calculations. This represents the area in which you expect certain inventory with asset tags to appear. Any asset tags located within the snap-width area are plotted on the rail line (majority) or just outside of the snap-width area (minority).

The snap-width area is defined in feet or meters (user-defined) and represents the distance that is monitored on either side (east and west or north and south) of the rail.

Follow the steps below to define a rail with a floor.

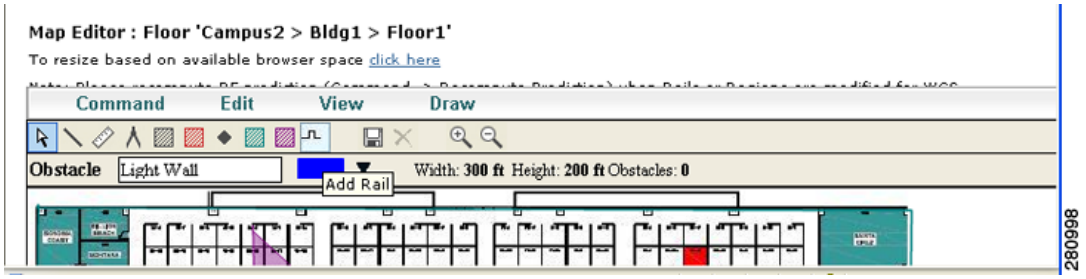
Step 1 Click **Monitor > Maps**.

Step 2 Click on the name of the appropriate floor area.

Step 3 Select **Map Editor** from the Select a command drop-down menu.Click **GO**.

Step 4 At the map, click the rail icon (to the right of the purple exclusion icon) in the tool bar (see Figure 7-15).

Figure 7-15 Rail Icon on Map Editor Tool Bar



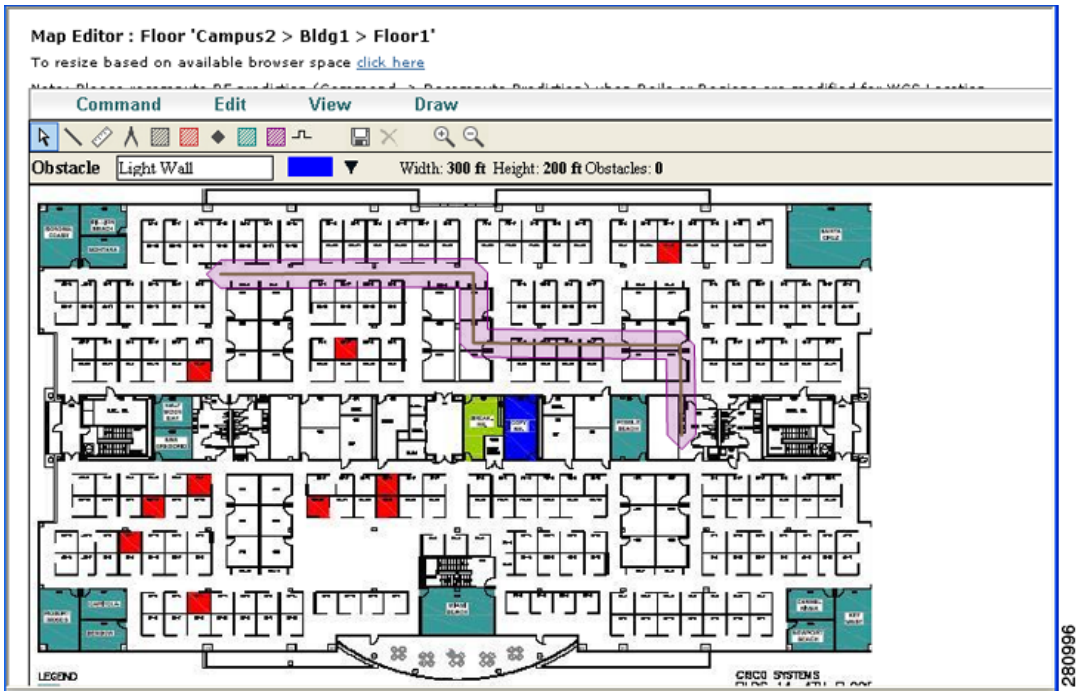
Step 5 In the message panel that appears, enter a snap-width (feet or meters) for the rail and then click **OK.** A drawing icon appears.

Note The snap-width is defined in feet or meters (as defined by the user) and represents the distance that is monitored on either side (left and right) of the rail.

Step 6 Click the drawing icon at the starting point of the rail line. Click again when you want to stop drawing the line or change the direction of the line.

Step 7 Click the drawing icon twice when the rail line is completely drawn on the floor map. The rail line appears on the map and is bordered on either side by the defined snap-width region (see Figure 7-16).

Figure 7-16 Rail Line



Note To delete a rail line, click on the area to be deleted. The selected area is outlined by a dashed purple line. Next, click on the ***X*** icon in the tool bar. The area is removed from the floor map.

Step 8 To return to the floor map to enable rails on heatmaps, select **Exit** from the Command menu.

Step 9 At the floor map, click the Layers drop-down menu.

Step 10 Check the Rails check box for if it is not already checked and then click **Save settings** and close the Layers configuration panel when complete.

Step 11 To resynchronize the Cisco WCS and location databases, click **Mobility > Synchronize Servers**.

Step 12 At the Synchronize window, select **Network Designs** from the Synchronize drop-down menu and then click **Synchronize**.

Check the Sync. Status column to ensure the synchronization is successful (two green arrows).

Enabling Location Presence on a Location Server

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

Location Presence can be configured when a new Campus, Building, Floor or Outdoor Area is being added or configured at a later date.

Note For details on configuring location presence when adding a new Campus, Building, Floor or Outdoor Area, refer to the "Creating Maps" section in Chapter 5 of the *Cisco Wireless Control System Configuration Guide*, release 5.1 and greater.

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

Note Before enabling this feature, synchronize the location server.

Step 1 Click **Mobility > Mobility Service Engine**s > *Server Name*. Select the location server to which the campus or building is assigned.

Step 2 From the Location menu (left-panel), select **Presence Parameters** from the Administration sub-heading. The Presence window displays.

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

Step 4 Select one of the Location Resolution options.

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

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

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

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

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

- For example, if a client requests its location and the client is located at (50, 200) the 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 and X and Y coordinates. 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. Default value is 24 hours (1440 minutes).

Step 9 Click **Save**.