CHAPTER 7

Context Aware Planning and Verification

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

Context Aware Software (CAS) installed on a mobility services engine retrieves location as well as other contextual information such as temperature and asset availability about a client or tag (Cisco CX version 1 or later) from access points.

Note Non-Cisco CX tags are not tracked or mapped by Cisco WCS.

Note Context Aware Software was previously referred to as Cisco location-based services.

This chapter contains the following sections:

Note

- You must purchase licenses from Cisco to retrieve contextual information on tags and clients from access points. Licenses for tags and clients are offered independently. (The clients' license also includes tracking of rogue clients and rogue access points).
- For details on tag and client licenses, refer to the *Cisco 3350 Mobility Services Engine Release Note* at: http://www.cisco.com/en/US/products/ps9742/tsd_products_support_series_home.html

Planning for Data, Voice, and Location Deployment

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 location link from the list that displays.

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

Step 3 Select **Planning Mode** from the Select a command menu found at the top-right of the window. Click **GO.**

A color-coded map summarizing contributing access points appears.

Step 4 Click **Add APs** to open a window to enter data necessary to calculate the recommended number of access points.

Step 5 In the window that appears, 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 **Check** the check box next to the service 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 appears.

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 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.

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 Calibration models can only be applied to clients, rogue clients, and rogue access points. Calibration for tags is done using the Aeroscout System Manager. Refer to the following link for details on tag calibration at: http://support.aeroscout.com.

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 Cisco WCS and perform the calibration process.

To create and apply calibration models, follow these steps:

Step 1 Navigate to **Monitor > Maps** and click **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 in the upper right. Click **GO**.

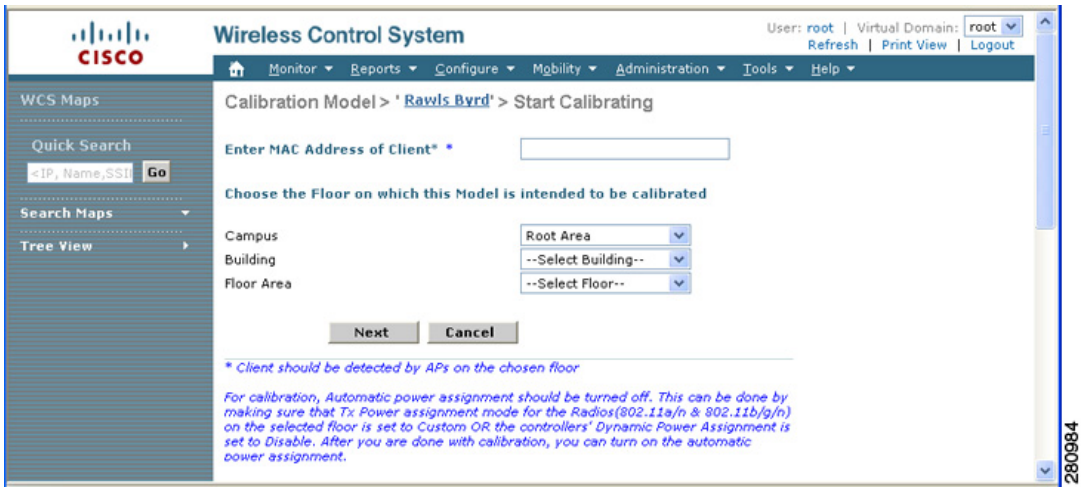
Step 3 Assign a name to the model and click **OK**.

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 7-1). Click **Next**.

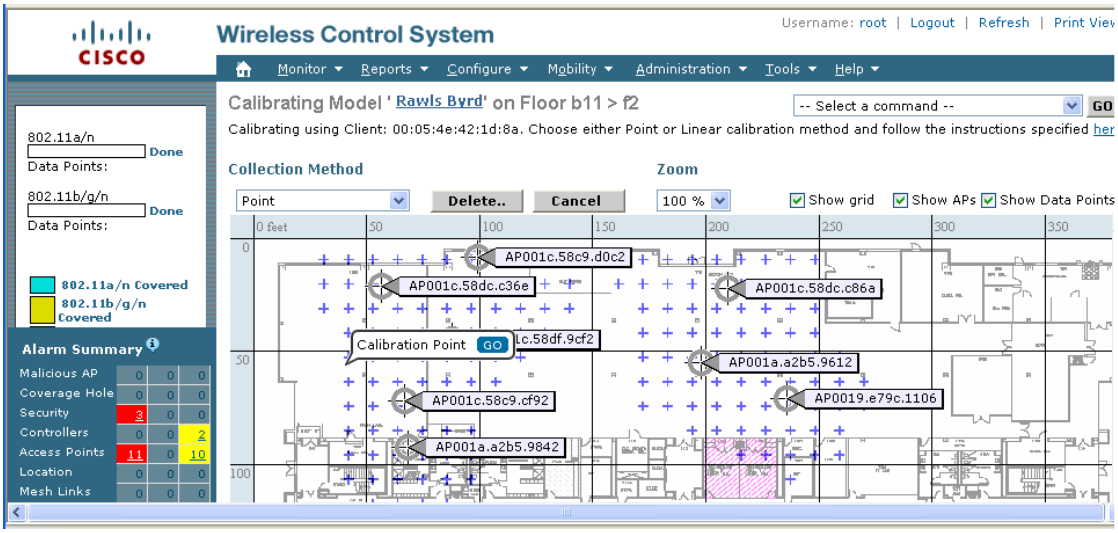
Figure 7-1 Starting to Calibrate



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 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:

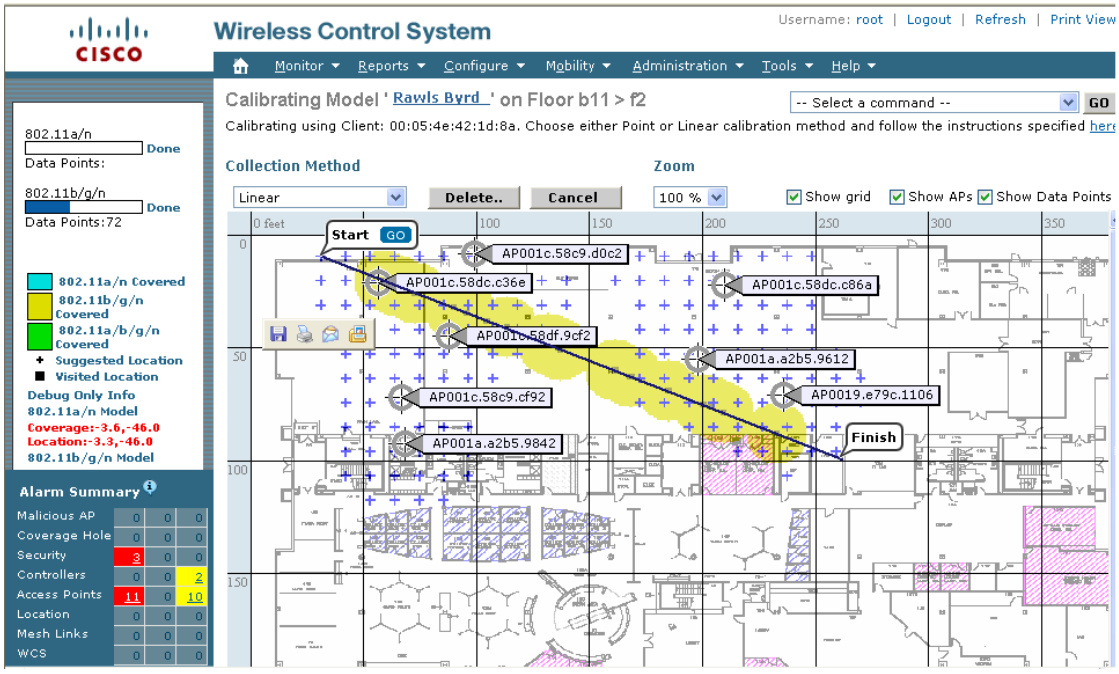
1. Select Linear from the Collection Method drop-down menu and check the Show Data points check box if not already checked. A line appears on the map with both Start and Finish pop-ups.
2. Position the tip of the Start pop-up at the starting data point.
3. Position the Finish pop-up at the ending data 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 **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 8 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 9 Select **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 displays.

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.

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.

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 found at the top-right of the window. 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 Mode**l 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 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. 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**.

Step 3 Select 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 mobility services engine 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 Select New Scheduled 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 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.

When you check a MAC address check box, two icons which overlay 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 mobility services engine 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 > 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 Cisco WCS

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 (also known as exciters) are managed by the chokepoint vendor's application. For details refer to the *AeroScout Context-Aware Engine for Tags, for Cisco Mobility Services Engine User's Guide* for configuration details at the following link: http://support.aeroscout.com.

To add a chokepoint to Cisco WCS, follow these steps:

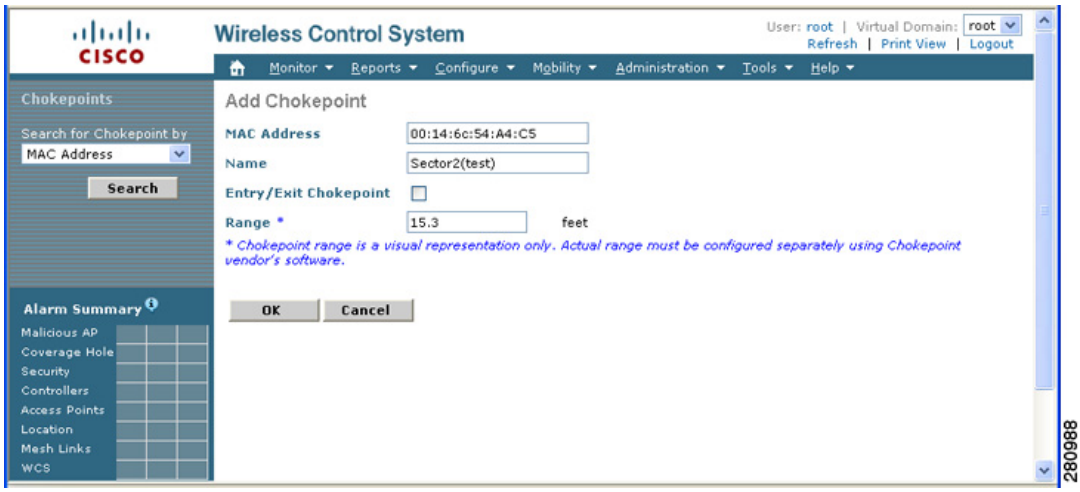
Step 1 Click **Configure > Chokepoints** from the main menu (top).

The All Chokepoints summary window appears.

Step 2 Select **Add Chokepoint** from the Select a command menu and 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.

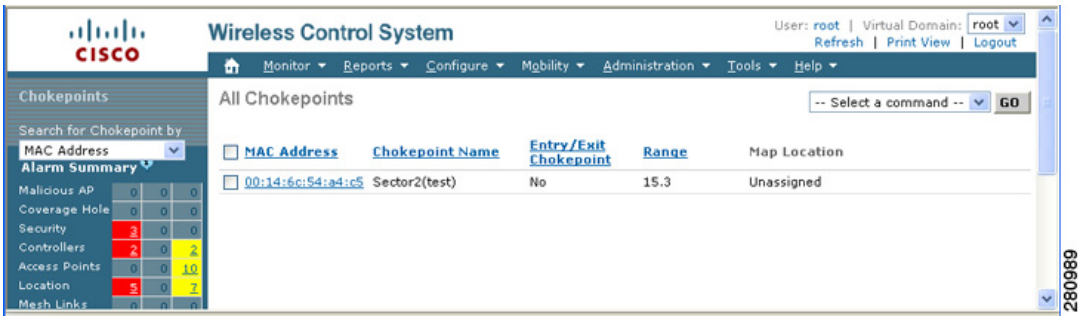
Step 4 Check the Entry/Exit Chokepoint check box if you want the chokepoint to function as an perimeter chokepoint. Its function is to track the entry and exit of clients and tags from an area or floor.

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).

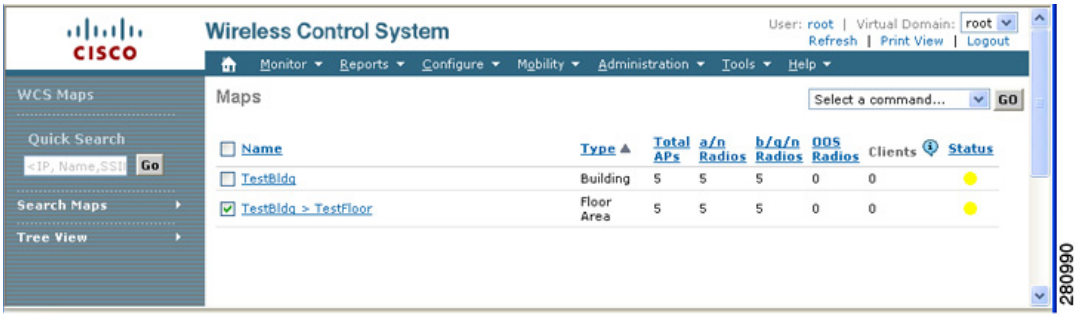
Figure 7-5 All Chokepoints Summary Window



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

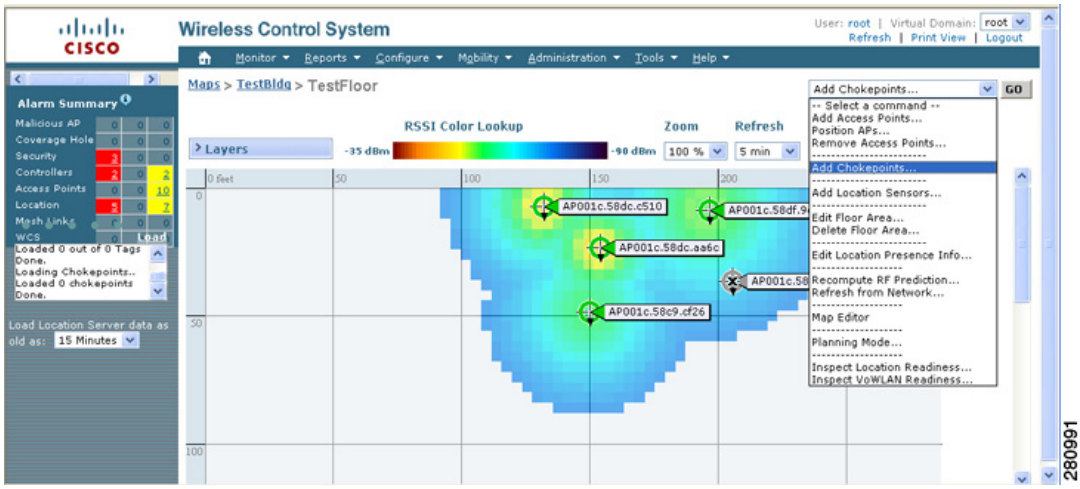
Step 6 To add the chokepoint to a map, click **Monitor > Maps** (Figure 7-6).

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

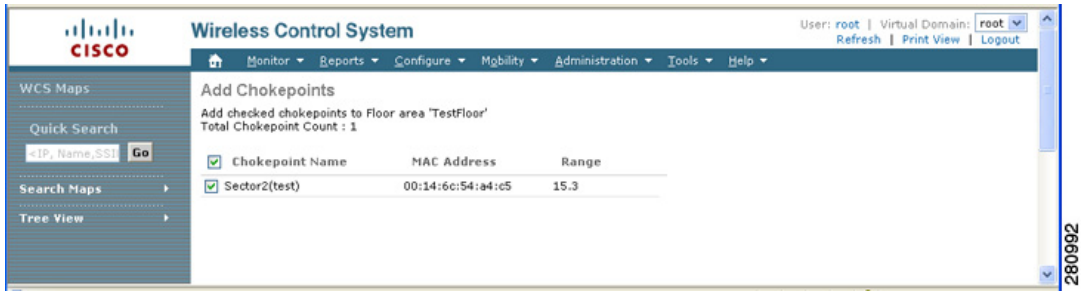


Step 8 Select **Add Chokepoints** from the Select a command menu. Click **GO**.

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

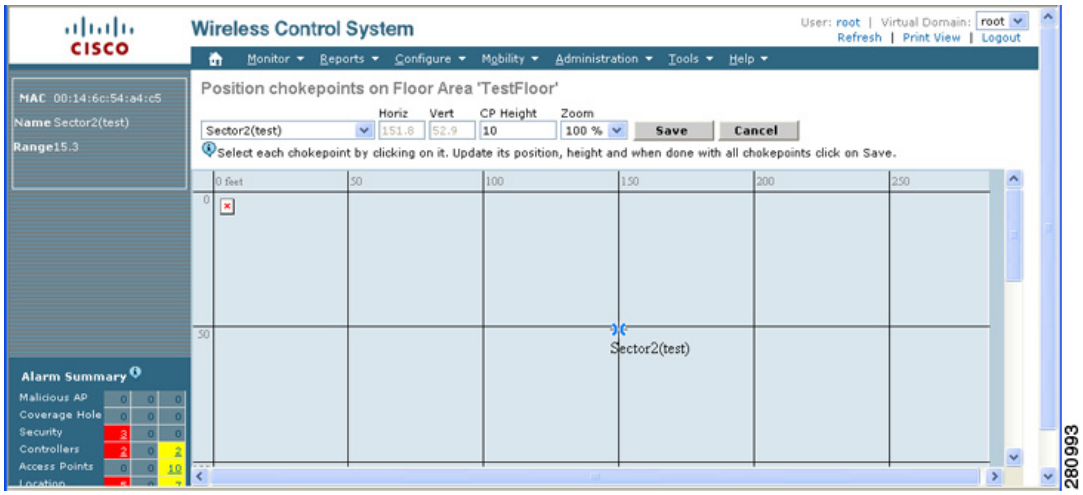


Step 9 Check the box next to the chokepoint to be added to the map. Click **OK** (bottom of screen).

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 Chokepoint Icon is Positioned on the Floor Map



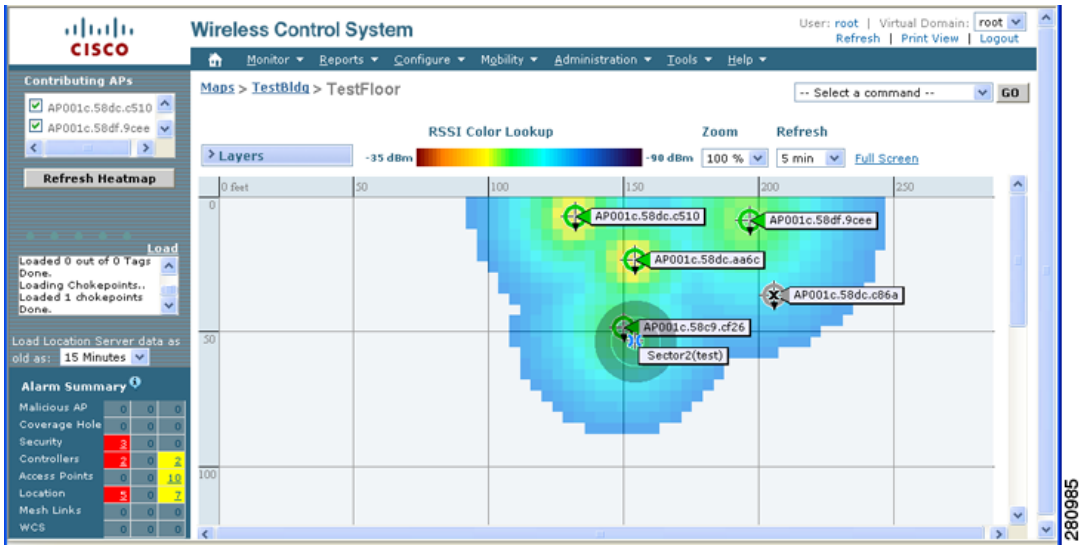
Note The MAC address, name, and coverage range of the chokepoint appear in the left panel when you click on the chokepoint icon for placement.

Step 11 Click **Save** when 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



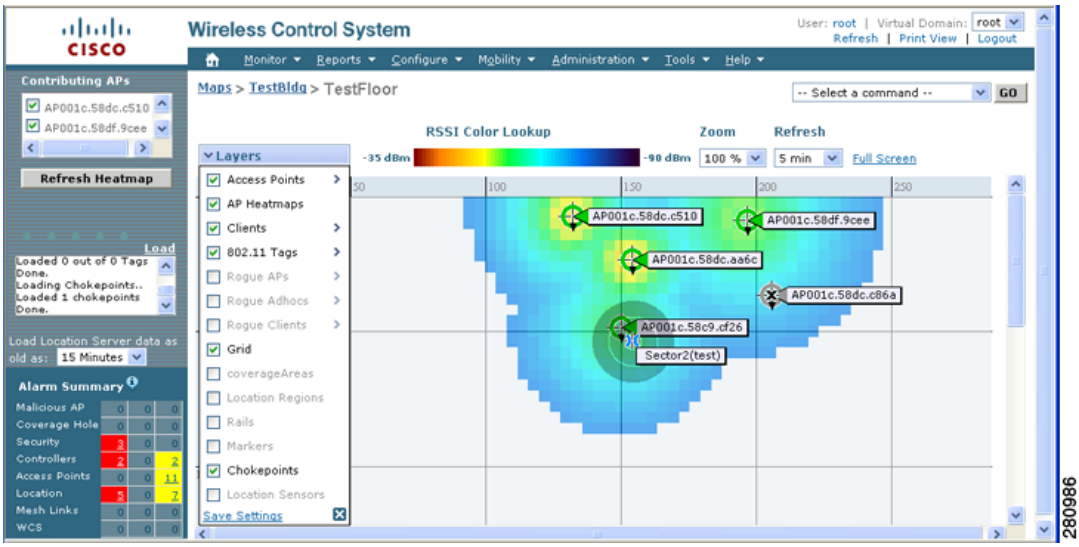
Note The rings around the chokepoint icon indicate the coverage area. When a Cisco CX tag and its asset passes within the coverage area, location details are broadcast and the tag is automatically mapped on the chokepoint coverage circle. When the tag moves out of the chokepoint range, its location is 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 Sensors to Enhance Tag Location Reporting

The location sensor (also known as a Wi-Fi TDOA location receiver) is an external system designed to receive signals transmitted from a tagged, tracked asset. These signals are then forwarded to the mobility services engine to aid in the location calculation of the asset. Location sensors use the method of Time Difference of Arrival (TDOA) to calculate tag location. This method uses data from a minimum of three location sensors to generate a tagged asset's location.

Note

- If a TDOA location sensor is not in use and the partner engine software is resident on the mobility service engine, then the location calculations for tags are generated using RSSI readings from access points.
- If the partner software engine is not installed and no location sensor is in use, no tag location calculations are done.

Before using a location sensor within the Cisco Unified Wireless Network, you must:

1. Have a mobility services engine active in the network.

   Refer to Chapter 2, "Adding and Deleting Systems" for details on adding a mobility services engine.
2. Add the location sensor to the Cisco WCS database and map.

   Refer to "Adding Location Sensors to Cisco WCS and Maps" section on page 7-19 for details on adding the location sensor to Cisco WCS.
3. Download the partner engine software to the mobility services engine using Cisco WCS.

   Refer to "Downloading Software for Location Sensors" section on page 7-21 for details on downloading the software.
4. Synchronize Cisco WCS and mobility services engines.

   Refer to Chapter 3, "Synchronizing Mobility Services Engines" for details on synchronization.
5. Setup the location sensor using the AeroScout System Manager.

Note Refer to the *AeroScout Context-Aware Engine for Tags, for Cisco Mobility Services Engine User's Guide* for configuration details at the following link: http://support.aeroscout.com.

Note Location sensors are referred to as Wi-Fi TDOA location receivers in the *AeroScout Context-Aware Engine for Tags, for Cisco Mobility Services Engine User's Guide.*

Adding Location Sensors to Cisco WCS and Maps

After the location sensor is installed and configured by the AeroScout System Manager and the partner software is downloaded on the mobility services engine, you are ready to add the location sensor to the mobility services engine database and position it on a Cisco WCS map.

After adding location sensors to Cisco WCS maps, you continue to make configuration changes to the location sensor using the AeroScout System Manager application rather than Cisco WCS.

Note For more details on configuration options, refer to the *AeroScout Context-Aware Engine for Tags, for Cisco Mobility Services Engine User's Guide* at the following link: http://support.aeroscout.com.

To add a location sensor to the Cisco WCS database and appropriate map, follow these steps:

Step 1 In Cisco WCS, click **Configure > Location Sensor** to display the All Location Sensors window.

Step 2 From the Select a command menu, choose Add Location Sensor and click **GO**.

Step 3 Enter the MAC Address, Name and Static IP address of the location sensor.

Step 4 Click **OK** to save the location sensor entry to the database. The All Locations Sensors summary window appears with the new location sensor entry listed.

Note After you add the location sensor to the database, you can place the location sensor on the appropriate WCS floor map. To do so, continue with Step 5.

Step 5 To add the location sensor to a map, click **Monitor > Maps.**

Step 6 At the Maps window, select the link that corresponds to the floor location of the location sensor. The floor map appears.

Step 7 Select **Add Location Sensors** from the Select a command menu. Click **GO**.

The Add Location Sensors summary window appears.

Note The Add Location Sensors summary window lists all recently-added location sensors that are in the database but not yet mapped.

Step 8 Check the check box next to the location sensor(s) to be added to the map. Click **OK**.

A map appears with a location sensor icon located in the top-left hand corner. You are now ready to place the location sensor on the map.

Step 9 Left click on the location sensor icon and drag and place it in the proper location on the floor map.

Note The MAC address and name of the location sensor appear in the left panel when you click on the location sensor icon for placement.

Step 10 Click **Save** when the icon is placed correctly on the map.

You are returned to the floor heat map and the added location sensor appears on the map.

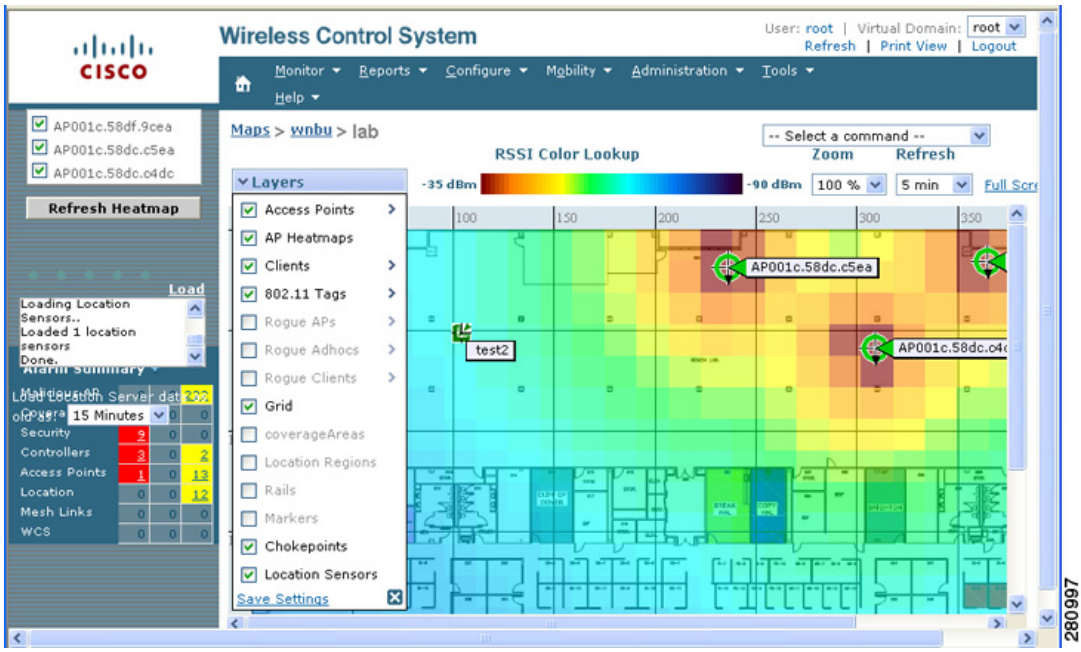
Note The icon for the newly added location sensor may or may not appear on the map depending on the display settings for that floor. If the icon did not appear, proceed with Step 11.

Step 11 If the location sensor does not appear on the map, click **Layers** to collapse a selection menu of possible elements to display on the map. Click the **Location Sensors** check box.

Step 12 The location sensor appears on the map (Figure 7-13).

Note You can hover over (mouse over) a location sensor on a map to see configuration details for that sensor.

Figure 7-13 Location Sensor Enabled on Layers Menu for Map Display



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

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

Step 14 You can now download the partner engine software to the mobility services engine.

Refer to the "Downloading Software for Location Sensors" section on page 7-21 for details.

Removing Location Sensors from Cisco WCS and Maps

You can remove one or multiple location sensors at a time. <ADD the maps section; if you remove from MP it comes back unassigned but still in database; approach below removes from WCS database.>

To delete a location sensor, follow these steps.

Step 1 In Cisco WCS, click **Configure > Location Sensors**. The All Location Sensors window appears.

Step 2 Check the box next to each location sensor to be deleted.

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

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

You are returned to the All Location Sensors window. A message confirming deletion of the location sensor appears. The deleted location sensor is no longer listed in the window.

Downloading Software for Location Sensors

Note If you have already downloaded the partner engine software onto the mobility services engine and added the location sensor to Cisco WCS, you are ready to synchronize the mobility service engine and Cisco WCS. Proceed to Chapter 3, "Synchronizing Mobility Services Engines" for more details.

To download software for the location sensor to the mobility services engine, follow these steps:

Step 1 In Cisco WCS, click **Mobility > Mobility Service Engines** to display the All Servers window.

Step 2 Click the name of the mobility services engine to which you want to download software.

Step 3 From the **Partner Engine** menu (left panel), select Download Software. The Transfer Partner Software Image window appears.

Step 4 To download the partner engine software image onto the mobility services engine, do one of the following:

a. To download software listed in the Cisco WCS directory, choose **Select from uploaded images to transfer into the Server**. Then choose the appropriate binary image from the drop-down menu.

Cisco WCS downloads the binary images listed in the drop-down menu into the FTP server directory you specified during Cisco WCS installation.

b. To use software available locally or over the network, select the **Browse a new software image to transfer into the Server** and click **Browse**. Locate the file and click **Open**.

Step 5 Enter the time in seconds (between 1 and1800) after which the software download times out.

Step 6 Click Download to send the software to the /opt/installers directory on the mobility services engine.

Note After the image has been transferred to the mobility service engine, log in to the mobility service engine CLI and run the installer image from the /opt/installers directory by entering the following command **rpm -Uvh** *aeroscout-engine rpm file* to install the software. To run the software enter **service aeroscout-engine-wd start**.

Note To stop the software, enter **service aeroscout-engine-wd stop** and to check status enter **service aeroscout-engine-wd status**.

Once the partner engine software is installed on the mobility services engine, two additional options, *Logs* and *Status*, are available on the Partner Engine Menu. Refer to Chapter 9, "Performing Maintenance Operations" for details.

Note You are ready to synchronize the mobility service engine and Cisco WCS. Proceed to Chapter 3, "Synchronizing Mobility Services Engines" for details.

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 mobility services engine recalculates location.

Defining an Inclusion Region on a Floor

Follow the steps below to define an inclusion area.

Step 1 Click **Monitor > Maps**.

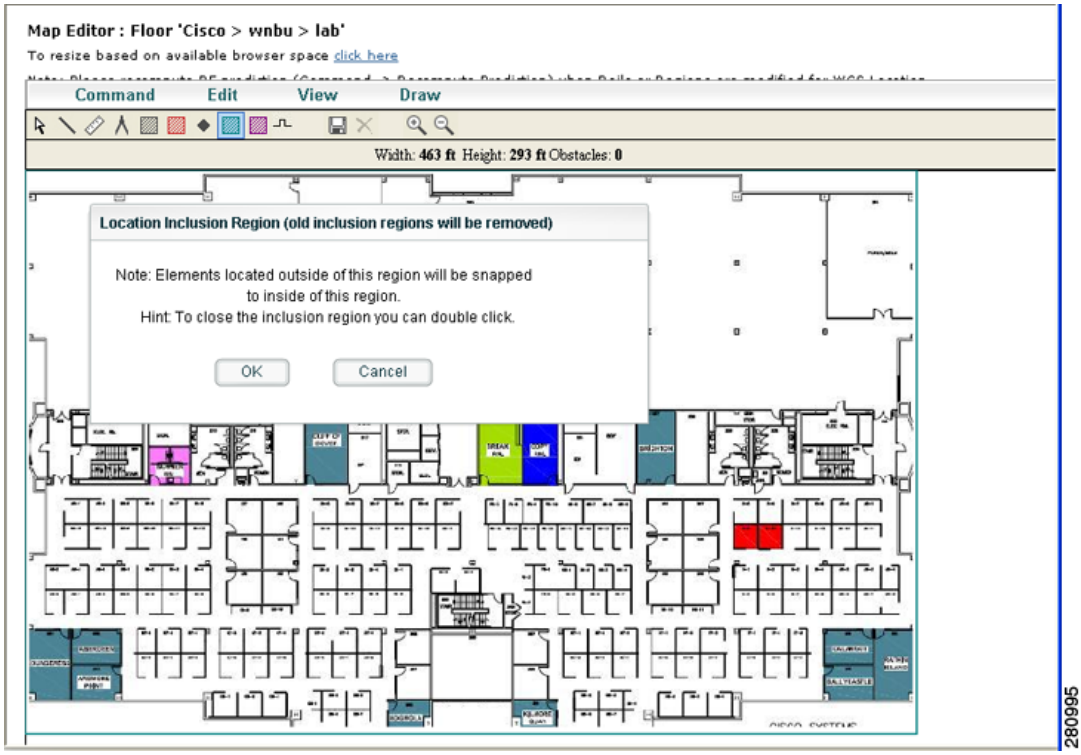
Step 2 Click on the name of the appropriate floor area.

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 7-14).

Figure 7-14 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 that the synchronization is successful (two green arrows).

Note Newly defined inclusion and exclusion regions appear on heatmaps only after the mobility services engine 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.

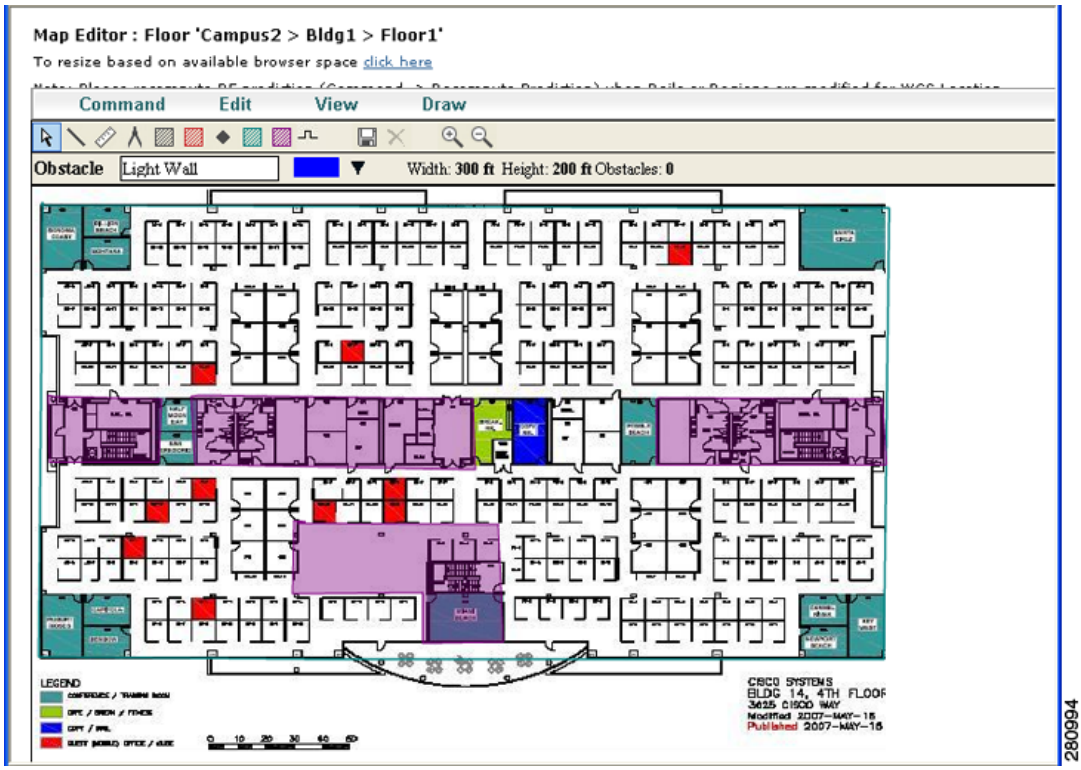
Step 6 To begin defining the exclusion area, move the drawing icon to the starting point on the map and click once.

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 7-15).

Figure 7-15 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 setting**s 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 that 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 clients to appear. Any client located within the snap-width area is plotted on the rail line (majority) or just outside of the snap-width area (minority).

Note Rail line configurations do not apply to tags.

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.

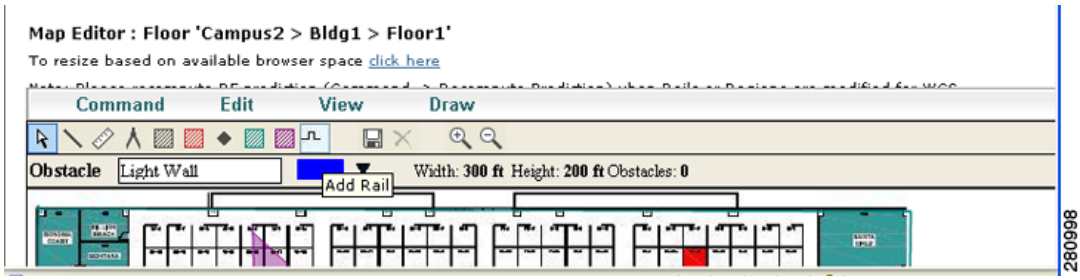
Step 1 Click **Monitor > Maps**.

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 7-16).

Figure 7-16 Rail Icon on Map Editor Tool Bar



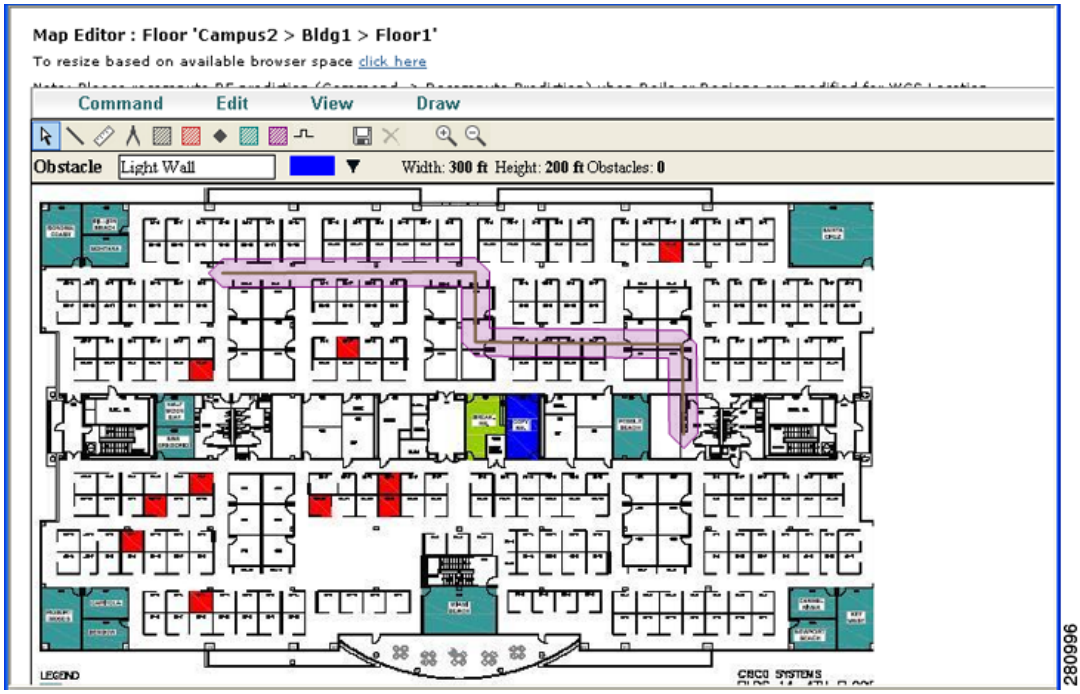
Step 5 In the message panel that appears, enter a snap-width (feet or meters) for the rail and then click **OK.** A drawing icon appears.

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 7-17).

Figure 7-17 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 mobility services engine, 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 that the synchronization is successful (two green arrows).

Enabling Location Presence on a Mobility Services Engine

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

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

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

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

Step 1 Click **Mobility** > **Mobility Service Engines** > *Server Name*. Select the mobility services engine 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 following Location Resolution options.

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

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

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

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

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

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

Step 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**.

Modifying Context Aware Software Parameters

You can modify Context Aware Software properties as to the type and number of clients or tags that are tracked and whether or not locations are calculated for those clients or tags.

You can also modify parameters that affect the location calculation of clients and tags such as Receiver Signal Strength Indicator (RSSI) measurements.

Note Licenses are required to retrieve contextual information on tags and clients from access points. The client's license also includes tracking of rogue clients and rogue access points. Licenses for tags and clients are offered independently. Licenses for tags and clients are offered in a range of quantities, ranging from 3,000 to 12,000 units. Refer to the *Release Notes for Cisco 3350 Mobility Services Engine for Software Release 5.1.30.0* at the following link for details: http://www.cisco.com/en/US/products/ps9742/tsd_products_support_series_home.html

Modifying Tracking Parameters

The mobility services engine can track up to18,000 clients and up to18,000 tags (with the proper license purchase). Updates on the locations of elements being tracked are provided to the mobility services engine from the Cisco wireless LAN controller.

Only those elements designated for tracking by the controller are viewable in Cisco WCS maps, queries and reports. No events and alarms are collected for non-tracked elements and none are used in calculating the 18,000 element limit for clients or tags.

You can modify the following tracking parameters using Cisco WCS:

- Enable and disable element locations (client stations, active asset tags, and rogue clients and access points) you actively track.
- Set limits on how many of a specific element you want to track.

  For example, given a client license of 12,000 trackable units, you could set a limit to track only 8,000 client stations (leaving 4,000 units available to track rogue clients and rogue access points). Once the tracking limit is met for a given element, the number of elements not being tracked is summarized on the Tracking Parameters page.
- Disable tracking and reporting of ad hoc rogue clients and access points.

To configure tracking parameters for a mobility services engine, follow these steps:

Step 1 In Cisco WCS, click **Mobility > Mobility Service Engines**. The All Servers window appears.

Step 2 Click the name of the mobility services engine whose properties you want to edit. The General Properties window appears.

Step 3 In the Location menu (left panel), select Tracking Parameters from the Administration sub-heading to display the configuration options.

Step 4 Modify the tracking parameters as appropriate. Table 7-1 describes each parameter.

:

Table 7-1 Tracking Parameters

Parameter	Configuration Options
Tracking Parameters	
Client Stations	1. Check the **Enable** check box to enable tracking of client stations by the mobility services engine. 2. Check the **Enable Limiting** check box to set a limit on the number of client stations to track. 3. Enter a Limit Value, if limiting is enabled. The limit entered can be any positive value up to 18,000 which is the maximum number of clients that can be tracked by a mobility services engine. **Note** The actual number of tracked clients is determined by the license purchased. **Note** Active Value (display only): Indicates the number of client stations currently being tracked. **Note** Not Tracking (display only): Indicates the number of client stations beyond the limit.
Asset Tags	1. Check the **Enable** check box to enable tracking of asset tags by the mobility services engine. 2. Check the **Enable Limiting** check box to set a limit on the number of asset tags stations to track. 3. Enter a Limit Value, if limiting is enabled. The limit entered can be any positive value up to 18,000, which is the maximum number of tags that can be tracked by a mobility services engine. **Note** The actual number of tracked tags is determined by the license purchased. **Note** Active Value (display only): Indicates the number of asset tags currently being tracked. **Note** Not Tracking (display only): Indicates the number of asset tags beyond the limit.

Table 7-1 Tracking Parameters (continued)

Parameter	Configuration Options
Rogue Clients and Access Points	1. Check the **Enable** check box to enable tracking of rogue clients and asset points by the mobility services engine. 2. Check the **Enable Limiting** check box to set a limit on the number of rogue clients and asset tags stations to track. 3. Enter a Limit Value, if limiting is enabled. The limit entered can be any positive value up to18,000 which is the maximum number of rogue clients and access points that can be tracked by a mobility services engine. **Note** The actual number of tracked rogues (clients and access points) is driven by the client license purchased. The user must consider the number of clients that are being tracked in determining the available quantity to allocate to track rogue clients and access points because clients and rogue clients and access points are addressed by the same license. **Note** Active Value (display only): Indicates the number of rogue clients and access points currently being tracked. **Note** Not Tracking (display only): Indicates the number of rogue clients and asset tags beyond the limit.
Exclude Ad-Hoc Rogues	Check the check box to turn off the tracking and reporting of ad hoc rogues in the network. As a result, ad hoc rogues are not displayed on Cisco WCS maps or its events and alarms reported.
SNMP Parameters	Not applicable to mobility services engines.
SNMP Retry Count	Enter the number of times to retry a polling cycle. Default value is 3. Allowed values are from 1 to 99999. (Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only).
SNMP Timeout	Enter the number of seconds before a polling cycle times out. Default value is 5. Allowed values are from 1 to 99999. (Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only).
Client Stations	Check the **Enable** check box to enable client station polling and enter the polling interval in seconds. Default value is 300. Allowed values are from 1 to 99999. (Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only).
Asset Tags	Check the **Enable** check box to enable asset tag polling and enter the polling interval in seconds. Default value is 600. Allowed values are from 1 to 99999. (Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only). **Note** Before the location server can collect asset tag data from controllers, you must enable the detection of active RFID tags using the CLI command **config rfid status enable** on the controllers.

Table 7-1 Tracking Parameters (continued)

Parameter	Configuration Options
Rogue Clients and Access Points	Check the **Enable** check box to enable rogue access point polling and enter the polling interval in seconds. Default value is 600. Allowed values are from 1 to 99999.(Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only).
Statistics	Check the **Enable** check box to enable statistics polling for the location server, and enter the polling interval in seconds. Default value is 900. Allowed values are from 1 to 99999.(Configurable in controller release 4.1 and earlier and location server release 3.0 and earlier only).

Step 5 Click **Save** to store the new settings in the mobility services engine database.

Modifying Filtering Parameters

In Cisco WCS, you can limit the number of asset tags, clients, and rogue clients and access points whose location is tracked by filtering on:

- MAC addresses

  Specific MAC addresses can be entered and labeled as allowed or disallowed from location tracking. You can import a file with the MAC addresses that are to be allowed or disallowed, or you can enter them individually from the WCS GUI window.

  The format for entering MAC addresses is xx:xx:xx:xx:xx:xx. If a file of MAC addresses is imported, the file must follow a specific format as noted below:

  – Each MAC address should be listed on a single line.

  – Allowed MAC addresses must be listed first and preceded by an "[Allowed]" line item. Disallowed MAC addresses must be preceded by "[Disallowed]."

  – Wildcard listings can be used to represent a range of MAC addresses. For example, the first entry "00:11:22:33:*" in the Allowed listing below is a wildcard.

Note Allowed MAC address formats are viewable from the Filtering Parameters configuration window. See Table 7-2 for details.

EXAMPLE file listing:

[Allowed]
00:11:22:33:*
22:cd:34:ae:56:45
02:23:23:34:*
[Disallowed]
00:10:*
ae:bc:de:ea:45:23

- Probing clients

  Probing clients are clients that are associated to another controller but whose probing activity causes them to be seen by another controller and counted as an element by the “probed” controller as well as its primary controller.

To configure filtering parameters for a mobility services engine, follow these steps:

Step 1 In Cisco WCS, click **Mobility > Mobility Service Engines**. The All Servers window appears.

Step 2 Click the name of the mobility services engine whose properties you want to edit. The General Properties window appears.

Step 3 From the Location menu (left panel), select Filtering Parameters from the Administration sub-heading to display the configuration options.

Step 4 Modify the filtering parameters as appropriate. Table 7-2 describes each parameter.

Table 7-2 Filtering Parameters

Parameter	Configuration Options
Exclude Probing Clients	Check the check box to prevent location calculation of probing clients.
Enable Location MAC Filtering	1. Check the check box to enable MAC filtering of specific elements by their MAC address. 2. To import a file of MAC addresses (*Upload a file for Location MAC Filtering* field), browse for the file name and click **Save** to load the file. The imported list of MAC addresses auto-populates the Allowed List and Disallowed List based on their designation in the file. **Note** To view allowed MAC address formats, click on the red question mark next to the *Upload a file for Location MAC Filtering* field. 3. To add an individual MAC address, enter the MAC addresses (format is xx:xx:xx:xx:xx:xx) and click either **Allow** or **Disallow**. The address appears in the appropriate column. **Note** To move an address between the Allow and Disallow columns, highlight the MAC address entry and click the button under the appropriate column. **Note** To move multiple addresses, click the first MAC address and depress the **Ctrl** to highlight additional MAC addresses. Click the **Allow** or **Disallow** button based on its desired destination. **Note** If a MAC address is not listed in the Allow or Disallow column, by default, it appears in the Blocked MACs column. If you click the **Unblock** button, the MAC address automatically moves to the Allow column. You can move it to the Disallow column by selecting the Disallow button under the Allow column.

Step 5 Click **Save** to store the new settings in the mobility services engine database.

Editing Advanced Location Parameters

You can use Cisco WCS to modify parameters that affect location calculations such as Receiver Signal Strength Indicator (RSSI) measurements for clients.

You can also apply varying smoothing rates to manage location movement of a client.

Note Tag location is not managed or affected by advanced location parameter settings. Only client location is affected.

To configure advanced location parameters, follow these steps:

Step 1 In Cisco WCS, click **Mobility> Mobility Service Engine**.

Step 2 Click the name of the mobility services engine whose properties you want to edit.

Step 3 From the Location menu (left panel), select Location Parameters from under the Advanced sub-heading. The configuration options appear.

Step 4 Modify the location parameters as appropriate. Table 7-3 describes each parameter.

Table 7-3 Advanced Location Parameters

Parameter	Configuration Options
Calculation time	Check the corresponding check box to enable the calculation of the time required to compute location. **Note** This parameter applies only to clients. **Caution** Enable only under Cisco TAC personnel guidance because enabling this parameter slows down overall location calculations.
OW Location	Check the corresponding check box to enable Outer Wall (OW) calculation as part of location calculation. **Note** This parameter is ignored by the mobility services engine.
Relative discard RSSI time	Enter the number of minutes since the most recent RSSI sample after which RSSI measurement should be considered discarded. For example, if you set this parameter to 3 minutes and the mobility services engine receives two samples at 10 and 12 minutes, it keeps both samples. An additional sample received at 15 minutes is discarded. Default value is 3. Allowed values range from 0 to 99999. *A value of less than 3 is not recommended.* **Note** This parameter applies only to clients.
Absolute discard RSSI time	Enter the number of minutes after which RSSI measurement should be considered stale and discarded, regardless of the most recent sample. Default value is 60. Allowed values range from 0 to 99999. *A value of less than 60 is not recommended.* **Note** This parameter applies only to clients.

Table 7-3 Advanced Location Parameters (continued)

Parameter	Configuration Options
RSSI Cutoff	Enter the RSSI cutoff value, in decibels (dBs) with respect to one (1) mW (dBm), above which the mobility services engine will always use the access point measurement. Default value is –75. **Note** When 3 or more measurements are available above the RSSI cutoff value, the mobility services engine will discard any weaker values and use the 3 (or more) strongest measurements for calculation; however, when only weak measurements below the RSSI cutoff value are available, those values are used for calculation. **Note** This parameter applies only to clients. **Caution** Modify only under Cisco TAC personnel guidance. Modifying this value can reduce the accuracy of location calculation.
Smooth Location Positions	Smoothing compares an element's prior location to its most recent reported location by applying a weighted average calculation to determine its current location. The specific weighted average calculation employed is tied to the given smoothing option selected. Default value is More Smoothing. Options: • Off (No smoothing): Elements assumed to be in location indicated by most recent polling. • Less smoothing: Prior location weighted at 25% and New location weighted at 75%. • Average smoothing: Prior location weighted at 50% and New location weighted at 50%. • More smoothing: Prior location weighted at 75% and New location weighted at 25%. • Maximum smoothing: Prior location weighted at 90% and New location weighted at 10%. **Note** This parameter applies only to clients.
Chokepoint Usage	Check the Enable check box to enable tracking of Cisco compatible tags by chokepoints. **Note** This parameter is ignored by the mobility services engine.

Table 7-3 Advanced Location Parameters (continued)

Parameter	Configuration Options
Use Chokepoints for Interfloor conflicts	Perimeter chokepoints or weighted location readings can be selected to determine the location of Cisco compatible tags. Options: • Never: When selected, perimeter chokepoints are not used to determine the location of Cisco compatible tags. • Always: When selected, perimeter points are used to determine the location of Cisco compatible tags. • Floor Ambiguity: When selected, both weighted location readings and perimeter chokepoints are used to generate location for Cisco compatible tags. If similar locations are calculated by the two methods, the perimeter chokepoint value is used by default. **Note** This parameter is ignored by the mobility services engine.
Chokepoint Out of Range Timeout	When a Cisco compatible tag leaves a chokepoint range, the timeout period entered is the period that passes before RSSI values are again used for determining location. **Note** This parameter is ignored by the mobility services engine.
Allow Civic Address updates from Switches	Check the enable check box to receive civic address updates from the controller. When enabled, the civic address parameter provides city, state, postal code and country specifics for the mobility services engine. This capability is in addition to the Cisco default settings of campus, building, floor, and X, Y coordinates. This information can then be requested by clients on demand for use by location-based services and applications. **Note** For more details on civic addresses and other location options, refer to the "Enabling Location Presence on a Location Server" section on page 7-24.

Step 5 Click **Save** to store your selections in the Cisco WCS and mobility services engine databases.