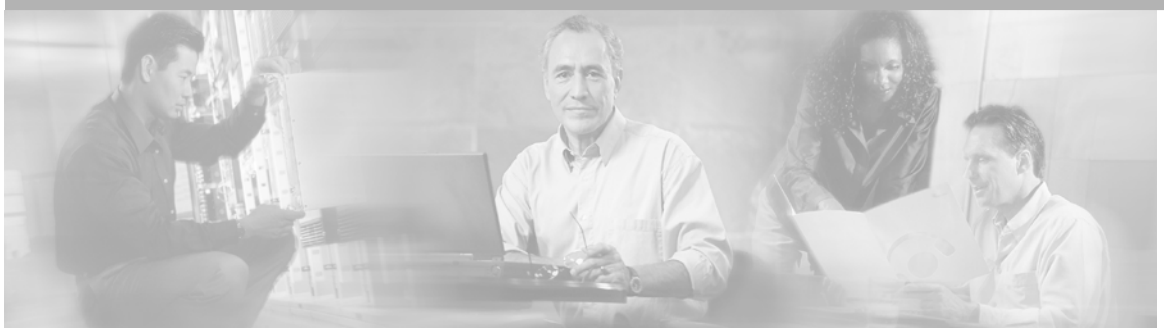

Cisco Location Appliance Configuration Guide

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Preface

This section describes the objectives, audience, organization, and conventions of the *Cisco Location Appliance Configuration Guide*.

Objectives

This publication explains the steps for using Cisco Wireless Control System (WCS) for configuring and managing location servers.

Audience

This publication is for the person configuring and managing location services. The user should be familiar with network structures, terms, and concepts.

Organization

This guide contains the following sections:

Chapter 1, "Overview," describes the major features of location servers that you can configure using Cisco WCS.

Chapter 2, "Adding and Deleting Location Servers," describes how to add and delete location servers.

Chapter 3, "Synchronizing Cisco WCS and Location Servers," describes how to synchronize Cisco WCS and locations servers.

Chapter 4, "Editing Location Server Properties," describes how to configure location server properties.

Chapter 5, "Managing Location Server Users and Groups," describes how to configure and manage users, groups, and hot access.

Chapter 6, "Configuring Event Notifications," describes how to define events and event groups, and how to configure event notification parameters. It also describes how to view event notification summaries.

Chapter 7, "Monitoring Location Servers and Site," describes how to monitor locations servers by configuring and viewing alarms, events, and logs. It also describes how to view location server, client, and asset tag status. Achieving optimum AP placement and coverage is also addressed.

Chapter 8, "Performing Maintenance Operations," describes how to back up and restore location server data and how to update the location server software. It also describes other maintenance operations.

Conventions

This publication uses the following conventions to convey instructions and information:

- Commands and keywords are in **boldface** type.

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Publications

For more information about location appliances and related products, refer to the *Cisco 2700 Series Location Appliance Quick Start Guide*, which describes how to set up location appliances. This document is available on the Cisco CCO website at the following URL:

http://www.cisco.com/en/US/products/ps6386/prod_installation_guides_list.html

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

The Product Documentation DVD is a comprehensive library of technical product documentation on a portable medium. The DVD enables you to access multiple versions of installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the same HTML documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .PDF versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Ordering Documentation

Registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

- Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can submit comments about Cisco documentation by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you will find information about how to:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- For Emergencies only—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- For Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is down, or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Quick Reference Guide* is a handy, compact reference tool that includes brief product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through channel partners. It is updated twice a year and includes the latest Cisco offerings. To order and find out more about the Cisco Product Quick Reference Guide, go to this URL:

  http://www.cisco.com/go/guide

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

  or view the digital edition at this URL:

  http://ciscoiq.texterity.com/ciscoiq/sample/

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  http://www.cisco.com/discuss/networking

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

Overview

Cisco 2700 series location appliances operate within the Cisco Wireless LAN Solution infrastructure. Location appliances compute, collect, and store historical location data using Cisco wireless LAN controllers and access points to track the physical location of wireless devices. Up to 2,500 laptop clients, palmtop clients, VoIP telephone clients, active Radio Frequency Identifier (RFID) asset tags, rogue access points and clients can be tracked.

The collected location data can be viewed in GUI format in the Cisco Wireless Control System (WCS), the centralized WLAN management platform. However, before you can use the WCS, you must perform an initial configuration using a CLI console session as described in the *Quick Start Guide: Cisco 2700 Series Location Appliance*.

The following sections describe the main topics covered in this guide:

- "Display of Location Data" section on page 1-1
- "Event Notification" section on page 1-2
- "Maintenance Operations" section on page 1-3
- "WCS and Location Server Synchronization" section on page 1-3
- "Monitoring Capability" section on page 1-3
- "Configuration and Administration" section on page 1-3
- "Compatibility Matrix" section on page 1-4

Display of Location Data

After it is configured, each location server communicates directly with the Cisco wireless LAN controllers to which it was assigned to collect operator-defined location data. You can then use the associated Cisco WCS server to communicate with each location server to transfer and display selected data.

You can configure location appliances to collect data for Cisco Wireless LAN Solution clients, rogue access points, rogue clients, mobile stations, and RFID asset tags at separate intervals which you define.

Event Notification

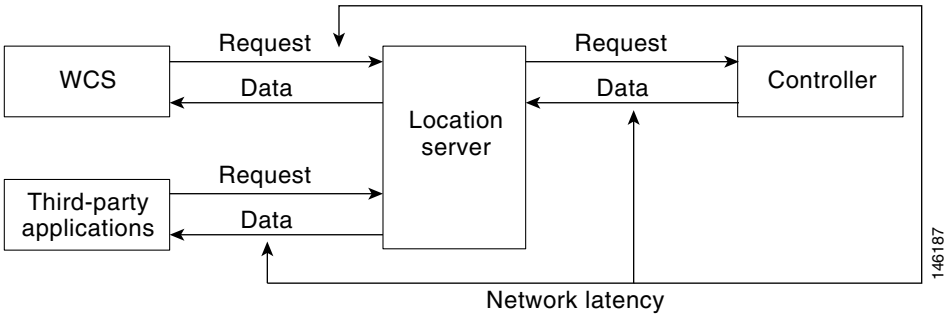
Location servers provide the functionality for sending event notifications to registered listeners over the following transport mechanisms:

- Simple Object Access Protocol (SOAP)
- Simple Mail Transfer Protocol (SMTP) mail
- Simple Network Management Protocol (SNMP)
- SysLog

Note WCS can act as a listener receiving event notifications over SNMP.

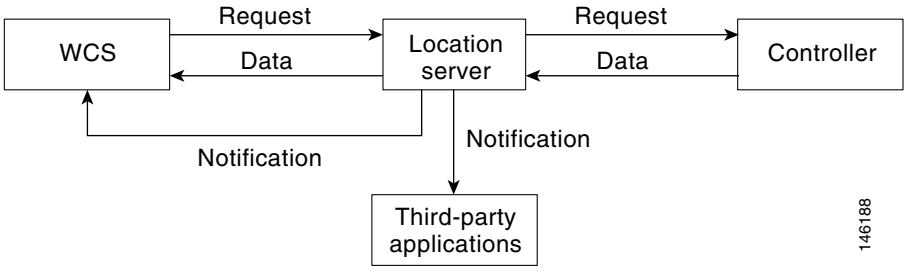
Without event notification, Cisco WCS and third-party applications will need to periodically request location information from location servers. (Figure 1-1).

Figure 1-1 Pull Communication Model



The pull communication model, however, is not suitable for applications that require more real-time updates to location information. For these applications, you can configure location servers to send event notifications (push) when certain conditions are met by the registered listeners (Figure 1-2).

Figure 1-2 Push Communication Model



Maintenance Operations

You can use Cisco WCS to back up the location server to a predefined FTP folder on any Cisco WCS server at defined intervals. You can also restore the location server data from that Cisco WCS Server. Other location server maintenance operations that you can perform include downloading new application code to all associated location server from any Cisco WCS server, defragmenting the Cisco WCS database, restarting location servers, and clearing location server configurations.

WCS and Location Server Synchronization

To maintain accurate location information, you can use Cisco WCS to configure location servers so that they are synchronized with network design, event group, and controller elements. Cisco WCS provides you with two ways to synchronize these elements and locations servers: manual and automatic (auto-sync).

Monitoring Capability

You can use Cisco WCS to monitor alarms and events generated by location servers. You can also download log files and view location server status information.

Configuration and Administration

You use Cisco WCS to perform different configuration and administrative tasks, including adding and removing location servers, configuring location server properties, managing users and groups and importing and exporting asset location information.

Compatibility Matrix

Table 1-1 describes compatibility between WCS and location server versions.

Table 1-1 WCS and Location Server Compatibility Matrix

WCS \ Location Server	LOC 1.1	LOC 1.2	LOC 2.0	LOC 2.1
WCS 3.0	Supported	Supported[1]	Not supported	Not supported
WCS 3.1	Supported[2]	Supported	Supported from WCS 3.1.35.0 onward[3]	Supported from WCS 3.1.35.0 onward[3]
WCS 3.2	Supported[2, 3, 4, 5]	Supported[3, 4, 5]	Supported	Supported[6]
WCS 4.0	Supported[2, 3, 4, 5, 7]	Supported[3, 4, 5, 7]	Supported[7]	Supported

1. Certain antenna attributes are ignored by WCS.
2. Certain antenna attributes are ignored by the location server.
3. Asynchronous notification features are ignored by the location server.
4. Backup and restore operations for the location server may time out.
5. Searching for elements by a specific MAC address or asset name will not work until the location server SW is upgraded.
6. Battery level and location notification update features are ignored by WCS. Location smoothing parameters and contributing access point (AP) debug options are ignored by WCS.
7. Battery level and location notification update features are ignored by the location server. Location smoothing parameters and contributing access point (AP) debug options are ignored by the location server.

Adding and Deleting Location Servers

This chapter describes how to add and delete location servers. This chapter contains the following sections:

- "Adding a Location Server to Cisco WCS" on page 2-1
- "Deleting Location Servers from the Cisco WCS Database" on page 2-2

Adding a Location Server to Cisco WCS

Log into WCS and follow these steps to add a location server to Cisco WCS:

Step 1 Verify that you can ping the location server that you want to add from the Cisco WCS server.

Step 2 Choose **Location > Location Servers** to display the All Location Servers page.

Step 3 From the drop-down menu (right-hand side), choose **Add Server** and click **GO**.

Step 4 In the Server Name field, enter a name for the location server.

Step 5 In the IP Address field, enter the location server's IP address.

Step 6 (Optional) In the Contact Name filed, enter the name of the location server administrator.

Step 7 In the User Name and Password fields, enter the username and password for the location server.

The default username and password are both *admin*.

Step 8 In the Port field, enter the port number used by the location server.

The default port is 8001.

Step 9 Check the Enable check box to enable HTTPS. Uncheck the check box to disable HTTPS.

HTTPS is disabled by default.

Step 10 Click **Save**.

Cisco WCS searches for the location server and adds it to the Cisco WCS database.

Step 11 Go back to the All Location Servers page and click **Refresh** (top right). Verify that the location server that you have just added appears on the page.

Note Cisco WCS does not allow you to add a server that already exists in the WCS database.

Deleting Location Servers from the Cisco WCS Database

To delete location servers from the Cisco WCS database, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Select the server or servers to be deleted by checking the corresponding check box(es).

Step 3 From the drop-down menu (right-hand side), choose **Delete Server(s)** and click **GO**.

Step 4 Click **OK** to confirm that you want to delete the selected location server from the WCS database.

Step 5 Click **Cancel** to stop deletion.

Synchronizing Cisco WCS and Location Servers

This chapter describes how to synchronize Cisco WCS and locations servers. This chapter contains the following sections:

- "Keeping Cisco WCS and Location Servers Synchronized" on page 3-1
- "Viewing Synchronization Information" on page 3-5

Keeping Cisco WCS and Location Servers Synchronized

This section describes how to synchronize WCS and location servers manually and automatically.

Note Be sure to verify software compatibility between WCS and the location server before performing synchronization as summarized in the compatibility matrix in Section 1-4 of Chapter 1.

Synchronizing Network Designs and Location Servers

After adding a location server to the WCS database, you can add (synchronize) network designs (campus, building, and outdoor maps) to the location server database. After the network designs are stored in the Cisco WCS and location server databases, you can re-synchronize the two databases at any time.

Follow these steps to synchronize WCS network designs with location servers:

Step 1 Choose **Location > Location Servers** to display the All Location Servers page.

Step 2 From the drop-down menu (right-hand side), choose **Synchronize Servers** and click **GO**.

Cisco WCS displays the Synchronize WCS and Location Servers page.

Step 3 From the Synchronize menu, choose **Network Designs**.

Step 4 To assign a network design to one or more location server, click its corresponding **Assign** link.

Step 5 In the "Assign to servers" dialog box that appears, check the box of each server that you want to assign to the network design. Click **OK** when selection is complete.

A red asterisk (*) appears next to the Assign link. To undo assignments, click **Reset**. To go back to the All Location Servers page without making any changes, click **Cancel**.

Note A network design might comprise a large campus with several buildings, each monitored by a different location server. This is why you might need to assign a single network design to multiple location servers.

Step 6 Click **Synchronize** to update the Cisco WCS and location server databases.

When the Cisco WCS and location server databases are synchronized, a green two-arrow icon appears in the Sync. Status column for each synchronized network design entry.

Note To unassign a network design from a location server, uncheck the server's check box in the "Assign to servers" dialog box and click **OK**. Then, click **Synchronize**. A two-arrow icon with a red circle appears in the Sync. Status column.

Synchronizing Controllers and Location Servers

Before a location server can collect any data, you must associate the server with a controller and synchronize them using Cisco WCS. After the initial synchronization, you can resynchronize the controllers and location servers at any time.

Follow these steps to synchronize a location server and a controller:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Cisco WCS displays the All Location Servers page.

Step 2 From the drop-down menu (right-hand side), choose **Synchronize Servers** and click **GO**.

Cisco WCS displays the Synchronize WCS and Location Servers page.

Step 3 From the Synchronize menu, choose **Controllers**.

Cisco WCS displays the Controllers summary page.

Step 4 To assign a location server to a controller, choose the server from the corresponding drop-down menu.

Step 5 Click **Synchronize** to synchronize the controller and location server databases.

When the Cisco WCS and location server databases are synchronized, a green two-arrow icon appears in the Sync. Status column of every synchronized controller entry.

Note Controller names must be unique for synchronizing with location servers. If you have two controllers with the same name, only one will be synchronized.

Note To remove a controller from a location server, choose **-- Unassigned --** from the controller's drop-down menu and click **Synchronize**. A two-arrow icon with a red circle appears in the Sync. Status column.

Synchronizing Event Groups and Location Servers

Follow these steps to synchronize WCS event groups and location servers:

Step 1 Choose **Location > Location Servers** to display the All Location Servers page.

Step 2 From the drop-down menu (right-hand side), choose **Synchronize Servers** and click **GO**.

Cisco WCS displays the Synchronize WCS and Location Servers page.

Step 3 From the Synchronize menu, choose **Event Groups**.

Step 4 To assign one or more location servers to an event group, click its corresponding **Assign** link.

Step 5 In the Assign to servers dialog box, check the box of each server that you want to assign to the event group. Click **OK** when selection is complete.

A red asterisk (*) appears next to the Assign link.

Step 6 Click **Synchronize** to update the Cisco WCS and location server databases.

When the Cisco WCS and location server databases are synchronized, a green two-arrow icon appears in the Sync. Status column of every synchronized event group entry.

Note To unassign an event group from a location server, uncheck the server's check box in the "Assign to servers" dialog box and click **OK**. Then, click **Synchronize**. A two-arrow icon with a red circle appears in the Sync. Status column.

Configuring Automatic Location Server Synchronization

Manual synchronization of WCS and location servers provides immediate synchronization. However, future deployment changes (such as making changes to maps and access point positions), can yield incorrect location calculations and asset tracking until resynchronization reoccurs. To prevent out-of-sync conditions, use Cisco WCS to enable automatic synchronization. This policy ensures that synchronization between WCS and location servers is triggered periodically and any related alarms are cleared.

To configure automatic synchronization, follow these steps:

Step 1 In Cisco WCS, choose **Administration > Scheduled Tasks**.

Step 2 Click **Location Server Synchronization**.

The Location Server Synchronization page lists the latest automatic synchronization operations and displays automatic synchronization options that you can configure.

Step 3 To set the location server to send out-of-sync alerts, check the **Enabled** check box of the Out of Sync Alerts field.

Step 4 To enable automatic synchronization, check the **Auto Synchronization** check box.

Note Automatic synchronization does not apply to elements (network designs, controllers, or event groups) that have not yet been assigned to a location server. However, out-of-sync alarms will still be generated for these unassigned elements. For automatic synchronization to apply to these elements, you need to manually assign them to a location server.

Step 5 Enter the time interval in days and the time of day that the automatic synchronization is to be performed.

Note Time interval was represented in minutes prior to release 2.1.x.

By default, auto-sync is disabled.

Step 6 Click **Submit**.

Out-of-Sync Alarms

Out-of-sync alarms are of Minor severity (yellow), and are raised in response to the following conditions:

- Elements have been modified in Cisco WCS (the auto-sync policy will push these elements)
- Elements have been modified in location servers (the auto-sync policy will pull these elements)
- Elements except controllers exist in the location server but not in Cisco WCS (the auto-sync policy will pull these elements)
- Elements have not been assigned to any location server (the auto-sync policy doesn't apply)

Out-of-sync alarms are cleared when the following occurs:

- Location server is deleted

  Note When you delete a location server, the out-of-sync alarms for that server are also deleted. In addition, if you delete the last available location server, the alarms for "elements not assigned to any location server" will also be deleted.

- Elements are synchronized manually or automatically
- User manually clears the alarms (although the alarms may reappear in the future when the scheduled task is next executed)

Note By default, out-of-sync alarms are enabled. You can disable them in Cisco WCS by choosing **Administration > Scheduled Tasks**, clicking **Location Server Synchronization**, unchecking the **Auto Synchronization** check box, and clicking **Submit**.

Viewing Synchronization Information

This section describes how to view location server synchronization status and history.

Viewing Location Server Synchronization Status

You can use the Synchronize Servers command in Cisco WCS to view the status of network design, controller, and event group synchronization with location servers.

To view synchronization status, follow these steps:

Step 1 In Cisco WCS, choose **Location > Synchronize Servers**.

Step 2 From the **Synchronize** drop-down menu, choose **Network Designs**, **Controllers**, or **Event Groups**.

Depending on the command you have chosen, Cisco WCS displays a list of elements (network designs, controllers, or event groups). In the list, the Sync. Status column shows the synchronization status. A green two-arrow icon indicates that its corresponding element is synchronized with the specified location server. A gray two-arrow icon with a red circle indicates that its corresponding item is not synchronized with the location server.

Viewing Location Server Synchronization History

You can use the Synchronization History command in Cisco WCS to view the location server synchronization history for the last 30 days. This is especially useful when automatic synchronization is enabled as alarms are automatically cleared. Synchronization History provides a summary of those cleared alarms.

To view synchronization history, follow these steps:

Step 1 In Cisco WCS, choose **Location > Synchronization History**.

Step 2 Click the column headers to sort the entries.

In the Synchronization History page, the Sync Direction column indicates whether information is pushed into the location server or pulled by the location server. The Generated By column indicates whether the synchronization was manual or automatic.

Editing Location Server Properties

This chapter describes how to configure location server properties. This chapter contains the following sections:

- "Editing General Properties" on page 4-1
- "Editing Polling Parameters" on page 4-1
- "Editing History Parameters" on page 4-3
- "Editing Location Parameters" on page 4-4
- "Editing Advanced Parameters" on page 4-6

Editing General Properties

You can use Cisco WCS to edit the general properties of location servers registered in the WCS database. These properties are: Contact Name, User Name, Password, and HTTPS. To edit the general properties of a location server, follow these steps:

Step 1 Choose **Location > Location Servers** to display the All Location Servers page.

Step 2 Click the name of the server you want to edit to display its properties.

Step 3 Edit the general properties.

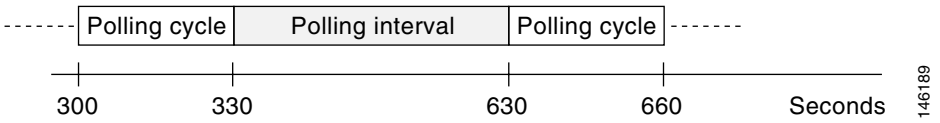
Step 4 Click **Save** to update the Cisco WCS and location server databases.

Editing Polling Parameters

You can use Cisco WCS to modify the time periods (polling intervals) for polling client stations, rogue access points, asset tags, and statistics of clients and asset tags.

The polling interval is the period of time between polling cycles. For example, if a polling cycle requires 30 seconds to complete, and the polling interval is 300 seconds, polling cycles start every 330 seconds, as shown in Figure 4-1.

Figure 4-1 Polling Interval



When configuring polling intervals, use shorter intervals to increase the granularity of data collection. To decrease the granularity of data collection, use longer intervals.

Note The polling intervals are independent of the number of times that WCS users request a data refresh from the location server.

To configure a location server's polling parameters, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left-hand side) to display the administrative configuration options.

Step 4 Click **Polling Parameters**.

Step 5 Configure the following parameters in the Polling Parameters page:

Parameter	Description
Retry Count	Enter the number of times to retry a polling cycle. Default value is 3. Allowed values are from 1 to 99999.
Timeout	Enter the number of seconds before a polling cycle times out. Default value is 5. Allowed values are from 1 to 99999.
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.
Rogues	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.
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. **Note** Before the location server can collect asset tag data from controllers, you must enable the detection of RFID tags using the CLI command **config rfid status enable** on the controllers.
Statistics	Check the **Enable** check box to enable statistics polling, and enter the polling interval in seconds. Default value is 900. Allowed values are from 1 to 99999.

Step 6 Click **Save** to store the new settings in the location server database.

Editing History Parameters

You can use Cisco WCS to specify how often to collect client station, rogue access point, and asset tag histories from the controllers associated with a location server. You can also program the location server to periodically prune (remove) duplicate data from its historical files to reduce the amount of data stored on its hard drive.

Follow these steps to configure location server history settings:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left-hand side) to display the administrative configuration options.

Step 4 Click **History Parameters**.

Step 5 Configure the following parameters in the History Parameters page:

Parameter	Description
Archive for	Number of days for the location server to retain a history of each enabled category. Default value is 30. Allowed values are from 1 to 99999.
Prune data starting at	Enter the number of hours and minutes at which the location server starts data pruning (between 0 and 23 hours, and between 1 and 59 minutes). Also enter the interval in minutes after which data pruning starts again (between 0, which means never, and 99900000). Default start time is 23 hours and 50 minutes, and the default interval is 1440 minutes.
Client Stations	Check the **Enable** check box to turn historical data collection on, and enter the number of minutes between data collection events. Default value is 120. Allowed values are from 1 to 99999.
Rogues	Check the **Enable** check box to turn historical data collection on (disabled by default), and enter the number of minutes between data collection events. Default value is 360. Allowed values are from 1 to 99999.
Asset Tags	Check the **Enable** check box to turn historical data collection on, and enter the number of minutes between data collection events. Default value is 180. Allowed values are from 1 to 99999.  **Note** Before the location server can collect asset tag data from controllers, you must enable the detection of RFID tags using the CLI command **config rfid status enable**.

Step 6 Click **Save** to store your selections in the location server database.

Editing Location Parameters

You can use Cisco WCS to specify whether the location server retains its calculation times and how soon the location server deletes its collected Receiver Signal Strength Indicator (RSSI) measurement times. You can also apply varying smoothing rates to manage location movement of an element.

To configure location parameters, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left-hand side) to display the administrative configuration options.

Step 4 Click **Location Parameters**.

Step 5 Configure the following parameters in the Location Parameters page:

Parameter	Description
Calculation time	Check the corresponding check box to enable the calculation of the time required to compute location. **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** The OW Location parameter is ignored by the location server.
Relative discard RSSI time	Enter the number of minutes since the most recent RSSI sample after which RSSI measurement should be considered stale and discarded. For example, if you set this parameter to 3 minutes and the location server 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.* .
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.*

Parameter	Description
RSSI Cutoff	Enter the RSSI cutoff value, in decibels (dBs) with respect to one (1) mW (dBm), above which the location server will always use the access point measurement. Default value is –75. **Note** When 4 or more measurements are available above the RSSI cutoff value, the location server will discard any weaker values and use the 4 (or more) strongest measurements for calculation; however, when only weak measurements below the RSSI cutoff value are available, those values are used for calculation. ⚠ **Caution** Modify only under Cisco TAC personnel guidance. Modifying this value can reduce the accuracy of location calculation.
Smooth Location Positions	Smoothing compares an elements 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: • None: Elements assumed to be in location indicated by most recent polling • Less: Prior location weighted at 25% and New location weighted at 75% • Average: Prior location weighted at 50% and New location weighted at 50% • More: Prior location weighted at 75% and New location weighted at 25% • Maximum: Prior location weighted at 90% and New location weighted at 10%

Step 6 Click **Save** to store your selections in the Cisco WCS and location server databases.

Editing Advanced Parameters

Follow these steps to edit location server advanced parameters:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left-hand side) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 In the Advanced Parameters section, you can configure the following settings:

Parameter	Description
Advanced Debug	Check the check box to enable advanced debugging. Uncheck the check box to disable advanced debugging. ⚠ **Caution** Enable advanced debugging only under the guidance of TAC personnel because advanced debugging slows the location server down.
Number of Days to Keep Events	Enter the number of days to keep logs. Change this value as required for monitoring and troubleshooting.
Session Timeout	Enter the number of minutes before a session times out. Change this value as required for monitoring and troubleshooting.
Absent Data cleanup interval	Interval in minutes for data cleanup.

Step 6 Click **Save** to update the Cisco WCS and location server databases.

Managing Location Server Users and Groups

This chapter describes how to configure and manage users, groups, and hot access. This chapter contains the following sections:

- "Managing Groups" on page 5-1
- "Managing Users" on page 5-3
- "Managing Host Access" on page 5-5

Managing Groups

This section describes how to add, delete, and edit user groups.

Adding User Groups

To add a user group to a location server, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Groups**.

Step 5 Choose **Add Group** from the drop-down menu (right-hand side) and click **GO**.

Step 6 Enter the name of the group in the Group Name field.

Step 7 Choose a permission level from the Permission drop-down menu.

There are three permissions levels to choose from:

- Read Access
- Write Access
- Full Access (required for Cisco WCS to access location servers)

Step 8 Click **Save** to add the new group to the location server.

Caution Group permissions override individual user permissions. For example, if you give a user full access permission and add that user to a group with read access permission, that user will not be able to configure location server settings.

Deleting User Groups

To delete user groups from a location servers, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Groups**.

Step 5 Check the check boxes of the groups that you want to delete.

Step 6 Choose **Delete Group** from the drop-down menu (right-hand side) and click **GO**.

Step 7 Click **OK** to confirm that you want to delete the selected groups.

Changing User Group Permissions

To change user group permissions, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Groups**.

Step 5 Click the name of the group you want to edit.

Step 6 Choose a permission level from the Permission drop-down menu.

Step 7 Click **Save** to apply your change.

Caution Group permissions override individual user permissions. For example, if you give a user full access permission and add that user to a group with read access permission, that user will not be able to configure location server settings.

Managing Users

This section describes how to add, delete, and edit users. It also describes how to view active user sessions.

Adding Users

To add a users to a location server, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Users**.

Step 5 Choose **Add User** from the drop-down menu (right-hand side) and click **GO**.

Step 6 Enter the username in the Username field.

Step 7 Enter a password in the Password field.

Step 8 Enter the name of the group to which the user belongs in the Group Name field.

Step 9 Choose a permission level from the Permission drop-down menu.

There are three permission levels to choose from: Read Access, Write Access, and Full Access

Caution Group permissions override individual user permissions. For example, if you give a user full access permission and add that user to a group with read access permission, that user will not be able to configure location server settings.

Step 10 Click **Save** to add the new user to the location server.

Deleting Users

To delete a user from a location server, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Users**.

Step 5 Check the check boxes of the users that you want to delete.

Step 6 Choose **Delete User** from the drop-down menu (right-hand side) and click **GO**.

Step 7 Click **OK** to confirm that you want to delete the selected users.

Changing User Properties

To change user properties, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Users**.

Step 5 Click the name of the group that you want to edit.

Step 6 Make the required changes to the Password, Group Name, and Permission fields.

Step 7 Click **Save** to apply your change.

Viewing Active User Sessions

To view active user sessions, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Active Sessions**.

Cisco WCS displays a list of active location server sessions. For every session, Cisco WCS displays the following information:

- Session identifier
- IP address from which the location server is accessed
- Username of the connected user
- Date and time when the session started
- Date and time when the location server was last accessed
- How long the session was idle for since the last access

Managing Host Access

This section describes how to add, delete, and edit host access records.

Adding Host Access

You can use Cisco WCS to add host access records to the location server database. Using host access records, you can control which hosts have access to the location server and when. You can also control access preference by assigning priorities to host access.

To add a new host access record, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Host Access**.

Step 5 Choose **Add Host Access** from the drop-down menu (right-hand side) and click **GO**.

Step 6 Enter the IP address and netmask of the host using the *ddd.ddd.ddd.ddd./dd* format.

Following are examples of IP address and netmask entries:

IP Address/Netmask	Description
120.10.0.0/8	Specifies hosts on a class A subnet (120.x.x.x).
120.10.0.0/16	Specifies hosts on a class B subnet (120.10.x.x).
120.10.223.0/16	Specifies hosts on a class C subnet (120.10.223.x).
120.10.223.10/32	Specifies a single host (120.10.223.10).

Step 7 To allow host access, check the **Enable** check box of the Permit field.

To deny host access, uncheck the **Enable** check box.

Step 8 Enter a priority number from 0 to 99999 in the Priority field.

Hosts with high priority have access preference over hosts with low priority.

Step 9 Enter the time of day when the host may access the location server in the Start Access field.

In the Hrs. field, enter a value from 0 to 23. In the Mins field, enter a value from 0 to 59.

Step 10 Enter the time of day when host access ends.

In the Hrs. field, enter a value from 0 to 23. In the Mins field, enter a value from 0 to 59.

Step 11 Click **Save** to add the new host access to the location server.

Deleting Host Access

To delete a host access record, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Users**.

Step 5 Check the check boxes of the host access records that you want to delete.

Step 6 Choose **Delete Host Access** from the drop-down menu (right-hand side) and click **GO**.

Step 7 Click **OK** to confirm that you want to delete the selected host access records.

Editing Host Access

To edit a host access record, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Accounts** (left).

Step 4 Click **Host Access**.

Step 5 Click the name of the host access that you want to configure.

Step 6 Make the required changes to the Permit, Priority, Start Access, and End Access fields.

Step 7 Click **Save** to apply your changes.

Configuring Event Notifications

Event notification is a feature that enables you to define conditions that cause the location server to send notifications to the listeners that you have specified in Cisco WCS. This chapter describes how to define events and event groups, and how to configure event notification parameters. It also describes how to view event notification summaries. This chapter contains the following sections:

- "Working with Event Groups" on page 6-1
- "Working with Event Definitions" on page 6-2
- "Viewing Event Notification Summary" on page 6-6
- "Configuring Notification Parameters" on page 6-7
- "Notification Message Formats" on page 6-9

Working with Event Groups

This section describes how to add and delete event groups.

Adding Event Groups

To manage events more efficiently, you can use Cisco WCS to create event groups. Event groups help you organize your event definitions.

To add an event group, follow these steps:

Step 1 In Cisco WCS, choose **Location > Notifications**.

Step 2 From the drop-down menu (right-hand side), choose **Add Event Group**, and click **Go**.

Step 3 Enter the name of the group in the Group Name field.

Step 4 Click **Save**.

The new event group appears in the Event Settings page.

Deleting Event Groups

To manage events more efficiently, you can use Cisco WCS to create event groups. Event groups help you organize your event definitions.

To add an event group, follow these steps:

Step 1 In Cisco WCS, choose **Location > Notifications**.

Step 2 Select the event groups to delete by checking their corresponding check boxes.

Step 3 From the drop-down menu (right-hand side), choose **Delete Event Group(s)**, and click **Go**.

Step 4 Click **Save**.

Working with Event Definitions

An event definition contains information about the condition that caused the event, the assets to which the event applies, and the event notification destinations. This section describes how to add, delete, and test event definitions.

Adding an Event Definition

Cisco WCS enables you to add definitions on a per-group basis. Any new event definition must belong to a particular group.

To add an event definition, follow these steps:

Step 1 In Cisco WCS, choose **Location > Notifications**.

Step 2 Click **Settings** (left).

Step 3 Click the name of the group to which you want to add the event.

Step 4 From the drop-down menu (right-hand side), choose **Add Event Definition**, and click **Go**.

Step 5 Enter the name of the event definition in the Event Definition Name field.

Note The event definition name must be unique within the event group.

Step 6 Click **Save**.

Step 7 In the Conditions tab, add one or more conditions. For each condition you add, specify the rules for triggering events notifications.

For example, to keep track of heart monitors in a hospital, you can add three rules to generate an event notification if the heart monitor is missing for two hours, if the heart monitor moves out of the second floor, or if the heart monitor enters a specific coverage area within a floor.

To add a condition, follow these steps:

a. Click **Add** to add a condition that triggers this event.

b. In the Add/Edit Condition dialog box, follow these steps:

1. Choose a condition type from the Condition Type drop-down menu.

2. In the Trigger If field, follow these steps:

   If you chose **Missing** from the Condition Type drop-down menu, enter the number of minutes after which a missing asset event is generated. For example, if you enter 10 in this field, the location server generates a missing asset event if the location server has not located the asset for more than 10 minutes. Proceed to Step c.

   If you chose **In/Out** from the Condition Type drop-down menu, select **Inside of** or **Outside of**, then click **Select Area** to select the area to monitor for assets going into it or out of it. In the Select dialog box, choose the area to monitor, then click **Select**. The area to monitor could be an entire campus, building within a campus, a floor in a building, or a coverage area (you can define a coverage area using the map editor). For example, to monitor part of a floor in a building, choose a campus from the Campus drop-down menu, choose a building from the Building drop-down menu, and choose the area to monitor from the Floor Area drop-down menu. Then click **Select**. Proceed to Step c.

   If you chose **Distance** from the Condition Type drop-down menu, enter the distance in feet that will trigger an event notification if the monitored asset moves beyond the specified distance from a designated marker, then click **Select Marker**. In the Select dialog box, select the campus, building, floor, and marker from the corresponding drop-down menus and click **Select**. For example, if you add a marker to a floor plan and set the distance in the Trigger If field to 60 feet, an event notification will be generated if the monitored asset moves 73 feet away from the marker. Proceed to Step c.

   Note You can create markers and coverage areas using the Map Editor. When you create marker names, make sure they are unique across the entire system.

   If you chose **Location Change** from the Condition Type drop-down menu, proceed to Step c.

   If you chose **Battery Level** from the Condition Type drop-down menu, check the box next to the appropriate battery level (low, medium, normal) that will trigger an event. Proceed to Step c.

c. Choose the type of asset (Any, Clients, Tags, Rogue APs, or Rogue Clients) that will trigger event notifications if the triggering condition is met from the Apply To drop-down menu.

d. Choose the asset matching criteria for generating event notifications from the Match By drop-down menu, choose the operator (**Equals** or **Like**) from the drop-down menu, and enter the information for matching the elements.

   Following are examples of asset matching criteria that you can specify:

   – If you choose **MAC Address** from the Match By drop-down menu, choose **Equals** from the Operator drop-down menu, and enter **12:12:12:12:12:12**, the event condition applies to the element whose MAC address is 12:12:12:12:12:12 (exact match).

   – If you choose **MAC Address** from the Match By drop-down menu, choose **Like** from the Operator drop-down menu, and enter **12:12**, the event condition applies to elements whose MAC address starts with 12:12.

e. Click **Add** to add the condition you have just defined.

   To delete a condition, select the condition and click **Delete**.

Step 8 Under the General tab, follow these steps:

a. Enable event generation (disabled by default) by checking the **Enabled** check box for the Admin Status field.

b. Set the event priority by choosing a number from the Priority drop-down menu. Zero is highest.

Note An event definition with higher priority is serviced before event definitions with lower priority.

c. Set the date and time when you want to activate event notification using the hour, minute and AM/PM menus next to the Apply From heading.

Note If you want to continuously report events, you would select the **All the Time** option. In this case, there is no need to set start and end ranges for event notification. These options are not displayed.

d. Set the date and time for ending notification for this event using the hour, minute and AM/PM menus next to the Apply Until heading.

e. Click **Save**.

Step 9 In the Destination and Transport tab, follow these steps to add one or more destinations to receive event notifications and configure the transport settings:

a. To add a new destination, click **Add New**.

b. Enter the IP address of the system that will receive event notifications, and click **OK**.

The recipient system must have an event listener running to process notifications. By default, when you create an event definition, Cisco WCS adds its IP address as the a destination.

c. To select a destination to send event notifications to, highlight one or more IP addresses in the box on the right, and click **Select** to add the IP addresses to the box on the left.

d. In the Message Format field, select **XML** or **Plain Text** to specify the message format.

If you select WCS as the destination of event notifications, you must select the XML format.

e. Choose one of the following transport types from the Transport Type drop-down menu:

- **SOAP**—Specifies Simple Object Access Protocol, a simple XML protocol, as the transport type for sending event notifications. Use SOAP to send notifications over HTTP/HTTPS and to be processed by web services on the destination.

  If you choose **SOAP**, specify whether to send notifications over HTTPS by checking its corresponding check box. If you don't, HTTP is used. Also, enter the destination port number in the Port Number field.

- **Mail**—Use this option to send notifications via email.

  If you choose **Mail**, you need to choose the protocol for sending the mail from the Mail Type drop-down menu. You also need to enter the following information: username and password (if Authentication is enabled), name of the sender, prefix to add to the subject line, email address of recipient, and a port number if necessary.

- **SNMP**—Use Simple Network Management Protocol, a very common technology for network monitoring used to send notifications to SNMP-capable devices.

  If you choose **SNMP**, enter the SNMP community string in the SNMP Community field and the port number to send notifications to in the Port Number field.

– **SysLog**—Specifies the system log on the destination system as the recipient of event notifications.

  If you choose **SysLog**, enter the notification priority in the Priority field, the name of the facility in the Facility field, and the port number on the destination system in the Port Number field.

f. Click **Add**.

Step 10 Go back to the page listing event definitions to verify that the new event has been added to the list.

Deleting an Event Definition

To delete one or more event definitions from WCS, follow these steps:

Step 1 In Cisco WCS, choose **Location > Notifications**.

Step 2 Click **Settings** (left).

Step 3 Click the name of the group from which you want to delete the event definitions.

Step 4 Select the event definitions that you want to delete by checking their corresponding check boxes.

Step 5 From the drop-down menu (right-hand side), choose **Delete Event Definition(s)**, and click **Go**.

Step 6 Click **OK** to confirm that you want to delete the selected event definitions.

Deleting event definitions as described above removes them from only WCS.

To remove definitions from the location server, follow these steps:

Step 1 In Cisco WCS, choose **Location > Synchronize Servers**.

Step 2 From the **Synchronize** drop-down menu, choose **Event Groups**.

Step 3 To remove an event definition, click **Unassign** for the event group to which the event belongs.

Step 4 Click **Synchronize**.

Testing Event Definitions

To verify that the location server is sending event definitions over the transport protocol you have specified in the event definition, use Cisco WCS to test-fire event notifications. The location server sends 3 fictitious event notifications (absence, containment, and distance) to the destinations you have specified in the event definition. The messages contain dummy MAC addresses.

To test one or more event definitions, follow these steps:

Step 1 In Cisco WCS, choose **Location > Notifications**.

Step 2 Click **Settings** (left).

Step 3 Click the name of the group containing the event definitions that you want to test.

Step 4 Select the event definitions that you want to test by checking their corresponding check boxes.

Step 5 From the drop-down menu (right-hand side), choose **Test-Fire Event Definition(s)**, and click **GO**.

Step 6 Click **OK** to confirm that you want to test-fire event notifications.

Step 7 Check to make sure that notifications were sent to the designated recipient.

Viewing Event Notification Summary

The location server sends event notifications and does not store them (fire and forget). However, if WCS is a destination of notification events, it stores the notifications it receives and groups them into the following five categories:

- Absence (Missing)—The location server generates absence events when the monitored assets go missing. In other words, the location server cannot see the asset in the WLAN for the specified time.
- In/Out Area (Containment)—The location server generates containment events when an asset is moved inside or outside a designated area.

Note You define a containment area (campus, building, or floor) in the Maps section of Cisco WCS (**Monitor > Maps**). You can define a coverage area using the Map Editor.

- Movement from Marker (Movement/Distance)—The location server generates movement events when an asset is moved beyond a specified distance from a designated marker you define on a map.
- Location Changes—The location server generates location change events when client stations, asset tags, rogue clients and rogue access points move from their previous location.
- Battery Level—The location server generates battery level events for all tracked asset tags.

To view event notifications, follow these steps:

Note All element events are summarized hourly and daily.

Step 1 In Cisco WCS, choose **Location > Notifications**.

Cisco WCS displays a summary of event notifications for each of the five event notification categories.

Step 2 To view event notifications for a monitored asset, click one of its corresponding links.

For example, to view absence events for client stations generated in the last hour, click the link in the Last Hour column for the Client Stations entry in the Absence (Missing) list.

Clicking one of these links searches for location notifications of all severities.

Notifications Cleared

A location server sends event notifications when it clears an event condition in one of the following scenarios:

- **Missing (Absence)**—Elements reappear.
- **In/Out Area (Containment)**—Elements move back in or out of the containment area.
- **Distance**—Elements move back within the specified distance from a marker.
- **Location Changes**—Clear state is not applicable to this condition.
- **Battery Level**—Tags are detected again operating with Normal battery level.

Note In Cisco WCS, the Notifications Summary page reflects whether notifications for cleared event conditions have been received.

Configuring Notification Parameters

Note Tweak notification parameters only if you expect the location server to send a large number of notifications or if notifications are not being received.

You can use Cisco WCS to configure location server event notification parameters.

To configure notification parameters, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Notification Parameters**.

Step 5 Configure the following parameters in the Notification Parameters page:

Parameter	Description
Rate Limit	Enter the rate in milliseconds at which the location server will generate notifications. A value of 0 (default) means that the server will generate event notifications as fast as possible.
Queue Limit	The event queue limit for sending notifications. The server will drop any event above this limit. Default value is 500.
Retry Limit	Enter the number of times to generate an event notification before the refresh time expires. This value ensures, to some extent, that the events that the location server generated will eventually reach WCS. Default value is 1. **Note** The location server does not store events in its database. It just fires events and forgets about them (fire and forget).

Parameter	Description
Refresh Time	Enter the wait time in minutes before restarting the event refresh cycle if an event notification needs to be resent. For example, suppose you enter 30 in this field. If a monitored element goes out of a specified area, the location server sends an event notification. Then, until the event is cleared, the location server resends event notifications every 30 minutes.
Notifications Dropped	(Read only). The number of event notifications dropped from the queue since startup.

Step 6 Click **Save** to store your updates in the Cisco WCS and location server databases.

Notification Message Formats

This section describes the notification message formats.

Notification Formats in XML

This section describes the XML format of notification messages.

Note The XML format is part of a supported API and Cisco will provide change notification as part of the Location Server API program, whenever the API is updated in the future.

Missing (Absence) Condition

Message format for element absence:

```
<AbsenceTrackEvent
missingFor="<time in secs entity has been missing>"
lastSeen="time last seen"
trackDefn="<name of track definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Message format for the clear state:

```
<AbsenceTrackEvent
state="clear"
trackDefn="<name of track definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Following are examples:

```
<AbsenceTrackEvent state="set" missingFor="34" lastSeen="15:00:20 28 May 2006"
trackDefn="absenceDef1" entityType="Mobile Station"
entityID="00:0c:f1:53:9e:c0"/>

<AbsenceTrackEvent state="clear" entityType="Tag"
trackDefn="absenceDef1" entityID="00:0c:cc:5b:fc:da"/>
```

In/Out (Containment) Condition

Message format for element containment:

```
<ContainmentTrackEvent
in="true | false"
trackDefn="<name of track definition>"
containerType="Floor | Area | Network Design | Building"
containerID="<fully quality name of container>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Message format for the clear state:

```
<ContainmentTrackEvent
state="clear"
trackDefn="<name of track definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Following are examples:

```
<ContainmentTrackEvent in="true" trackDefn="myContainerRule1"
containerType="Area"
containerID="wcsDevArea,4th Floor,Bldg-14,WNBU_Group,WNBU,"
entityType="Tag" entityID="00:0c:cc:5b:fa:44"/>
```

Note The `containerID` string represents a coverage area called `wcsDevArea`, located in the floor 4th floor of Bldg-14 of the campus WNBU.

```
<ContainmentTrackEvent state="clear" entityType="Tag"
trackDefn="myContainerRule1" entityID="00:0c:cc:5b:f8:ab"/>
```

Distance Condition

Message format for elements in the same floor:

```
<MovementTrackEvent
distance="<distance in feet at which the element was located>"
triggerDistance="<the distance specified on the condition"
reference="<name of the marker specified on the condition>"
trackDefn="<name of event definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Message format for elements located in a different floor:

```
<MovementTrackEvent optionMsg="has moved beyond original floor"
reference="<name of the marker specified on the condition>"
trackDefn="<name of event definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Message format for clear state:

```
<MovementTrackEvent
state="clear"
trackDefn="<name of event definition>"
entityType="Mobile Station | Tag | Rogue AP | Rogue Client"
entityID="<mac address"/>
```

Following are examples:

```
<MovementTrackEvent distance="115.73819627990147" triggerDistance="60.0"
reference="marker2" trackDefn="distance2" entityType="Mobile Station"
entityID="00:0c:41:15:99:92"/>

<MovementTrackEvent optionMsg="has moved beyond original floor"
reference="marker2" entityType="Tag"
trackDefn="distance2"
entityID="00:0c:cc:5b:fa:4c"/>

<MovementTrackEvent state="clear" entityType="Tag"
```

Battery Level

An example:

```
<BatteryLifeTrackEvent lastSeen="10:28:52 23 May 2006" batteryStatus="medium"
trackDefn="defn1" entityType="Tag" entityID="00:01:02:03:04:06"/>
```

Location Change

An example:

```
<MovementTrackEvent distance="158.11388300841898" triggerDistance="5.0"
reference="marker1" referenceObjectID="1" trackDefn="defn1" entityType="Mobile Station"
entityID="00:01:02:03:04:05"/>
```

Notification Formats in Text

When you specify that notification be sent in Text format, the location server uses a plain-text string to indicate the condition. Following are examples:

```
Tag 00:02:02:03:03:04 is in Floor <floorName>
Tag 00:02:02:03:03:04 is outside Floor <floorName>
Client 00:02:02:03:09:09 is in Area <areaName>
RogueClient 00:02:02:08:08:08 is outside Building <buildingName>
Tag 00:02:02:03:03:06 has moved 105 feet where the trigger distance was 90 feet.
Tag 00:02:02:03:03:20 missing for 14 mins, last seen <timestamp>.
```

Note Cisco maintains the right to modify the Text notification Format, without notice, at any time in the future.

Note XML is the recommended format if systems need to parse or analyze the notification contents.

WCS as a Notification Listener

WCS acts as a notification listener. WCS receives the notifications from location servers in the form of the trap `locationNotifyTrap` as part of the MIB file bsnwras.my. The location server stores the content of the notification message in XML format in the variable `locationNotifyContent` (see "Notification Formats in XML" on page 6-9).

```
locationNotifyTrap  NOTIFICATION-TYPE
    OBJECTS { locationNotifyContent}
    STATUS current
    DESCRIPTION
        "This trap will be generated by the location server
        for notifications of location events."
    ::= { bsnTraps 89 }

locationNotifyContent OBJECT-TYPE
    SYNTAX  OCTET STRING(SIZE(0..512))
    MAX-ACCESS  accessible-for-notify
    STATUS  current
    DESCRIPTION
        "This is the content of the notification."
    ::= { bsnTrapVariable 72 }
```

WCS translates the traps into UI alerts and displays them in the following formats:

- Missing (Absence)

  ```
  Absence of Tag with MAC 00:0c:cc:5b:e4:1b, last seen at 16:19:45 13 Oct 2005.
  ```

- In/Out (Containment)

  ```
  Tag with MAC 00:0c:cc:5b:fa:44 is In the Area 'WNBU > WNBU > 4th Floor > wcsDevArea'
  ```

- Distance

  ```
  Tag with MAC 00:0c:cc:5b:fa:47 has moved beyond the distance configured for the marker
  'marker2'.
  Tag with MAC 00:0c:cc:5b:f9:b9 has moved beyond 46.0 ft. of marker 'marker2', located
  at a range of 136.74526528595058 ft.
  ```

- Battery Level

  ```
  Tag 00:01:02:03:04:06 has medium battery, last seen 11:06:01 23 May 2006
  ```

- Location Change

  ```
  Mobile Station 00:01:02:03:04:05 has moved
  158.11388300841898ft, where the trigger distance was 5.0
  ```

Monitoring Location Servers and Site

This chapter describes how to monitor location servers by configuring and viewing alarms, events, and logs. It also describes how to view location server, client and asset tag status. Details for deployment planning are also provided. This chapter contains the following sections:

- "Working with Alarms" on page 7-1
- "Working with Events" on page 7-3
- "Working with Logs" on page 7-4
- "Monitoring Location Server Status" on page 7-5
- "Monitoring Clients" on page 7-6
- "Monitoring Tagged Assets" on page 7-7
- "Inspect Location Readiness and Quality" on page 7-9
- "Deployment Planning for Data, Voice, and Location" on page 7-10

Working with Alarms

This section describes how to view, assign, and clear alarms and events on location servers using Cisco WCS.

Viewing Alarms

To view location server alarms, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 In the bottom left of the Cisco WCS window, click one of the three squares next to Location in the Alarms Dashboard (bottom left) to display the Alarms page and search the Cisco WCS database for location server alarms based on severity.

You can also display the alarms by choosing **Monitor > Alarms** and searching for location server alarms.

Note The dashboard uses colors to represent alarm categories. The first square in the dashboard displays the number of critical alarms, the second square displays the number of major alarms, and the third square displays the number of minor alarms.

Cisco WCS displays the Alarms page, which lists the alarms found. Moving the cursor over the links in the Failure Object column displays a tool tip containing the alarm's message.

Step 3 Use the navigation buttons (top) to browse the alarm pages if necessary. Use the column headers to sort alarms.

Step 4 To perform another alarm search, use the Severity drop-down menu (left) to choose a different severity and click **Search**.

Assigning and Unassigning Alarms

Follow these steps to assign and unassign an alarm to yourself:

Step 1 Display the Alarms page as described in "Viewing Alarms" on page 7-1.

Step 2 Select the alarms that you want to assign to yourself (or unassign from yourself) by checking their corresponding check boxes.

Step 3 From the drop-down menu (right-hand side), choose **Assign to Me** (or **Unassign**) and click **Go**.

If you choose **Assign to Me**, your username appears in the Owner column. If you choose **Unassign**, the username column becomes empty.

Note You cannot unassign other users.

Deleting and Clearing Alarms

Follow these steps to delete or clear an alarm from a location appliance:

Step 1 Display the Alarms page as described in "Viewing Alarms" on page 7-1.

Step 2 Select the alarms that you want to delete or clear by checking their corresponding check boxes.

Step 3 From the drop-down menu (right-hand side), choose **Delete** or **Clear**, and click **Go**.

Note If you delete an alarm, Cisco WCS removes it from its database. If you clear an alarm, it remains in the Cisco WCS database, but under the Clear state. You clear an alarm when the condition that caused it no longer exists.

Emailing Alarm Notifications

Cisco WCS lets you send alarm notifications to a specific email address. Sending notifications through email enables you to take prompt action when needed.

To send alarm notifications, follow these steps:

Step 1 Display the Alarms page as described in "Viewing Alarms" on page 7-1.

Step 2 From the drop-down menu (right-hand side), choose **Email Notification**, and click **Go**.

In the Email Notification page, you can follow these steps:

- Click the links of the supported alarm categories and configure the email options (SMTP server to use, email address of sender, and email address of recipient).
- Enable email notifications for the selected alarm categories.

Step 3 To configure the email options for an alarm category, follow these steps:

1. Click the alarm's corresponding link.
2. In the Email Notification section, enter the following information:

- SMTP Server field—Enter the server to use for sending email notifications.
- From field—Enter the email address of the sender.
- To field—Enter the email address of the recipient.

3. Click **OK** to confirm changes and go back to the Email Notification page.

Step 4 To enable email notification for an alarm category, check its corresponding check box, and click **OK**.

Working with Events

You can use Cisco WCS to view location server and location notification events. You can display events based on their severity.

To display events, follow these steps:

Step 1 In Cisco WCS, choose **Monitor > Events**.

Step 2 In the Events page, choose **Location Servers** or **Location Notifications** from the Event Category drop-down menu (left).

Step 3 Choose an event severity from the Severity drop-down menu.

You can choose one of the following categories:

- **Location Server** —Reports events such as location server unreachable or elements are not synchronized
- **Location Notifications**—Reports events representing asynchronous notifications sent by the location server

Step 4 Click **Search**. If Cisco WCS finds events that match the search criteria, it displays a list of these events.

Step 5 For more information about an event, click the event's failure object's name.

Working with Logs

This section describes how to configure logging options and how to download log files.

Configuring Logging Options

You can use Cisco WCS to specify the logging level and types of messages to log.

To configure logging options, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server that you want to configure.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 In the Logging Options section, choose a logging level from the Logging Level drop-down menu or **Off** to disable logging.

There are four logging options: **Off**, **Error**, **Information**, and **Trace**. Use **Error** and **Trace** only when directed to do so by Cisco Technical Assistance Center (TAC) personnel.

Step 6 Enable logging categories as required by checking the appropriate **Enabled** check boxes.

Step 7 Click **Save** to apply your changes.

Downloading Location Server Log Files

If you need to analyze location server log files, you can use Cisco WCS to download them into your system. Cisco WCS downloads a zip file containing the log files.

To download a zip file containing the log files, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the location server to view its status.

Step 3 Click **Logs** (left).

Step 4 Click **Download Logs**.

Step 5 Follow the instructions in the File Download dialog box to save the zip file on your system.

Monitoring Location Server Status

This section describes how to view location server status and how to enable status information polling.

Viewing Location Server Current Information

Follow these steps to view the current status of a location server:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of a location server to view its status.

Step 3 Click **Administration** (left-hand side of screen) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

You can find the following information for the selected location server in the Advanced Parameters page:

Page Heading	Description
General Information	Product name, version, time server started operation, time zone, hardware restarts, active sessions, number of tracked elements and tracked element limit. **Note** A major alert appears on the Advanced Parameter page if the tracked elements limit of 2,500 for the location server is reached.
Cisco UDI	Product identifier, version identifier, and serial number.
Logging Options	Types of occurrences and activity levels being logged.
Memory Information	Memory allocation and usage. Database memory levels. Command: Run Java GC.
Advanced Parameters	Number of days to keep events, Session Time out, Interval between data cleanup and enabled/disable status of Advanced Bug operation.
Advanced Commands	Commands: Reboot Hardware, Clear Configuration and Defragment Database.

Enabling Automatic Location Server Status Polling

You can configure Cisco WCS to automatically poll location servers on a regular basis for status information to keep the location server records in the Cisco WCS database current.

To enable automatic location server status polling, follow these steps:

Step 1 In Cisco WCS, choose **Administration > Scheduled Tasks**.

Step 2 Click **Location Server Status**.

Step 3 Enable automatic location server status polling by checking the **Enabled** check box.

Step 4 In the **Interval** field, enter the interval (in minutes) for performing automatic server status polling.

By default, the location server performs automatic server polling every 5 minutes.

Step 5 Click **Submit**.

Monitoring Clients

You can configure Cisco WCS to display the name of the access point that generated the signal for a client, its strength of signal and how often the location information for the client is updated. Pass the mouse over the relevant access point icon on the map page to reveal all of this information.

To provide this functionality, you must first enable location status for the client. Polling frequency can then be configured.

Enabling Client Location Status

You can configure Cisco WCS to display the access point that generated a client location on both the client detail page and map. The access point name, signal strength and last located information are displayed.

To enable client location status, follow these steps:

Step 1 In Cisco WCS, choose **Monitor > Devices > Clients**

The Clients Summary page displays.

Step 2 Click on the **Map Location** link that corresponds to the client to be configured.

A map for the selected client location appears.

Step 3 Click on the appropriate client icon on the map to display the Client Properties page.

Step 4 Enable client location status by checking the **Location Debug** box found under Asset Info (top-right). Click **Update** and close the window.

The map appears.

Step 5 Click on **Refresh Heatmap** after the next polling period to activate the feature on the map.

Step 6 To view the access point signal details for the client from the map, pass the mouse over the client icon. The information is also seen on the Client Properties page.

Note You can configure how often the location server updates its client location information. Please see the next section in this chapter entitled, "Configuring Client Status Polling" for more details.

Configuring Client Status Polling

You can set how often the location server updates its client location information. Information updates can occur up to every 2 minutes. By default, the location server performs automatic polling every 15 minutes.

You can also modify those clients polled by filtering on a specific client state. Options are All States, Idle, Authenticated, Associated, Probing, and Excluding.

To configure the frequency of client status polling, follow these steps:

Step 1 In Cisco WCS, choose **Monitor > Devices > Clients.**

The Clients Summary page appears.

Step 2 To filter by client state, select the appropriate option from the **Client State** menu (left side).

Note Select the filter before you select the client location that is to be polled. All States is the default filter.

Step 3 Click the **Map Location** link of the relevant client location.

A map for the selected client location appears.

Step 4 To configure how often client locations are polled, select the desired polling rate from the **Load Location Server data as old as** menu. The default is 15 minutes.

Step 5 You are prompted to click the **Load** link (left side) to immediately accept the new polling period and to load new client location information.

The number of clients location updates received (loaded) appear in the window beneath the Load link.

Monitoring Tagged Assets

You can configure WCS to display the name of the access point that generated the signal for a tagged asset, its strength of signal and when the location information was last updated for the asset. All of this information is accessible on location maps by passing the mouse over the relevant access point.

To provide this functionality, you must first enable location status for the tagged asset. You can then configure the last detected parameter to modify the polling frequency.

Enabling Tagged Asset Location Status

You can configure Cisco WCS to display the access point that generated the tag location. The access point name, signal strength, signal type and last located information is displayed and accessible from maps.

To enable tag location status, follow these steps:

Step 1 In Cisco WCS, choose **Monitor > Devices > Tags.**

The Tags Summary page appears.

Step 2 Check the **Tag Vendor** box and select the appropriate vendor from the menu that appears. Click the **Total Tags** link for the appropriate location server.

A summary of all tags for the chosen location server displays noting MAC address, Asset Name, Asset Category, Asset Group, Vendor, Location, Controller, Battery Status, and Map location for each of the tags.

Step 3 Click the appropriate tag.

Note As the mouse passes over the MAC addresses a map showing the location of the tag appears.

Step 4 At the Tag Properties page that appears, check the **Location Debug** box (top-right) to enable tag location status. Click **Update** and close the window.

Step 5 Enlarge the map to see the access point(s) that generated the location signal.

Step 6 To view the access point signal details for the tag, pass the mouse over the appropriate access point icon.

Note You can configure how often the location server updates its tag location information. Please see the next section in this chapter entitled, Configuring Tagged Asset Status Polling for more details.

Configuring Tagged Asset Status Polling

You can set how often the location server updates its tag location information. Information updates can be as often as every 5 minutes. To configure the frequency of tag status polling, follow these steps:

Step 1 In Cisco WCS, choose **Monitor > Devices > Tags**

The Tags Summary page appears.

Step 2 Choose the search criteria for the tag from the **Search for tags by** menu (left side).

Step 3 Choose the desired polling frequency from the **Last Detected within** menu. The default is 15 minutes.

Step 4 Select the appropriate location server from the **Choose a Location Server** menu.

Step 5 Check the **Tag Vendor** box and select the appropriate vendor from the menu that appears.

Step 6 Click **Search**.

A listing of tags displays corresponding to the selected polling frequency. For example, if you chose 5 minutes from the **Last Detected within** menu, all tags last found within the past 5 minutes are listed.

Inspect Location Readiness and Quality

You can configure Cisco WCS toverify 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. 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.

Inspect Location Readiness Using Access Point Data

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

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

Step 2 Click on the appropriate 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.

Step 3 Select **Inspect Location Readiness** from the menu found at the top-right of the page. Click **GO.**

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

Inspect 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, choose **Monitor > Maps.**

Step 2 Choose **RF Calibration Mode**l from the menu found at the top-right of the page. 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 On the same page, 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.

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, choose **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 menu found at the top-right of the page. Click **GO.**

A color-coded map summarizing contributing access points appears.

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

Step 5 In the page 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 box next to the service that will be used on the floor. Options are Data/Coverage (default), Voice and Location. 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.

Performing Maintenance Operations

This chapter describes how to back up and restore location server data and how to update the location server software. It also describes other maintenance operations. This chapter contains the following sections:

- "Recovering Lost Password" on page 8-1
- "Backing Up and Restoring Location Server Data" on page 8-2
- "Updating Location Appliance Software" on page 8-4
- "Configuring an NTP Server" on page 8-6
- "Defragmenting the Location Server Database" on page 8-7
- "Running Java GC on the Location Server Memory" on page 8-8
- "Rebooting the Location Server Hardware" on page 8-8
- "Clearing Location Server Configurations" on page 8-8
- "Importing and Exporting Asset Information" on page 8-9

Recovering Lost Password

If you lose or forget the root password for the location appliance, you can recover the password by doing the following:

Step 1 Once the GRUB screen comes up, press **Esc** to enter the boot menu.

Step 2 Press **e** to edit.

Step 3 Navigate to the line beginning with "kernel," and press **e.**

At the end of the line put a space, followed by the number one (**1**). Press **Enter** to save this change.

Step 4 Press **b** to begin boot.

The boot sequence will commence and at the end the user will be given a shell prompt.

Step 5 The user may change the root password by invoking the **passwd** command.

Step 6 Enter and confirm the new password.

Step 7 Reboot the machine.

Backing Up and Restoring Location Server Data

This information describes how to back up and restore location server data. It also describes how to enable automatic backup.

Backing Up Location Server Historical Data

Cisco WCS includes functionality for backing up location server data.

To back up location server data, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server that you want to back up.

Step 3 Click **Maintenance** (left).

Step 4 Click **Backup**.

Step 5 Enter the name of the backup.

Step 6 Enter the time in seconds after which the backup times out.

Note
- For location servers versions 2.1 and later, the timeout value is not required.
- For location server versions 2.0 and earlier, the timeout indicates how long the full operation will take. The default value is1800 seconds. For pre-2.0 versions of the location server, the timeout parameter refers only to the connection timeout value and a smaller value should be entered (120 seconds by default)

Step 7 Click **Submit** to back up the historical data to the hard drive of the server running Cisco WCS.

Status of the backup can be seen on the screen while the backup is in process. Three items will display on the screen during the backup process: (1) Last Status field provides messages noting the status of the backup; (2) Progress field shows what percentage of the backup is complete; and (3) Started at field shows when the backup began noting date and time.

Note
- You can run the backup process in the background while working on other location server operations in other WCS windows.
- Backups are stored in the FTP directory you specify during the Cisco WCS installation

Restoring Location Server Historical Data

You can use Cisco WCS to restore backed-up historical data.

To restore location server data, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server that you want to restore.

Step 3 Click **Maintenance** (left).

Step 4 Click **Restore**.

Step 5 Choose the file to restore from the drop-down menu.

Step 6 Enter the time in seconds after which restoration times out.

Note
- For location servers versions 2.1 or later, the timeout value is not required.
- For location server versions 2.0 or earlier, the timeout represents how long the full operation will take (by default, the user interface suggest 1800 seconds). For older location servers, the timeout represents the connection timeout and you should use a small value (120 seconds by default).

Step 7 Click **Submit** to start the restoration process.

Step 8 Click **OK** to confirm that you want to restore location server data from the Cisco WCS Server hard drive.

When restoration is completed, Cisco WCS displays a message to that effect.

Note You can run the restore process in the background while working on other location server operations in other WCS windows.

Enabling Automatic Location Server Backup

You can configure Cisco WCS to perform automatic backups of location server data on a regular basis.

To enable automatic location server data backup, follow these steps:

Step 1 In Cisco WCS, choose **Administration > Scheduled Tasks**.

Step 2 Click **Location Server Backup**.

Step 3 Enable automatic backup by checking the **Enabled** check box.

Step 4 In the "Max backups to keep" field, enter the maximum number of backups to keep on the system running Cisco WCS.

Step 5 In the Interval field, enter the interval (in days) for performing automatic backups.

By default, the location server performs automatic backups every 7 days.

Step 6 In the Time of Day field, enter the time of day at which to perform backups.

Step 7 Click **Submit**.

Cisco WCS instructs all the location servers registered in its database to perform backups at the specified time interval. The backups are stored in the FTP directory you have specified during the Cisco WCS installation.

Updating Location Appliance Software

You can update the location appliance using the WCS server or manually download the software using a console port connected to the location appliance.

Note For the latest WCS and location appliance compatibility and installation notes, refer to the appropriate location release note at http://www.cisco.com/en/US/products/ps6386/prod_release_notes_list.html.

Before downloading and updating software on the location appliance, note the following:

- The location appliance (server) image is compressed.
  - If upgrading a location appliance installed with a pre-2.0 version, you must first download and decompress the file (`gzip -d imageFilename`) **before** installing the image. After decompressing the file, run the resulting *.bin installer file.

    Enter the following command after the file download to make the file executable:

    ```
    chmod + x. *.bin
    ```
  - If upgrading a location appliance installed with 2.0 or later version of the location server image already installed, the software image automatically decompresses during its download from WCS.
- A backup of location appliance software releases 2.0.x and later cannot be restored on any location appliance running an earlier software release.
  - Before you upgrade a location appliance to 2.0.x release or later, Cisco recommends that you create a backup of the earlier release and archive it. This will enable you to convert an upgraded system to an earlier release, if necessary.
- Secure shell (SSH) version 1 (v1) is no longer supported in releases 2.1.x and later due to known security issues; however, SSH version 2 (v2) is supported.
  - If you are installing release 2.1.x or later, you must reboot the location appliance after software installation to remove support of SSH v1.
  - If you are installing release 2.0.x or earlier, you must edit the sshd_config file to remove support for SSH v1 by adding **`Protocol 2`** to the end of the script as noted below.

    ```
    #override default of no subsystems

    Subsystem sftp /usr/libexec/openssh/sftp-server

    Protocol 2
    ```

    With this addition, the script will match that of releases 2.1.x and later.

    A restart is required to reread the config file after the edit is made.
- Approximately 5 minutes is required for the newly loaded location appliance software version to appear on the WCS Location > Location Server screen.

Note WCS queries for location appliance connectivity and database updates every 5 minutes by default.

Downloading Software Using the WCS Server

Follow these steps to download software to a location appliance using WCS:

Step 1 Verify that you can ping the location server from the Cisco WCS Server or an external FTP server, whichever you are going to use for the application code download.

Step 2 In Cisco WCS, choose **Location > Location Servers**.

Step 3 Click the name of the server that is to receive the software download.

Step 4 Click **Maintenance** (left).

Step 5 Click **Download Software**.

Step 6 To download software, do one of the following:

- To download software listed in the WCS directory, select **Select from uploaded images to transfer into the Location Server**. Then, choose a 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 have specified during the Cisco WCS installation.

  Note If upgrading a location server installed with a pre-2.0 version, you must first download and decompress the file (`gzip -d imageFilename`) **before** installing the image. After decompressing the file, run the resulting *.bin installer file.

  Note If you have a 2.0 or later version of the location server image already installed, the software image automatically decompresses during its download from WCS.

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

Step 7 Enter the time in seconds (between 1 and 999) after which software download times out.

Step 8 Click **Download** to send the software to the /opt/installers directory on the location server.

Note After the image has been transferred to the location appliance, follow the instructions on the screen. Log in to the location appliance's CLI, stop the server, and run the installer image from the /opt/installers directory.

Downloading Software Using a Console Port

If you do not want to update the location appliance software using WCS, follow these steps to upgrade the software manually using CLI and a console:

Step 1 Transfer the new Location Server code onto the hard drive.

a. Log in as root, and use the binary setting to send the application code (for example, *AIR-LOC2700-L-K9-1-2-17-0.bin*; *1-2-17-0* is the release number and changes with each release) from an external FTP server root directory. Your entries should look like this example:

```
# cd /opt/installers
# ftp <FTP Server IP address>
Name: <login>
Password: <password>
binary
get AIR-LOC2700-L-K9-1-2-17-0.bin
<CTRL-Z>
#
```

b. Verify that the application code (*AIR-LOC2700-L-K9-x-x-x-x.bin*) is in the location server /opt/installers directory.

c. Make sure that the *AIR-LOC2700-L-K9-x-x-x-x.bin* file has execute permissions for the root user. If not, enter **chmod 755** *AIR-LOC2700-L-K9-x-x-x-x.bin*.

Step 2 Manually stop the old Location Server application.

a. Log in as root and enter **/etc/init.d/locserverd stop**.

Step 3 Enter **/opt/installers/***AIR-LOC2700-L-K9-x-x-x-x.bin* to install the new location appliance application files.

Step 4 Start the new Location Server application by entering the following command:

```
/etc/init.d/locservd start
```

Caution Only complete the next step that uninstalls the application files, if the system instructs you to do so. Removing the application files unnecessarily erases your historical data.

Step 5 Enter **/opt/locserver/uninstall/uninstall** to uninstall the location appliance application files.

Configuring an NTP Server

You can configure NTP servers to set up the time and date of the 2700 and 2710 location appliances.

Note You are automatically prompted to enable NTP and enter NTP server IP addresses as part of the automatic installation script. For more details on the automatic installation script, refer to the *Cisco 2700 Series Wireless Location Appliance Installation and Configuration Guide* at the following link: http://www.cisco.com/en/US/products/ps6386/prod_installation_guides_list.html

The /etc/ntp.conf file is the main configuration file in which you place the IP addresses or DNS names of the NTP servers you want to use (see the following example).

```
server ntp.mydomain.com # my corporate NTP
server 192.168.2.5 # my second NTP
```

To get NTP configured to start at bootup, enter the following:

```
[root@loc-server1]# chkconfig ntpd on
```

To start, stop, and restart NTP after booting, follow these examples:

```
[root@loc-server1]# service ntpd start
[root@loc-server1]# service ntpd stop
[root@loc-server1]# service ntpd restart
```

After configuring and starting NTP, make sure it is working properly. To test whether the NTP process is running, use the following command:

```
[root@loc-server1]# pgrep ntpd
```

You should get a response of plain old process ID numbers.

Enter the *ntpdate -u<serverIP>* command to force your server to become instantly synchronized with its NTP servers before starting the NTP daemon for the first time (see the following example).

```
[root@loc-server1]# service ntpd stop
[root@loc-server1] ntpdate -u 192.168.1.100
Looking for host 192.168.1.100 and service ntp
host found: ntpl.my-site.com
12 Aug 08:03:38 ntpdate[2472]: step time server 192.168.1.100 offset 28993.084943 sec
[root@smallfry tmp]# service ntpd start
```

Note For more information on the NTP configuration, consult the Linux configuration guides.

Defragmenting the Location Server Database

Over time, the location server's database might get fragmented, which might lead to a decrease in the server's performance. To fix this problem, use Cisco WCS to defragment the database.

To defragment the location server database, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the location server that you want to defragment its database.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 Click **Defragment Database**.

Step 6 Click **OK** to confirm that you want to defragment the location server's database.

Running Java GC on the Location Server Memory

Cisco WCS enables you to run a Java General Cleanup (Java GC) program to free up memory on a location server.

To run the Java GC on a location server, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the location server whose database you want to defragment.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 In the Memory Information section, click **Run Java GC**.

Rebooting the Location Server Hardware

If you need to restart the location appliance, use Cisco WCS to reboot the hardware on which the location server is running.

To reboot the location server hardware, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the location server that you want to reboot.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 In the Advanced Commands section (bottom right), click **Reboot Hardware**.

Step 6 Click **OK** to confirm that you want to reboot the location server hardware.

The rebooting process takes a few minutes to complete.

Clearing Location Server Configurations

To clear the location server configuration and restore the factory defaults using Cisco WCS, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

Step 2 Click the name of the server you want to configure.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Advanced Parameters**.

Step 5 In the Advanced Commands section, click **Clear Configuration**.

Note Using this command also clears the server's database.

Step 6 Click **OK** to clear the location server configurations.

Importing and Exporting Asset Information

This section describes how to import and export asset information stored in a flat text file to minimize manual entry.

Importing Asset Information

To import asset information for the location server using Cisco WCS, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

The All Location Servers summary page appears.

Step 2 Click the name of the server for which you want to import asset information.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Import Asset Information**.

Step 5 Enter the name of the text file or browse for the file name.

Information stored in the imported file should be in the following format:

a. tag format: #tag, 00:00:00:00:00:00, categoryname, groupname, assetname

b. station format: #station, 00:00:00:00:00:00, categoryname, groupname, assetname

Step 6 Click **Import**.

Exporting Asset Information

To export asset information from the location server to a file using Cisco WCS, follow these steps:

Step 1 In Cisco WCS, choose **Location > Location Servers**.

The All Location Servers summary page appears.

Step 2 Click the name of the server from which you want export asset information.

Step 3 Click **Administration** (left) to display the administrative configuration options.

Step 4 Click **Export Asset Information**.

Step 5 Click **Export**.

You are prompted to **Open** (display to screen) or **Save** (to external PC or server) the asset file or to **Cancel** the request.

Note If you select **Save**, you are asked to select the asset file destination and name. The file is named "assets.out" by default. Click **Close** from the dialog box when download is complete.

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