Getting Started

This chapter provides information on prerequisites, system requirements, and enabling the Cisco Location Analytics service.

This chapter contains the following sections:

Prerequisites for Enabling Location Analytics Service

- The location analytics system takes input from the MSE. The location analytics is installed as part of the MSE installation but you must select Location Analytics service explicitly from the list of available services within the Prime Infrastructure UI. For details on enabling location analytics service, see the "Enabling Location Analytics Service on the Mobility Services Engine" section on page 2-17.

- If you want to use data from specific parts of your network, then you must edit the `mse.properties` (`.opt/mse/analytics/intellify/tools/MSEclient/mse.properties`) file in order to select either network, building, or floor that you want to analyze. Keep these guidelines in mind when editing the `mse.properties` file.

    - Network, building, or floors—By default, the analytics takes all the data that is available in the MSE. These three settings allow you to download only a subset. For example, if you have three building B1, B2, and B3 in network N and you want to run analytics only on building B1 and building B2, then you need to specify as `buildings=N>B1,N>B2`.

    - max-history—By default, when the analytics becomes active for the first time, it searches for the previous three days data in the MSE history file and tries to fetch data if there is any. In case there is more data available and you want to retrieve, you need to set this to a different value. You can set it to `nnnD`, and it retrieves nnn days, or `nnnW` to retrieve nnn weeks.

Note In order for the Location Analytics to access data from the MSE, you must set the history parameters on the MSE. For more information, see the Configuring MSE Tracking and History Parameters, page 2-9.

    - All settings (including the above said) are documented in the properties file.

- Location analytics requires both floor plans and coverage areas defined in the Prime Infrastructure UI in order for the location analytics visualization and reporting to function. You need to provide floor numbers for each floor plan. Floors on the same level should have the same number and floors above should have a higher number. The choice of coverage areas correspond to the zones which you want to report on. If you want to know the details of location A, then an area defining that location should be made available in the Prime Infrastructure. See the "Adding Floor Areas" section on page 2-18 and "Defining Coverage Area" section on page 2-23 for more information.

- You must define at least three GPS markers in the Prime Infrastructure UI. This is necessary to provide the latitude/longitude values that is necessary for the 2D view in Open Street Maps.

- You need three APs to get any location information on the device.

This section contains the following topics:

Prime Infrastructure Delivery Modes

Prime Infrastructure comes preinstalled on a physical appliance with various performance characteristics. Prime Infrastructure software runs on either a dedicated Prime Infrastructure appliance or on a VMware server. Prime Infrastructure software image does not support the installation of any other packages or applications on this dedicated platform. The inherent scalability of Prime Infrastructure allows you to add appliances to a deployment and increase performance and resiliency.

Prime Infrastructure is delivered in two modes, the physical appliance and the virtual appliance. This section contains the following topics:

Physical Appliance

The physical appliance is a dual Intel 2.40 GHz Xeon E5620 quad core processor, with 16 GB RAM, and four hard drives running in a RAID level 5 configuration. The physical appliance runs the latest 64-bit Red Hat Linux Operating System.

The physical appliance supports up to 15000 Cisco Aironet lightweight access points, 5000 standalone access points, 5000 switches and 1200 Cisco wireless LAN controllers.

> **Note** To receive the expected results with the Prime Infrastructure, you need a high performance physical appliance with built-in redundancy for hard disks, power supplies and internal cooling fans.

For more information on the physical appliance, see the *Cisco Prime Infrastructure Getting Started Guide, Release 1.0*.

Virtual Appliance

Prime Infrastructure is also offered as a virtual appliance to help support lower level deployments. Prime Infrastructure can be run on a workstation or a server and access points can be distributed unevenly across controllers.

Prime Infrastructure virtual appliance software is distributed as an Open Virtualization Archive (OVA) file. There are three recommended levels of Prime Infrastructure distribution with different resources and numbers of devices supported.

This section contains the following topics:

- Virtual Appliance for Large Deployment, page 2-3
- Virtual Appliance for Medium Deployment, page 2-4
- Virtual Appliance for Small Deployment, page 2-4

> **Note** You can deploy the OVA file directly from the vSphere Client; you do not need to extract the archive before performing the deployment.

You can install the Prime Infrastructure virtual appliance using any of the methods for deploying an OVF supported by the VMware environment. Before starting, make sure that Prime Infrastructure virtual appliance distribution archive is in a location that is accessible to the computer on which you are running the vSphere Client.

> **Note** For more information about setting up your VMware environment, see the VMware vSphere 4.0 documentation.

Virtual Appliance for Large Deployment

- Supports up to 15000 Cisco Aironet lightweight access points, 5000 standalone access points, 5000 switches, and 1200 Cisco wireless LAN controllers.
- 16 Processors at 2.93 GHz or better.
- 16-GB RAM.
- 300 GB minimum free disk space is required on your hard drive.

> **Note** The free disk space listed is a minimum requirement but might be different for your system depending on the number of backups performed.

Virtual Appliance for Medium Deployment

- Supports up to 7500 Cisco Aironet lightweight access points, 2500 standalone access points, 2500 switches, and 600 Cisco wireless LAN controllers.

- 8 Processors at 2.93 GHz or better.

- 12-GB RAM.

- 300 GB minimum free disk space is required on your hard drive.

Virtual Appliance for Small Deployment

- Supports up to 3000 Cisco Aironet lightweight access points, 1000 standalone access points, 1000 switches, and 240 Cisco wireless LAN controllers.

- 4 Processors at 2.93 GHz or better.

- 8-GB RAM.

- 200 GB minimum free disk space is required on your hard drive.

> **Note** For all server levels, AMD processors equivalent to the listed Intel processors are also supported.

> **Note** The free disk space listed is a minimum requirement, but several variables (such as backups) impact the disk space.

For information about the system and client requirements, and prerequisites, see the *"Pre-installation tasks"* section in the *Cisco Prime Infrastructure 2.0 Quick Start Guide*.

Reinstalling Prime Infrastructure on a Physical Appliance

You must have root privileges to install Prime Infrastructure on a physical appliance.

To reinstall Prime Infrastructure on a physical appliance, follow these steps:

Step 1 Insert the provided Prime Infrastructure software Image DVD. The system boots up and the following console appears:

```
ISOLINUX 3.11 2005-09-02  Copyright (C) 1994-2005 H. Peter Anvin

         Welcome to Cisco Prime Infrastructure

To boot from hard disk, press <Enter>.

Available boot options:

  [1] Prime Infrastructure Installation (Keyboard/Monitor)
  [2] Prime Infrastructure Installation (Serial Console)
```

```
[3] Recover administrator password. (Keyboard/Monitor)
[4] Recover administrator password. (Serial Console)
<Enter> Boot existing OS from Hard Disk.

Enter boot option and press <return>.

boot:
```

Step 2   Select option 1 to reinstall Prime Infrastructure software image. The system reboots and the configure appliance screen appears.

Step 3   Enter the initial setup parameters and the system reboots again. Remove the DVD and follow the steps to start the Prime Infrastructure server.

Deploying Prime Infrastructure Virtual Appliance

This section describes how to deploy the Prime Infrastructure virtual appliance from the VMware vSphere Client using the Deploy OVF Wizard or from the command line. (VMware vSphere Client is a Windows application for managing and configuring the vCenter Server.) This section contains the following topics:

- Deploying Prime Infrastructure Virtual Appliance from the VMware vSphere Client, page 2-5
- Deploying Prime Infrastructure Virtual Appliance using the Command Line Client, page 2-5

Deploying Prime Infrastructure Virtual Appliance from the VMware vSphere Client

Prime Infrastructure Virtual Image is packaged as an OVF file. An OVF is a collection of items in a single archive. In the vSphere Client, you can use the Deploy OVF Wizard to create a virtual machine, running the Prime Infrastructure virtual appliance application.

For detailed instructions on how to deploy the Prime Infrastructure virtual appliance using the Deploy OVF Wizard, see the *"Deploying the OVA"* section in the *Cisco Prime Infrastructure 2.0 Quick Start Guide*.

Deploying Prime Infrastructure Virtual Appliance using the Command Line Client

This section describes how to deploy Prime Infrastructure virtual appliance from the command line. As an alternative to using the vSphere Client to deploy Prime Infrastructure OVA distribution, you can use the VMware OVF Tool, which is a command-line client.

To deploy an OVA with the VMware OVF Tool, use the **ovftool** command, which takes the name of the OVA file to be deployed and the target location as arguments, as in the following example:

```
ovftool Prime Infrastructure-VA-X.X.X-large.ova vi://my.vmware-host.example.com/
```

In this case, the OVA file to be deployed is Prime Infrastructure-VA-X.X.X-large.ova and the target ESX host is my.vmware-host.example.com. For complete documentation on the VMware OVF Tool, see the VMware vSphere 4.0 documentation.

Setting Up Prime Infrastructure

This section describes how to configure the initial settings of Prime Infrastructure virtual appliance.

> ✎
>
> **Note**   These steps need to be performed only once, upon first installation of Prime Infrastructure virtual appliance.

For detailed instructions on how to configure the basic network and login settings for Prime Infrastructure virtual appliance system, see the *"Installing the Server"* section in the *Cisco Prime Infrastructure 2.0 Quick Start Guide*. When the steps are completed, Prime Infrastructure virtual appliance is accessible over the network.

Starting Prime Infrastructure Server

This section provides instructions for starting Prime Infrastructure on either a physical or virtual appliance.

To start Prime Infrastructure when it is installed on a physical or virtual appliance, follow these steps:

Step 1   Log into the system as administrator.

Step 2   Using the command-line interface, enter the following command:

```
ncs start
```

Logging into Prime Infrastructure User Interface

To log into Prime Infrastructure user interface through a web browser, see the detailed instructions provided in the *"Logging into the Prime Infrastructure User Interface"* section of the *Cisco Prime Infrastructure 2.0 Quick Start Guide*.

Applying Prime Infrastructure Software License

This section describes how to apply a license to Prime Infrastructure. Before starting, make sure that you have already acquired the license from the Cisco License Center and put it in a location that is accessible by the network from Prime Infrastructure. To add a new Prime Infrastructure license file, follow these steps:

Step 1   In the Administrator menu, choose **License Center** > **Files** > **Prime Infrastructure Files** page, and click **Add**.

Step 2   In the Add a License File dialog box, enter or browse to the applicable license file.

Step 3   Once displayed in the License File text box, click **Upload**.

To add a new license, see the "Managing Licenses" section in the *Cisco Prime Infrastructure 2.0 Administrator Guide*.

For more information about the licensing requirements, see the *"About Cisco Prime Infrastructure Licensing"* section in the *Cisco Prime Infrastructure 2.0 Quick Start Guide*.

Adding a Mobility Services Engine to the Prime Infrastructure

You can add MSE using the Add Mobility Services Engine dialog box in the Mobility Service page. In this dialog box, you can add licensing files, tracking parameters, and assign maps to MSE. If you launch the wizard with an existing MSE for configuration, then the Add MSE option appears as Edit MSE Details.

Tip   To learn more about Cisco Adaptive wIPS features and functionality, go to Cisco.com to watch a multimedia presentation. Here you can find the learning modules for a variety of Prime Infrastructure topics. Over future releases, there will be more overview and technical presentations to enhance your learning.

Note   The Prime Infrastructure Release 1.0 recognizes and supports MSE 3355 appropriately.

To add a mobility services engine to the Prime Infrastructure, log into the Prime Infrastructure and follow these steps:

Step 1   Verify that you can ping the mobility services engine.

Step 2   Choose **Services > Mobility Services** to display the Mobility Services page.

Step 3   From the Select a command drop-down list, choose **Add Mobility Services Engine**. Click **Go**.

Step 4   In the Device Name text box, enter a name for the mobility services engine.

Step 5   In the IP Address text box, enter the IP address of the mobility services engine.

Step 6   (Optional) In the Contact Name text box, enter the name of the mobility services engine administrator.

Step 7   In the User Name and Password text boxes, enter the username and password for the mobility services engine.

This refers to the Prime Infrastructure communication username and password created during the setup process.

If you have not specified the username and password during the setup process, use the defaults.

The default username and password are both *admin*.

Note   If you changed the username and password during the automatic installation script, enter those values here. If you did not change the default passwords, we recommend that you rerun the automatic installation script and change the username and password.

Step 8   Select the **HTTP** check box to allow communication between the mobility services engine and third-party applications. By default, the Prime Infrastructure uses HTTPs to communicate with MSE.

Step 9   Select the **Delete synchronized service assignments** check box if you want to permanently remove all service assignments from the mobility services engine.

This option is applicable for network designs, wired switches, controllers and event definitions. The existing location history data is retained, however, you must use manual service assignments to perform any future location calculations.

Step 10   Click **Next**. The Prime Infrastructure automatically synchronizes the selected elements with the MSE.

After the synchronization, the MSE License Summary page appears. You can use the MSE License Summary page to install a license, add a license, remove a license, install an activation license, and install service license.The Select Mobility Service page appears.

> **Note**   After adding a new mobility services engine, you can synchronize network designs (campus, building, and outdoor maps), controllers, switches (Catalyst Series 3000 only), and event groups on the local mobility services engine using the Prime Infrastructure. You can perform this synchronization immediately after adding a new mobility services engine or at a later time. To synchronize the local and the Prime Infrastructure databases, see the Information About Synchronizing the Prime Infrastructure and Mobility Services Engines, page 2-10.

Enabling Services on the Mobility Services Engine

To enable services on the mobility services engine, follow these steps:

Step 1   After adding the license file, the Select Mobility Service page appears.

Step 2   To enable a service on the mobility services engine, select the check box next to the service. The different type of services are as follows:

- Context Aware Service—If you select the Context Aware Service check box, then you must select a location engine to perform location calculation. You can choose **CAS to track clients**, **rogues**, **interferers**, and **tags**. You can choose either of the following engines to track tags:

  – Cisco Context-Aware Engine for Clients and Tags

  – Partner Tag Engine

  > **Note**   By default, the Context Aware Service check box and Cisco Context-Aware Engine for Clients and Tags radio button are enabled.

- Wireless Intrusion Prevention System—If you select the Wireless Intrusion Prevention System check box, it detects wireless and performance threats.

- MSAP Service—If you select the MSAP Service check box, it provides service advertisements that describe the available services for the mobile devices.

  > **Note**   With MSE 6.0 and later, you can enable multiple services (CAS and wIPS) simultaneously. Before Version 6.0, mobility services engines only supported one active service at a time.

Step 3   Click **Next** to configure the tracking and history parameters.

Configuring MSE Tracking and History Parameters

Step 1   After you enable services on the mobility services engine, the Select Tracking & History Parameters page appears.

> **Note**   If you skip configuring the tracking parameters, the default values are selected.

Step 2   You can select the clients that you want to keep track of by selecting the corresponding Tracking check box(es). The various tracking parameters are as follows:

- Wired Clients
- Wireless Clients
- Rogue Access Points
    - Exclude Adhoc Rogue APs
- Rogue Clients
- Interferers
- Active RFID Tags

Step 3   You can enable the history tracking of devices by selecting the corresponding devices check box(es). The different history parameters are as follows:

- Wired Stations
- Client Stations
- Rogue Access Points
- Rogue Clients
- Interferers
- Asset Tags

Step 4   Click Next to Assign Maps to the MSE.

Assigning Maps to the MSE

> **Note**   The Assigning Maps page is available only if you select CAS as one of the services to be enabled on the MSE.

Step 1   Once you configure MSE tracking and history parameters, the Assigning Maps page appears.

The Assign Maps page shows the following information:

- Map Name
- Type (building, floor, campus)
- Status

Step 2   You can see the required map type by selecting All, Campus, Building, Floor Area, or Outdoor Area from the Filter option available on the page.

Step 3   To synchronize a map, select the **Name** check box and click **Synchronize**.

Upon synchronization of the network designs, the appropriate controllers that have APs assigned on a particular network design are synchronized with the MSE automatically. Click **Done** to save the MSE settings.

Information About Synchronizing the Prime Infrastructure and Mobility Services Engines

This section describes how to synchronize the Prime Infrastructure and mobility services engines manually and automatically.

Note   The **Services > Synchronize Services** page is available only in the virtual domain in Release 7.3.101.0.

After adding a mobility services engine to the Prime Infrastructure, you can synchronize network designs (campus, building, floor, and outdoor maps), controllers (name and IP address), specific Catalyst 3000 series and 4000 series switches, and event groups with the mobility services engine.

- Network Design—A logical mapping of the physical placement of access points throughout facilities. A hierarchy of a single campus, the buildings that comprise that campus, and the floors of each building constitute a single network design.

- Controller—A selected controller that is associated and regularly exchanges location information with a mobility services engine. Regular synchronization ensures location accuracy.

- Wired Switches—Wired Catalyst switches that provide an interface to wired clients on the network. Regular synchronization ensures that location tracking of wired clients in the network is accurate.

  - The mobility services engine can be synchronized with Catalyst stackable switches (3750, 3750-E, 3560, 2960, IE-3000 switches), switch blades (3110, 3120, 3130, 3040, 3030, 3020), and switch ports.

  - The mobility services engine can also be synchronized with the following Catalyst 4000 series switches: WS-C4948, WS-C4948-10GE, ME-4924-10GE, WS-4928-10GE, WS-C4900M, WS-X4515, WS-X4516, WS-X4013+, WS-X4013+TS, WS-X4516-10GE, WS-X4013+10GE, WS-X45-SUP6-E, and WS-X45-SUP6-LE.

- Event Groups—A group of predefined events that define triggers that generate an event. Regular synchronization ensures that the latest defined events are tracked. Event groups can also be created by third-party applications. For more information on third-party application created event groups, see the "Configuring Automatic Database Synchronization and Out-of-Sync Alerts" section on page 2-14.

- Third Party Elements—When you synchronize elements with MSE, there might be event groups on the MSE that have been created by third-party applications. You can either delete the unused elements or mark them as third-party elements.

- Service Advertisements—MSAP provides service advertisements on mobile devices. This shows the service advertisement that is synchronized with the MSE.

Prerequisites for Synchronizing the Mobility Services Engine

- Be sure to verify software compatibility between the controller, Prime Infrastructure, and the mobility services engine before synchronizing. See the latest mobility services engine release notes at the following URL:
  http://www.cisco.com/en/US/products/ps9742/tsd_products_support_series_home.html

- Communication between the mobility services engine, Prime Infrastructure, and the controller is in Coordinated Universal Time (UTC). Configuring NTP on each system provides devices with UTC time. The mobility services engine and its associated controllers must be mapped to the same NTP server and the same Prime Infrastructure server. An NTP server is required to automatically synchronize time between the controller, Prime Infrastructure, and the mobility services engine. However, the timezone for MSE should still be set to UTC. This is because wIPS alarms require that the MSE time be set to UTC.

Working with Third-Party Elements

When you synchronize elements with MSE, there might be event groups on the MSE that have been created by third-party applications. You can either delete the unused elements or mark them as third-party elements.

Deleting Elements or Marking Them as Third-Party Elements

To delete elements or mark them as third-party elements, follow these steps:

Step 1   Choose **Services** > **Synchronize Services**.

The Network Designs page appears.

Step 2   In the Network Designs page, choose **Third Party Elements** from the left sidebar menu.

The Third Party Elements page appears.

Step 3   Select one or more elements.

Step 4   Click one of the following buttons:

- **Delete Event Groups**—Deletes the selected event groups.
- **Mark as 3rd Party Event Group(s)**—Marks the selected event groups as third-party event groups.

Synchronizing Controllers with a Mobility Services Engine

This section describes how to synchronize a controller, assign an MSE to any wireless controller and also to unassign a network design, controller, wired switch, or event group from a mobility services engine.

Synchronizing a Controller, Catalyst Switch, or Event Group

To synchronize network designs, a controller, a Catalyst switch, or event group with the mobility services engine, follow these steps:

Step 1   Choose **Services** > **Synchronize Services**.

The left sidebar menu contains the following options: **Network Designs**, **Controllers**, **Event Groups**, **Wired Switches**, **Third Party Elements**, and **Service Advertisements**.

Step 2   From the left sidebar menu, choose the appropriate menu options.

Step 3   To assign a network design to a mobility services engine, in the Synchronize Services page, choose **Network Designs** from the left sidebar menu.

The Network Designs page appears.

Step 4   Select all the maps to be synchronized with the mobility services engine by selecting the corresponding **Name** check box.

> ✏️
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> **Note**   Through Release 6.0, you can assign only up to a campus level to a mobility services engine. Starting with Release 7.0 this option is granular to a floor level. For example, you can choose to assign floor1 to MSE 1, floor2 to MSE 2, and floor3 to MSE 3.

Step 5   Click **Change MSE Assignment**.

Step 6   Select the mobility services engine to which the maps are to be synchronized.

Step 7   Click either of the following in the MSE Assignment dialog box:

- **Save**—Saves the mobility services engine assignment. The following message appears in the Messages column of the Network Designs page with a yellow arrow icon:

  "To be assigned - Please synchronize."

- **Cancel**—Discards the changes to the mobility services engine assignment and returns to the Network Designs page.

You can also click **Reset** to undo the mobility services engine assignments.

> ✏️
>
> **Note**   A network design may include a floor in a campus or a large campus with several buildings, each monitored by a different mobility services engine. Because of this, you may need to assign a single network design to multiple mobility services engines.

> ✏️
>
> **Note**   Network design assignments also automatically picks up the corresponding controller for synchronization.

Step 8   Click **Synchronize** to update the mobility services engine(s) database(s).

When items are synchronized, a green two-arrow icon appears in the Sync. Status column for each synchronized entry.

You can use the same procedure to assign wired switches or event groups to a mobility services engine. To assign a controller to a mobility services engine, see "Synchronizing Controllers with a Mobility Services Engine" section on page 2-11 for more information.

Assigning an MSE to the Controller

To assign a mobility services engine with any wireless controller on a per-service basis (CAS or wIPS), follow these steps:

Step 1   Choose **Services > Synchronize Services**.

Step 2   In the Network Designs page, choose **Controller** from the left sidebar menu.

Step 3   Select the controllers to be assigned to the mobility services engine by selecting the corresponding **Name** check box.

Step 4   Click **Change MSE Assignment**.

Step 5   Choose the mobility services engine to which the controllers must be synchronized.

Step 6   Click either of the following in the Choose MSEs dialog box:

- **Save**—Saves the mobility services engine assignment. The following message appears in the Messages column of the Controllers page with a yellow arrow icon:

  "To be assigned - Please synchronize."

- **Cancel**—Discards the changes to mobility services engine assignment and returns to the Controllers page.

You can also click **Reset** to undo the mobility services engine assignments.

Step 7   Click **Synchronize** to complete the synchronization process.

Step 8   Verify that the mobility services engine is communicating with each of the controllers for only the chosen service. This can be done by clicking the NMSP status link in the status page.

> **Note**   After Synchronizing a controller, verify that the timezone is set on the associated controller.

> **Note**   Controller names must be unique for synchronizing with a mobility services engine. If you have two controllers with the same name, only one is synchronized.

You can use the same procedure to assign Catalyst switches or event groups to a mobility services engine.

> **Note**   A switch can only be synchronized with one mobility services engine. However, a mobility services engine can have many switches attached to it.

Unassigning a Network Design, Controller, Wired Switch, or Event Group from the MSE

To unassign a network design, controller, wired switch, or event group from a mobility services engine, follow these steps:

Step 1   Choose **Services** > **Synchronize Services**.

Step 2   From the left sidebar menu, choose the appropriate menu options.

Step 3   Select one or more elements by selecting the **Name** check box, and click **Change MSE Assignment**. The Choose MSEs dialog box appears.

Step 4   Unselect the mobility services engine if you do not want the elements to be associated with that mobility services engine by selecting either the **CAS** or **wIPS** check box.

Step 5   Click **Save** to save the assignment changes.

Step 6   Click **Synchronize**.

The Sync Status column appears blank.

Configuring Automatic Database Synchronization and Out-of-Sync Alerts

Manual synchronization of the Prime Infrastructure and mobility services engine databases is immediate. However, future deployment changes (such as changes to maps and access point positions) can yield incorrect location calculations and asset tracking until resynchronization.

To prevent out-of-sync conditions, use the Prime Infrastructure to carry out synchronization. This policy ensures that synchronization between the Prime Infrastructure and mobility services engine databases is triggered periodically and any related alarms are cleared.

Any change to one or more of any synchronized component is automatically synchronized with the mobility services engine. For example, if a floor with access points is synchronized with a particular mobility services engine and then one access point is moved to a new location on the same floor or another floor that is also synchronized with the mobility services engine, then the changed location of the access point is automatically communicated.

To further ensure that the Prime Infrastructure and MSE are in sync, smart synchronization happens in the background.

This section contains the following topics:

Configuring Automatic Database Synchronization

To configure smart synchronization, follow these steps:

Step 1   Choose **Administration > Background Tasks**.

Step 2   Select the **Mobility Service Synchronization** check box.

The Mobility Services Synchronization page appears.

Step 3   To set the mobility services engine to send out-of-sync alerts, select the Out of Sync Alerts **Enabled** check box.

Step 4   To enable smart synchronization, select the Smart Synchronization **Enabled** check box.

> **Note**   Smart synchronization does not apply to elements (network designs, controllers, or event groups) that have not yet been assigned to a mobility services engine. However, out-of-sync alarms are still generated for these unassigned elements. For smart synchronization to apply to these elements, you must manually assign them to a mobility services engine.

> **Note**   When a mobility services engine is added to an Prime Infrastructure, the data in the Prime Infrastructure is always treated as the primary copy that is synchronized with the mobility services engine. All synchronized network designs, controllers, event groups and wired switches that are present in the mobility services engine and not in the Prime Infrastructure are removed automatically from mobility services engine.

Step 5   Enter the time interval, in minutes, that the smart synchronization is to be performed.

By default, the smart-sync is enabled.

Step 6   Click **Submit**.

For Smart controller assignment and selection scenarios, see the .

Smart Controller Assignment and Selection Scenarios

Scenario 1

If a floor having at least one access point from a controller is chosen to be synchronized with the mobility services engine in the Network Designs menu of the Synchronize Services page, then the controller to which that access point is connected is automatically selected to be assigned to the mobility services engine for CAS service.

Scenario 2

When at least one access point from a controller is placed on a floor that is synchronized with the mobility services engine, the controller to which the access point is connected is automatically assigned to the same mobility services engine for the CAS service.

Scenario 3

An access point is added to a floor and assigned to a mobility services engine. If that access point is moved from controller A to controller B, then controller B is automatically synchronized to the mobility services engine.

Scenario 4

If all access points placed on a floor that is synchronized to the MSE are deleted, then that controller is automatically removed from the mobility services engine assignment or unsynchronized.

Out-of-Sync Alarms

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

- Elements are modified in the Prime Infrastructure (the auto-sync policy pushes these elements)
- Elements other than controllers exist in the mobility services engine database but not in the Prime Infrastructure
- Elements are not assigned to any mobility services engine (the auto-sync policy does not apply)

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

- The mobility services engine is deleted

> **Note** When you delete a mobility services engine, the out-of-sync alarms for that system are also deleted. In addition, if you delete the last available mobility services engine, the alarm for the following event: "elements not assigned to any server" is 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)

Viewing Mobility Services Engine Synchronization Status

You can use the Synchronize Services feature in the Prime Infrastructure to view the status of network design, controller, switch, and event group synchronization with a mobility services engine.

This section contains the following topics:

Viewing Mobility Services Engine Synchronization Status

To view the synchronization status, follow these steps:

Step 1 Choose **Services > Synchronize Services**.

Step 2 From the left sidebar menu, choose **Network Designs**, **Controllers**, **Event Groups**, **Wired Switches**, **Third Party Elements**, or **Service Advertisements**.

For each of the elements, the Sync. Status column shows the synchronization status. A green two-arrow icon indicates that its corresponding element is synchronized with the specified server such as a mobility services engine. A gray two-arrow icon with a red circle indicates that its corresponding item is not synchronized with a provided server.

The Message column shows the reason for failure if the elements are out of sync.

You can also view the synchronization status at **Monitor > Site Maps > System Campus >** *Building >*
Floor.

where *Building* is the building within the campus and *Floor* is a specific floor in that campus building.

The MSE Assignment option on the left sidebar menu shows which mobility services engine the floor is
currently assigned to. You can also change the mobility services engine assignment in this page.

Viewing Synchronization History

You can view the synchronization history for the last 30 days for a mobility services engine. 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 choose **Services > Synchronization History**. The Synchronization
History page appears.

Table 2-1 describes the table column headings that appear in the Synchronization History page.

Table 2-1 Synchronization History Page

Text Boxes	Description
Timestamp	The date and time at which the synchronization has happened.
Server	The mobility services engine server.
Element Name	The name of element that was synchronized.
Type	The type of the element that was synchronized.
Sync Operation	The sync operation that was performed. It can be an Update, Add, or Delete.
Generated By	The method of synchronization. It can be Manual or Automatic.
Status	The status of the synchronization. It can be either Success or Failed.
Message	Any additional message about the synchronization.

Click the column headings to sort the entries.

Enabling Location Analytics Service on the Mobility Services Engine

To enable Location Analytics service on the mobility services engine within the Prime Infrastructure UI,
follow these steps:

Step 1   Choose **Services > Mobility Services Engine**.

The Mobility Services Engines page appears.

Step 2   In the Mobility Services page, click the **Device Name** to configure its properties.

Step 3   To enable Location Analytics service on the mobility services engine, select the check box next to the Location Analytics Service.

Step 4   Click **Save**.

Step 5   Click **Done** to save the settings.

Adding Floor Areas

This section describes how to add floor plans to either a campus building or a standalone building in the Prime Infrastructure database.

This section contains the following topics:

- "Adding Floor Areas to a Campus Building" section on page 2-18
- "Adding Floor Plans to a Standalone Building" section on page 2-21

Adding Floor Areas to a Campus Building

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

> **Note**   Use the zoom controls at the top of the campus image to enlarge or decrease the size of the map view and to hide or show the map grid (which shows the map size in feet or meters).

To add a floor area to a campus building, follow these steps:

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

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

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

✎
Note   The floor map image is enhanced for zooming and panning. The floor image is not visible completely until this operation is complete. You can zoom in and out to view the complete map image. For example, if you have a high resolution image (near 181 megapixels) whose size is approximately 60 megabytes, it may take two minutes to appear on the map.

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

Step 3   From the Maps Tree View or the Monitor > Site Maps list, choose the applicable campus building to open the Building View page.

Step 4   Hover your mouse cursor over the name within an existing building rectangle to highlight it.

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

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

Step 6   Click **Go**. The New Floor Area page appears.

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

    a.   Enter the floor area and contact names.

    b.   Choose the floor or basement number from the Floor drop-down list.

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

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

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

    e.   Select the **Image or CAD File** check box.

    f.   Browse to and choose the desired floor or basement image or CAD filename, and click **Open**.

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

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

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

> **Note**   The Prime Infrastructure uses a native image conversion library to convert auto-cad files into raster formats like .PNG. When there are issues loading the native library, Prime Infrastructure shows the following error: "Unable to convert the auto-cad file. Reason: Error while loading the auto-cad image conversion library." For more information see Prime Infrastructure online help or Prime Infrastructure documentation.

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

> **Note**   When you choose the floor or basement image filename, the Prime Infrastructure shows the image in the building-sized grid.

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

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

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

Enter the remaining parameters for the floor area.

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

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

> **Note**   The horizontal and vertical spans should be smaller than or the same size as the building horizontal and vertical spans in the Prime Infrastructure database.

k.   If applicable, enter the horizontal position (distance from the corner of the outdoor area rectangle to the left edge of the campus map) and vertical position (distance from the corner of the outdoor area rectangle to the top edge of the campus map) in feet or meters.

> **Tip**   Use **Ctrl-click** to resize the image within the building-sized grid.

l.   If desired, select the **Launch Map Editor after floor creation** check box to rescale the floor and draw walls.

m.   Click **OK** to save this floor plan to the database. The floor is added to the Maps Tree View and the Design > Site Maps list.

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

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

> ✎
> **Note**   You can zoom in or out to view the map at different sizes and you can add access points.

Adding Floor Plans to a Standalone Building

After you have added a standalone building to the Prime Infrastructure database, you can add individual floor plan maps to the building.

To add floor plans to a standalone building, follow these steps:

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

> ✎
> **Note**   The maps can be of any size because the Prime Infrastructure automatically resizes the maps to fit the workspace.

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

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

Step 3   Choose **Monitor > Site Maps**.

Step 4   From the Maps Tree View or the Design > Site Maps left sidebar menu, choose the desired building to display the Building View page.

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

Step 6   Click **Go**.

Step 7   In the New Floor Area page, add the following information:

- Enter the floor area and contact names.
- Choose the floor or basement number from the Floor drop-down list.
- Choose the floor or basement type (RF Model).
- Enter the floor-to-floor height in feet.
- Select the **Image or CAD File** check box.
- Browse to and choose the desired floor or basement Image or CAD file, and click **Open**.

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

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

Step 8 Click **Next**. At this point, if a CAD file was specified, a default image preview is generated and loaded.

> **Note** The Prime Infrastructure uses a native image conversion library to convert auto-cad files into raster formats like .PNG. When there are issues loading the native library, the Prime Infrastructure shows the following error: "Unable to convert the auto-cad file. Reason: Error while loading the auto-cad image conversion library. For more information, see the Prime Infrastructure online help or the Prime Infrastructure documentation".

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

> **Note** When you choose the floor or basement image filename, the Prime Infrastructure shows the image in the building-sized grid.

> **Note** The maps can be any size because the Prime Infrastructure automatically resizes the maps to fit the workspace.
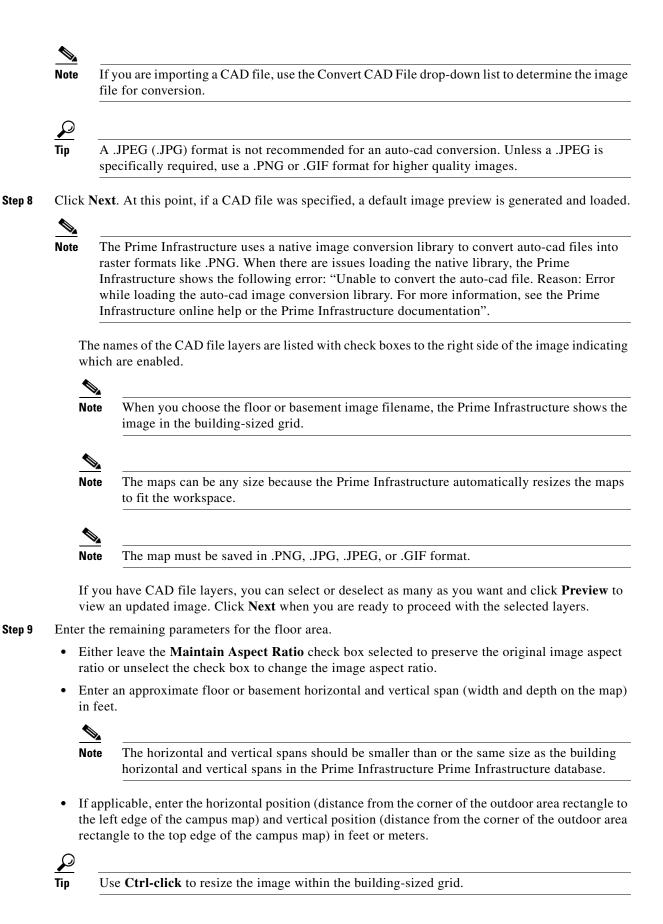
> **Note** The map must be saved in .PNG, .JPG, .JPEG, or .GIF format.

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

Step 9 Enter the remaining parameters for the floor area.

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

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

> **Note** The horizontal and vertical spans should be smaller than or the same size as the building horizontal and vertical spans in the Prime Infrastructure Prime Infrastructure database.

- If applicable, enter the horizontal position (distance from the corner of the outdoor area rectangle to the left edge of the campus map) and vertical position (distance from the corner of the outdoor area rectangle to the top edge of the campus map) in feet or meters.

> **Tip** Use **Ctrl-click** to resize the image within the building-sized grid.

- Adjust the floor characteristics with the Prime Infrastructure map editor by selecting the check box next to Launch Map Editor.

Step 10   Click **OK** to save this floor plan to the database. The floor is added to the Maps Tree View and the Design > Site Maps list.

Step 11   Click any of the floor or basement images to view the floor plan or basement map.

You can zoom in or out to view the map at different sizes and you can add access points.

Defining Coverage Area

To draw a coverage area using the Prime Infrastructure UI, follow these steps:

Note   You must add floor plan before drawing a coverage area.

Step 1   Add the floor plan if it is not already represented in the Prime Infrastructure.

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

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

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

Step 5   It the Map Editor page, click the **Draw Coverage Area** icon on the toolbar.

A pop-up appears.

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

A drawing tool appears.

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

- Click the left mouse button to begin and end drawing a line.
- When you have completely outlined the area, double-click the left mouse button and the area is highlighted in the page.

The outlined area must be a closed object to appear highlighted on the map.

Step 8   Click the disk icon on the toolbar to save the newly drawn area.

Monitoring Geo-Location

The MSE provides physical location of wired clients, wired endpoints, switches, controllers, and access points present in a wireless network deployment. Currently, MSE provides location information in geo-location format to the external entities through northbound and southbound entities.

To improve the accuracy of the geo-location information provided by MSE, this feature aims to transform the geometric location co-ordinates of a device to geo-location coordinates (latitude and longitude) and provides it to the external entities through northbound and southbound interfaces.

> **Note**   At least three GPS markers are required for geo-location calculation. The maximum number of GPS markers that you can add is 20.

This section contains the following topics:

- Adding a GPS Marker to a Floor Map, page 2-24
- Editing a GPS Marker, page 2-24
- Deleting a GPS Marker Present on a Floor, page 2-25

Adding a GPS Marker to a Floor Map

To add a GPS marker to a floor map, follow these steps:

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

Step 2   Choose **Campus Name** > **Building Name** > **Floor Name**.

Step 3   Choose the **Add/Edit GPS Markers Information** menu option on the top left menu to open the Add/Edit GPS page.

A GPS Marker icon appears on the top left corner of the map (X=0 Y=0).

Step 4   You can drag the GPS Marker icon and place it in the desired location on the map or enter the X and Y position values in the GPS Marker Details table on the left sidebar menu to move the marker to the desired position.

> **Note**   If the markers added are too close, then the accuracy of geo-location information is less.

Step 5   Enter the Latitude and Longitude degrees for the selected GPS Marker icon in the left sidebar menu.

Step 6   Click **Save.**

The GPS Marker information is saved to the database.

Step 7   Click **Apply to other Floors of Building** to copy GPS markers on one floor of a building to all the remaining floors of that building.

Editing a GPS Marker

To edit a GPS marker present on the floor, follow these steps:

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

Step 2   Choose the **Campus Name** > **Building Name** > **Floor Name**.

Step 3   Choose the **Add/Edit GPS Markers Information** menu option on the top left menu to open the Add/Edit GPS page.

Step 4   Select an existing GPS marker present on the floor.

Step 5   From the left sidebar menu, you can change the Latitude, Longitude, X Position, and Y Position which is associated with the GPS marker.

Step 6   Click **Save**.

The modified GPS marker information is now saved to the database.

Deleting a GPS Marker Present on a Floor

To delete a GPS marker present on a floor, follow these steps:

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

Step 2   Choose **Campus Name > Building Name > Floor Name**.

Step 3   Choose the **Add/Edit GPS Markers Information** menu option to open the Add/Edit GPS page.

Step 4   Select an existing GPS Marker which is present on the floor from the left sidebar menu.

> ✎
>
> **Note**   You can delete multiple GPS markers present on a floor by selecting the **Multiple GPS Markers** check box.

Step 5   Click **Delete GPS Marker**.

Step 6   The selected GPS marker is deleted from the database.

Logging into Location Analytics User Interface

To log into Location Analytics user interface through a web browser, follow these steps:

Step 1   In the address line of browser, enter https://location-analytics-ip-address:8080/ui, where location-analytics-ip-address is the IP address of the Location Analytics server. Location Analytics user interface displays the User Login page.

Step 2   Enter your username.

Step 3   Enter your password.

Step 4   Click **Login** to log into Location Analytics.

The Location Analytics home page appears.

WebGL Requirements

The Location Analytics in Release 7.4 provides ability to view the analytic results in both 2D (Open Street Maps) and 3D (WebGL) environments. This provides improved understanding of results on multiple floor paths or when dwell times are calculated throughout a multi-storey building. The 3D environment presents the same information as the 2D environment.

WebGL is an advanced feature that provides graphic capabilities. All browsers do not support WebGL on a particular hardware. Ensure to verify your browser compatibility at the following URL: http://get.webgl.org/. If your browser supports WebGL, then you must see a spinning cube.

If your browser does not support WebGL, you must do the following:

- Update your latest drivers for video card.
- For Google Chrome, follow the instructions available at the Google support website.
- For Firefox, go to **Help > Troubleshooting Information** and scroll down to **Graphics and WebGL Renderer**. This indicates if your system supports WebGL and if not, it provides information on what is recommended.

Note   If your system does not support 3D, then the analytic results are displayed only in 2D Open Street Maps view.

Internet Explorer 10 does not have the built-in support for WebGL and Microsoft has not announced any plans for implementing it in the future. WebGL support can be manually added to Internet Explorer using third-party plugins. For more information, see the http://www.iewebgl.com/