



Cisco CMX Analytics Configuration Guide

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Cisco CMX Analytics Configuration Guide

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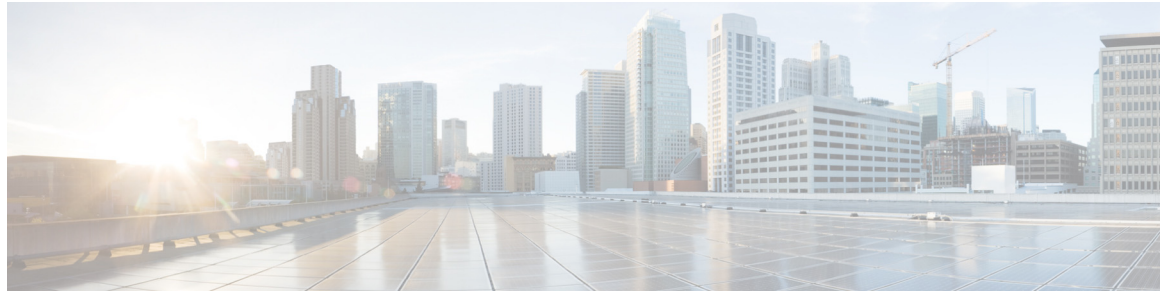
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Preface

This preface contains the following sections:

- [Conventions](#)
- [Related Documentation](#)
- [Obtaining Documentation and Submitting a Service Request](#)

Conventions

This guide uses the following conventions:

Table 1 **Conventions**

Convention	Indication
bold font	Commands and keywords and user-entered text appear in bold font .
<i>italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
[]	Elements in square brackets are optional.
{x y z}	Required alternative keywords are grouped in braced and separated by vertical bars.
[x y z]	Optional alternative keywords are grouped in braced and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
<code>courier font</code>	Terminal sessions and information the system displays appear in <code>courier font</code>
<>	Nonprinting characters such as passwords are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.



Note

Means reader take note

**Tip**

Means the following information will help you solve a problem.

**Caution**

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

**Warning**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix “Translated Safety Warnings.”)

Related Documentation

For more information about the Mobility Services Engine and related products, see the following URL: <http://www.cisco.com/c/en/us/support/wireless/mobility-services-engine/tsd-products-support-series-home.html>

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, that also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as an RSS feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.



Introduction to CMX Analytics

CMX analytics is a system that provides a set of data analytic tools packaged for analyzing Wi-Fi device locations that comes from the Mobility Services Engine (MSE). The CMX analytics service is part of advanced location service, that was first integrated into the MSE in Release 7.4.

When a wireless device is enabled in a network, it transmits probe request packets to identify the wireless network in its vicinity. Even after connecting to the access point in the Wireless LAN (WLAN), the client devices continue to transmit probe request packets to identify other access points for better quality of service. The access point gathers the request and the associated Receiver Signal Strength Indicator (RSSI) from the various wireless devices and forwards them to the Wireless LAN Controller (WLC). The controller then forwards this information to the MSE for analysis.

The basic data that is collected from various APs, when analyzed, produces information and knowledge about the movement and behavior patterns of people who are using Wi-Fi devices in the building. A building can be an airport, shopping mall, city center, and so on.

The CMX analytics system:

- Estimates the number of visitors, the amount of time they spend, and the frequency of their visits within a venue.
- Provides detailed insight into the behavior patterns of people moving and interacting within a venue.
- Analyzes business performance by measuring the effect of in-venue marketing.
- Improves customer satisfaction through sufficient staffing during peak times, proper signage, and make changes to the underutilized areas.

With the CMX analytics, organizations can get a lot of useful business intelligence from WiFi and location technologies. For location technology to work, you require precise maps and triangulated computation from at least three Access Points (APs). In many deployments, where there is only a couple of APs, it is not possible to do a triangulated location computation. With presence analytics, the organizations with one or two AP deployments can still use the WiFi technology to understand the customer pattern and behavior. For more information on presence analytics, see [Chapter 6, “Presence Analytics”](#).

CMX Analytics service is configured to have the following modes:

- Location only mode—To collect data for location enabled zones, you must import zones from the Prime Infrastructure (PI).
- Presence only mode—To collect data only for presence enabled sites, you must create presence sites and no need to import any zones from the PI.
- Mixed mode—To collect data for both location zones and presence sites, you must import zones from the PI and create presence sites.

This chapter contains the following sections:

- [Workflow for Setting up the CMX Analytics System, page 2-1](#)
- [CMX Analytics Within the Cisco Unified Wireless Network, page 1-2](#)
- [Getting Information on Your Network, page 1-3](#)

CMX Analytics Within the Cisco Unified Wireless Network

Cisco Unified Wireless Network (CUWN) solution ensures that your business achieves the highest level of network security and versatility. Cisco UWN solution empowers your network with the ability to offer secure wireless networking, either within your office for increased mobility or bridging between your office buildings. The following are the components of CUWN:

- **Access Points**—The Access point is the end point on the network side that provides the wireless access.
- **Wireless LAN Controllers**—The WLAN controllers are highly scalable and flexible platforms that enables system wide services for mission-critical wireless in medium to large-sized enterprises and campus environments. Designed for 802.11n and 802.11ac performance and maximum scalability, the WLAN controllers offer enhanced uptime with the ability to simultaneously manage from 5000 access points to 250 access points; superior performance for reliable streaming video and toll quality voice; and improved fault recovery for a consistent mobility experience in the most demanding environments. The controller actively manages these APs w.r.t what channel it operates, how does the client gets attach to it, what security types are supported and so on.
- **Cisco Prime Infrastructure**—With the Prime Infrastructure, network administrator have a single solution for RF prediction, policy provisioning, network optimization, troubleshooting, user tracking, security monitoring, and wired and wireless LAN systems management. Robust graphical interfaces make wired and wireless LAN deployment and operations simple and soft-effective. Detailed trending and analysis reports make the Prime Infrastructure vital to ongoing network operations.
- **Mobility Services Engine**—The Cisco Mobility Services Engine (MSE) is an open platform that provides a new approach for delivery of the mobility services and applications. The MSE is managed by the Prime Infrastructure and supports various services. There are two models of the MSE available:
 - Cisco 3355 Mobility Services Engine
 - Cisco Mobility Services Engine Virtual Appliance

The following figure shows the overall architecture within which the CMX analytics system fits in. The CMX analytics system contains the following components:

- Analysis
- Reporting
- Administration

Figure 1-1 CMX analytics Architecture



Getting Information on Your Network

The process of downloading and creating a database of devices or path information is automatic. If the installation is new, then the collection of data starts immediately and continues to download increments of data every 15 minutes. If you are upgrading to an existing MSE that has been collecting data, then the system downloads data from the previous 3 days or from the last successful download (whatever is shortest) before continuing every 15 minutes. The analytics is available immediately when the data is in the database.



Note

Analytics is run on currently available data that is stored in the Analytics database. The amount of raw data is limited and is based on the available disk space on the MSE. For data to remain current, a rollover or pruning is necessary at some point. The number of days available for analytics is therefore depends on the amount of points able to be stored. Currently default is 8 million points pruned back to 7.9 million points. The reports however are run from an Aggregated or Summary database which is considerably smaller than the Analytics database. This holds data for a much longer period of time, which means that eventually the available dates for reporting will have a wider coverage than that for the analytics.



Get Started with CMX Analytics

This chapter provides information on prerequisites, system requirements, and enabling the Cisco CMX analytics service.

This chapter contains the following sections:

- [Workflow for Setting up the CMX Analytics System, page 2-1](#)
- [Prerequisites for Enabling CMX Analytics Service, page 2-3](#)
- [WebGL Requirements, page 2-5](#)

Workflow for Setting up the CMX Analytics System

The following table describes the steps to be followed while setting up the CMX analytics system.

Table 2-1 *Process for Setting up the CMX analytics System*

Process	Description
1. Verify the prerequisites	See the following URL: Prerequisites for Enabling CMX Analytics Service, page 2-3
2. Setting up and starting the Prime Infrastructure	See the following URL: http://www.cisco.com/c/en/us/td/docs/net_mgmt/prime/infrastructure/2-0/quickstart/guide/cpi_qsg.html
3. Logging into the Prime Infrastructure User Interface	See the following URL: http://www.cisco.com/c/en/us/td/docs/net_mgmt/prime/infrastructure/2-0/quickstart/guide/cpi_qsg.html#pgfId-42039
4. Managing licenses	See the following URL: http://www.cisco.com/c/en/us/td/docs/net_mgmt/prime/infrastructure/2-0/administrator/guide/PIAdminBook/licensing.html
5. Adding a Mobility Services Engine to the Prime Infrastructure	See the following URL: http://www.cisco.com/c/en/us/td/docs/wireless/mse/7-6/MSE_CAS/7_6_MSE_CAS/7_4_MSE_CAS_chapter_010.html#ID136
6. Configure the MSE tracking and history parameters	See the following URL: http://www.cisco.com/c/en/us/td/docs/wireless/mse/7-6/MSE_CAS/7_6_MSE_CAS/7_4_MSE_CAS_chapter_010.html#ID136

Table 2-1 Process for Setting up the CMX analytics System (continued)

Process	Description
7. Managing Clients	To check if the Prime Infrastructure is showing clients in real time, see the following URL: http://www.cisco.com/c/en/us/td/docs/wireless/prime_infrastructure/2-0/configuration/guide/pi_20_cg/clientmgmt.html#pgfId-1288722
8. Adding Floor Areas	See the following URL: http://www.cisco.com/c/en/us/td/docs/wireless/prime_infrastructure/2-0/configuration/guide/pi_20_cg/maps.html#wp1670968
9. Defining Coverage Area	See the following URL: http://www.cisco.com/c/en/us/td/docs/wireless/prime_infrastructure/2-0/configuration/guide/pi_20_cg/maps.html#wp1671523
10. Adding a GPS Marker to a floor map	For more information see the following URLs: <ul style="list-style-type: none"> • Prerequisites for Monitoring Geo-Location, page 2-4. • http://www.cisco.com/c/en/us/td/docs/wireless/mse/3350/7-2/wIPS_Configuration/Guide/wIPS_72/msecg_Monitoring_System.html#wp1241724
11. Defining an Inclusion and Exclusion region on a floor	For more information, see the following URLs: <ul style="list-style-type: none"> • Prerequisites for Defining Inclusion and Exclusion Areas on a Floor, page 2-4 • http://www.cisco.com/c/en/us/td/docs/wireless/prime_infrastructure/2-0/configuration/guide/pi_20_cg/maps.html#wp1123748
Note	If there is data available in the MSE database, then you must wait for 15-20 minutes for sufficient data to get collected and uploaded to analytics. If the MSE is collecting data for first time, it takes more than an hour for sufficient data to get collected for analytics to take place. Once the data has started transferring from MSE to analytics database, it takes more than an hour to first become available for analytics. Points are assembled into path/visits and only the completed paths are written to the database. A path is closed if there are no new points that have appeared for over an hour.
12. Enabling CMX Analytics	Enabling CMX Analytics Service on the Mobility Services Engine, page 2-4
13. Managing User accounts	See the following URL: http://www.cisco.com/en/US/products/ps12239/products_installation_and_configuration_guides_list.html
14. Start the CMX analytics user interface.	See the following URL: Logging into the CMX Analytics User Interface, page 2-5

Prerequisites for Enabling CMX Analytics Service

- The CMX analytics system takes input from the Cisco Mobility Service Engine (MSE). The CMX analytics is installed as part of the MSE installation but you must select CMX Analytics service explicitly from the list of available services in the Prime Infrastructure UI. For details on enabling the CMX analytics service, see the “[Enabling CMX Analytics Service on the Mobility Services Engine](#)” section on page 2-4.
- 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.

Follow these guidelines 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 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. If there is more data available in the history file and you want to retrieve, then you must set this to a different value.
If you set the max-history to `nnnD`, then it retrieves `nnn` days and if you set to `nnnW`, then it retrieves `nnn` weeks.
- Control the size of the database—New parameters `max-points` and `reset-points` are added in the `mse.properties` file to help control the size of the database. Once the database reaches the threshold value of 8 million points, it removes the oldest data to reset the size to 7.9 million points.

**Note**

In order for the CMX analytics to access data from the MSE, you must set the history parameters on the MSE. For more information, see the http://www.cisco.com/c/en/us/td/docs/wireless/mse/7-6/MSE_CAS/7_6_MSE_CAS/7_4_MSE_CAS_chapter_010.html#ID136.

**Note**

Depending on your browser and the hardware, images over 2MB may not appear in the 3D environment. In the `mse.properties` file, set the value of `max-dimension`. For example, setting `max-dimension` to 2048 can reduce the resolution of the picture to at most 2048 pixels on the longest side.

- All settings (including the above mentioned information) are documented in the properties file.
- CMX analytics requires both floor plans and coverage areas to be defined in the Prime Infrastructure in order for CMX 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.
- You can define at least three GPS markers for each floor in the Prime Infrastructure UI (Optional).
- You need three APs to get reliable location information on the device.

Prerequisites for Defining Inclusion and Exclusion Areas on a Floor

- Inclusion and exclusion areas can be any polygon shape and must have at least three points. Points can sometime be located outside the building. If this is where the devices are, then a coverage area should be created. At other times, the points are actually inside and should be moved to the nearest inside location (same applies for unlikely areas inside). Defining inclusion and exclusion areas does this and therefore the analytic results are more consistent.
- You can only define one inclusion region on a floor. By default, an inclusion region is defined for each floor when it is added to Prime Infrastructure. The inclusion region is indicated by a solid aqua line, and generally outlines the region.
- You can define multiple exclusion regions on a floor.
- Newly defined inclusion and exclusion regions appear on heatmaps only after the mobility services engine recalculates location.

Prerequisites for 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.

You need GPS markers only for 2D view and not for 3D view. You can still use 3D view without GPS markers.



Note

For CMX Analytics, the 2D OpenStreetMaps requires all points to be geo-located as latitude/longitude in order for the results to be displayed in the correct geographical location.



Note

The GPS marker information is required by the CMX analytics to show results for the building in the 2D Open Street Maps view. A warning message is displayed if these GPS markers are not set. The latitude or longitude of the GPS markers can often be obtained through some of the mapping software such as Google maps or Open Street Maps.

Enabling CMX Analytics Service on the Mobility Services Engine



Note

When the CMX analytics service is enabled, the presence analytics gets enabled.

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

-
- Step 1** Launch the MSE admin UI. To launch the MSE admin user interface, type `https://mseip/mseui/` in the Web browser or you can launch it from the Cisco Prime Infrastructure (PI) by clicking the MSE name link from **Services > Mobility Services Engines** page. The MSE admin UI is enabled by default in the **Administration > User Preference** page.
- Step 2** Enter the username and password and click **Sign In**.
The MSE Admin UI home page appears. All the available MSE services are listed under the Services group box in the Home page.
- Step 3** Enable the CMX Analytics service in the Services group box.
- Step 4** Click **Save**.
-

Logging into the CMX Analytics User Interface

To log into CMX analytics user interface through a web browser, follow these steps:

-
- Step 1** Log into MSE Admin UI using Username and Password.
- Step 2** In the Apps group box, click **CMX Analytics Service**.
The CMX Analytics User Interface (UI) Login page appears.
- Step 3** Enter the username and password.
- Step 4** Click **Login**.
The CMX analytics home page appears.
-

WebGL Requirements

The CMX analytics 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. 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 given in the Google Chrome support website.
- For Firefox, follow these steps to enable WebGL:
 - In the browser address line, enter `about:config`
 - In the Search text box, enter `webgl` to filter the settings.
 - Double click `webgl.forceenabled`.
 - Make sure that `webgl.disable` is disabled.

- For Safari, follow these steps to enable WebGL:
 - Download the latest building of Safari browser.
 - You must enable the Develop menu and enable the WebGL.
 - To enable Develop menu, choose **Safari > Preferences**.
 - Click the **Advanced** tab.
 - Select the **Show Develop menu in menu bar** check box.
 - Choose **Enable WebGL** from the Develop menu.

**Note**

If your system does not support 3D, then the analytic results are displayed only in 2D Open Street Maps view provided that GPS markers are enabled.

- Internet Explorer Version 11 supports WebGL and all earlier versions do not support WebGL.



Licensing Requirement for CMX Analytics Service

To activate CMX Analytics, the CMX license (L-AD-LS-xAP) is required. A license is required for every AP on the network which is connected to the MSE.

For MSE 7.5, 7.6, or 8.0 Versions—Cisco MSE 3355 supports up to 2500 access points for Cisco MSE Location Services or CMX services (previously known as Advanced Location Services). The Cisco MSE virtual appliance supports up to 5,000 access points, depending on the server resources.

For MSE 7.4 Version—Cisco MSE 3355 supports up to 500 access points for Cisco MSE Location Services or CMX services (previously known as Advanced Location Services). The Cisco MSE virtual appliance supports up to 1,000 access points, depending on the server resources.

The number of tracked end devices is not dependent on the number of AP licenses and is capped at 25,000 end devices for the 3355 and 50,000 end devices for the virtual MSE, depending on the server resources.

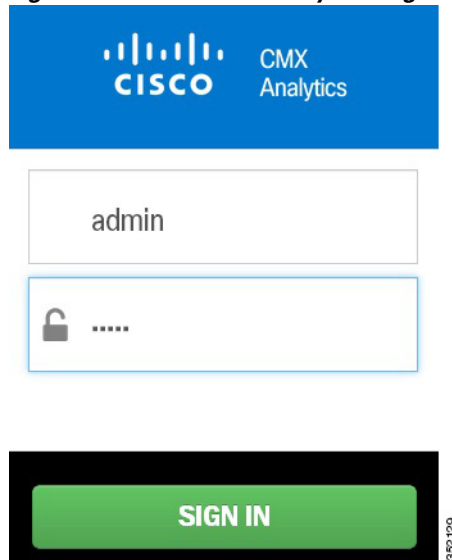


Understanding the CMX Analytics Home Page

The CMX Analytics user interface allows you to analyze the wireless devices location information using different analysis techniques.

Log into the CMX Analytics user interface with your username and password (see [Figure 4-1](#)).

Figure 4-1 CMX Analytics Login Page



The CMX Analytics home page:

- Provides an easy way to visualize and understand the various parameters associated with visitors moving through the zone or presence site.
- Allows you to customize the display of pages with different widgets to suit your focus of inquiry.
- Estimates the number of visitors, the amount of time they spend, and the frequency of their visits within the zone or presence site.

The CMX Analytics home page contains the following:

- [Dashboard Tab, page 4-2](#)
- [Analytics Tab, page 4-4](#)
- [Reports tab, page 4-7](#)

Dashboard Tab

CMX Analytics dashboard is designed to provide an easy way to visualize and understand various parameters associated with visitors moving within the zone or presence site. You can use analytics dashboard on a daily basis to examine the current trends or events and customize the dashboard with different widgets as per your requirement.

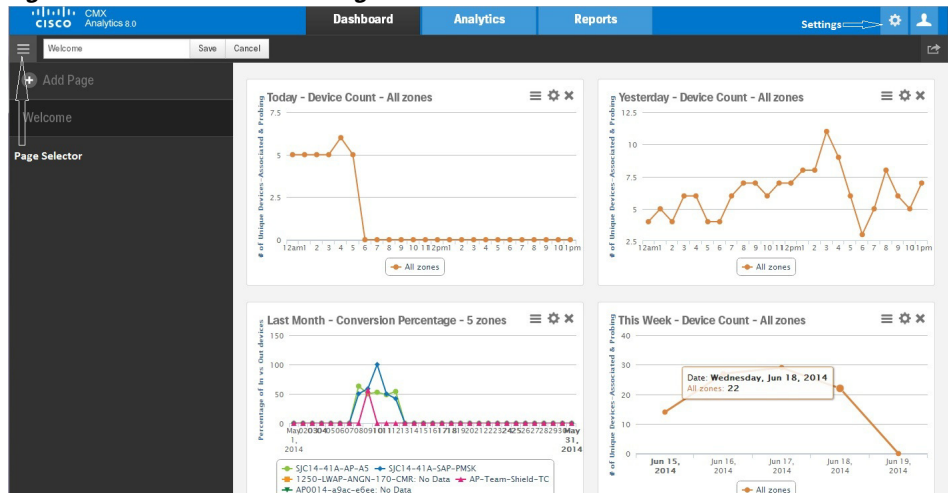


Note

The data in the dashboard tab is filtered to include devices that were seen for more than 5 minutes and less than 10 hours. To change these dwell time parameters, please use Setting > CMX Analytics > Threshold Settings from the CMX Analytics user interface.

By default, the Dashboard tab is displayed when you log into the CMX Analytics UI and contains the following (see [Figure 4-2](#)).

Figure 4-2 Dashboard Page



- Page selector—Click the page selector icon to view the left pane. The left pane displays the following:

Figure 4-3 Left Pane



- Add Page—To create a personalized dashboard.
- Welcome—To open the home page.
- Clicking on the page title allows the you to change the name, save, and delete it.

This section contains the following topics:

- [Configuring Widgets, page 4-3](#)
- [Edit Dashboard and Widgets, page 4-4](#)

Configuring Widgets

To add a new widget to the dashboard, follow these steps:

-
- Step 1** Click the page selector icon located at the top left side of the dashboard page.
- Step 2** Click **+ Add Page** from the left pane. Four widget dashlets appear in the right pane.
- Step 3** Enter the name for dashboard in the Untitled Page text box and click **Save**. The newly added dashboard appears in the left pane.
- Step 4** Click **+ Add Widget** to add a new widget to the dashboard. The Add a Widget dialog box opens.
- Step 5** In the Add a Widget dialog box, do the following:
- Select the location of the building from the floor map that you want to include in the analysis.



Note Location selection is only for location enabled zones and not for presence enabled sites.

- On the Analytic tab, choose the analytic parameter for your widget: **Dwell**, **Device Count**, or **Conversion Percentage**.
 - Dwell—Displays the average time that a device is spending in the target zone or site.
 - Device Count—Displays the number of devices in the zone or site.
 - Conversion Percentage—Displays the percentage between the devices that are coming into the store vs devices that are passing by.



Note The Conversion Percentage Widget is displayed only for Presence Analytics.

- On the Visualization tab, choose the display format for your widget: **Line Chart** or **Bar Chart**.
 - On the Zones tab, do the following:
 - To collect data for location enabled zones, you can either do a quick search by entering a partial or complete zone name in the search text box or select the radio button next to the zone.
 - To collect data for presence enabled zones, you can either do a quick search by entering a partial or complete site name in the search text box or select the radio button next to the presence site.
 - On the Date & Time tab, configure the date and time.
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Today**, **Yesterday**, **This Week**, **This Month**, and **Last Month**.
 - Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch time**, **Afternoon**, and **Evening**.
- Step 6** Click **ADD WIDGET** to add this widget to the dashboard.

The newly added widget with the data appears in the dashboard. The data provides information on the visitor traffic trends, dwell time, new vs. repeated visitor, etc. You can make use this statistics to improve the customer engagement.

Edit Dashboard and Widgets

To edit the individual widgets within the dashboard, follow these steps:


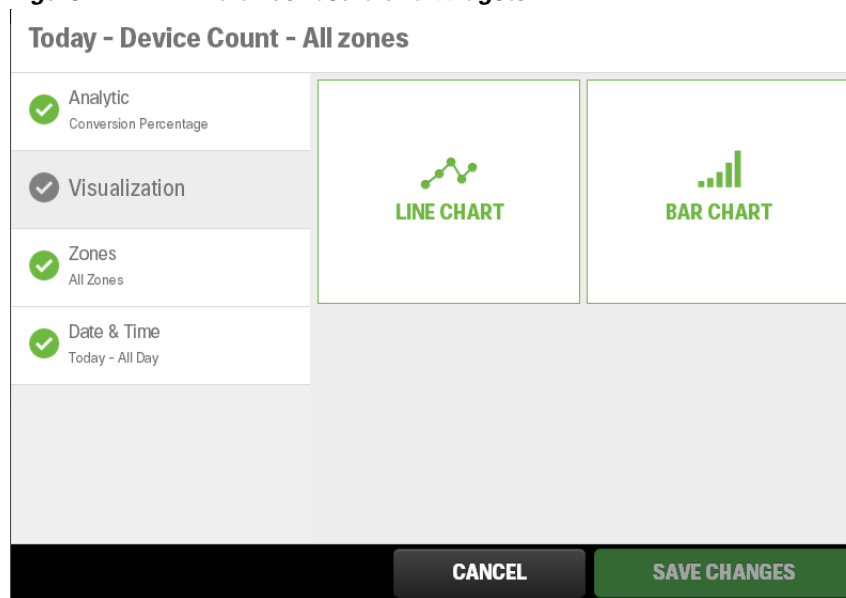
- Step 1** Click the  icon in the top-right corner of the widget.

Figure 4-4 Edit Dashboard and Widgets



- Step 2** Edit the necessary parameters and click **Save Changes**.

Analytics Tab

In the Analytics tab, you can perform deeper analysis on devices that pass through a building or environment and view the analytics results in 3D and 2D environment.

This section contains the following topics:

- [Options Pane, page 4-5](#)
- [Analytics Tab Toolbar, page 4-6](#)
- [Prerequisites for Viewing CMX Analytics in 3D, page 4-7](#)

Options Pane

The Rules pane allows you to identify the specific set of devices to which the analytics are to be applied and displays the following:

- **Building**—Lists all buildings that are synchronized with the MSE for analysis.
- **Type**—Lists different type of analysis to run: **Zone Analysis**, **Alternative Path Analysis**, **Heat Maps**, and **Location Analysis**. See [Analysis, page 5-1](#) for more information.
- **Date/Time**—This restricts the analysis to specific dates and times. Click the Date/Time group box and configure the following:



Note The date selector allows you to select only those dates for which there is some data available in the analytics database.

- Click the calendar icon to choose a start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Today**, **Yesterday**, **This Week**, **This Month**, and **Last Month**.
- Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All Day**, **Business Hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.



Note

Only those paths that are within the time period are considered for analysis. For example, if the time period is between 6 AM to 4 PM, then only paths that start after 6 AM and finishes before 4 PM are considered for analysis.

- **Zones**—This restricts the analysis to specific zones. Click the Zones group box and configure the following:
 - **Restrict to Zones**—Select this check box and choose one or multiple zones to restrict your analysis to selected zones. If want to analyze only certain part of the building, then information about the selected part is displayed.



Note Zones are defined as coverage areas in the Prime Infrastructure. Zone names are retained when there is data associated with them. Therefore while deleting previous zones in the Prime Infrastructure, these remain on the menus in Analytics until they disappear from the database during natural data pruning or rollover.

- **Path Filters**—This restricts the analysis to those devices that have followed a particular path through the predefined zones for analysis. The options are:
 - **Starts In**—Select the zone where the wireless device was first detected from the Starts In drop-down list.
 - **Visits**—Select the intermediate zone through which the device passes through from the Visits drop-down list.
 - **Ends In**—Select the zone where the device was last detected from the Ends In drop-down list.
- **Tags**—This configures any additional labels that is associated with point, paths, and devices. This allows you to describe the choices of devices based on characteristics such as manufacturer, associate/probing etc.

- Advanced Filters—This restricts the analysis to points and paths with specific characteristics.
 - Location Filters—Location filters allows you to select points for which you are more certain of the dwell times. This comes about when multiple points are detected in the same close proximity. These points (Actual) are replaced by a single one and the dwell time attached to it is the elapsed duration between the first and the last point. Mostly this filter is used to get a more accurate estimate on the dwell times, although using less data. As a side effect, it identifies the devices/paths which have instances of these points within them. Estimated dwell covers all points including the actual path.
 - Path Filters—Path filters allows you to select the data for analysis based on quantitative constraints on paths. The different quantitative constraints that you can use on paths from the Path Filters are:
 - Length—Length restricts the analysis to those paths within the sum of the straight line distances between the points.
 - Duration—Duration restricts the analysis to the total duration between the first and the last time points on the path.
 - Hops—Hops is the measure of the number of location observations made on that path.
- Granularity Options—This allows you to specify the number of typical locations that you want to find.



Note Number of Locations and Optimal field is displayed for Typical Locations Analysis.

- Number of Locations—Enter the number of locations that you want to include in the analysis. A large number of locations for zone analysis results in a dense concentration of markers across an area.
- Optimal—Select this check box if you want the number of locations to be determined mathematically.
- Number of Paths—Enter the number of popular paths that you want to include in the analysis.

Analytics Tab Toolbar

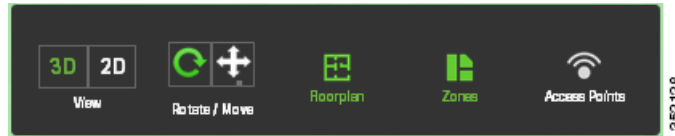
The Analytics tab contains the toolbars at the top-right of the page (see [Figure 4-5](#)).

Figure 4-5 *Analytics Tab View Toolbar—Top-right*



- Top View—Displays the top view for the floor map.
- Site View—Displays the side view for the floor map.

The Analytics tab contains the Navigation toolbar at the bottom-right of the page (see). This window provides access to the 2D and 3D navigation and visible overlays on the building or area when you are in the 3D or 2D environment.

Figure 4-6 Analytics Tab Navigation Toolbar—Bottom-right

- View
 - 3D—The CMX analytics system provides the ability to view analytics results in 3D environment. This provides a better understanding of results on multiple floor paths or when the dwell time is calculated for the multi-storey building.
 - 2D—The CMX analytics provides the ability to view the analytic results in 2D. The 2D environment is primarily for outdoor visualization such as analyzing the open space or placing the building in its geographical context.
- Rotate/Move—Click this to move or rotate the floor plan.
- Floorplan—Click this to view individual floor plans in the building.
- Zones—Click this and select the zone that you want to view on the floor.
- Access Points—Click this to view access points on the floor plan.

Prerequisites for Viewing CMX Analytics in 3D

- Set up the CMX analytics system. See the [Workflow for Setting up the CMX Analytics System, page 2-1](#) for more information.
- The CMX analytics supports a 3D representation of analytic results using the WebGL through Three.js library. See the [WebGL Requirements, page 2-5](#) for information on compatible browsers.

Reports tab

The CMX analytics reporting is necessary to monitor common behavioral patterns over time. A number of reports can be generated and it provides more zone oriented analysis on the patterns of behavior in different zones of the building as well as movements throughout the building. See the [Reports, page 7-1](#) section for more information.



Analysis

This chapter describes the different types of analysis that you can perform on devices in a building or environment. You can perform the following analysis:

- [“Zone Analysis” on page 1](#)
- [“Alternative Path Analysis” on page 4](#)
- [“Heat Maps” on page 7](#)
- [“Typical Locations” on page 8](#)



Note

The time window for reports is typically longer for Analytics. Reports operates off an aggregated databased which is considerably smaller than the full analytics database, which is restricted by default to 8 million points. For this reason you may likely to see less history available for Analytics than for Reporting.

Zone Analysis

The zone analysis breaks down the data into the predefined zones. The center of those areas is shown along with a number of characteristics and graphs.

The zone analysis gives you parameters such as dwell time, number of devices, and crowding for each zone defined. If there are no zones defined, then by default each complete floor is analyzed. The results are first presented by a colored marker at the center of the zone. The color indicates the value range for one of the zone parameters.



Note

The average dwell time is reported only for those devices that stayed in the zone and not passed through. Therefore the analysis is based on those devices with less than 2 minute dwell time in the zone.

Analyze with Zone Analysis

Step 1 Click **Analytics** from the CMX Locations home page.

Step 2 Do the following in the Rules pane:

- From the Building drop-down list, select the building where you want to conduct this analysis. The drop-down list contains all buildings that are synchronized with the MSE.

- From the Type drop-down list, choose **Zone Analysis**.

- Step 3** You can apply the parameterized rules to your analysis in the Rules pane. See [Options Pane, page 4-5](#) for more information.
- Step 4** Click **Run**.
- Step 5** Click **3D** or **2D** view on the navigation toolbar at the bottom of the right pane to view the results in 3D environment or 2D environment.
- Step 6** Click **Dwell** to view the dwell time distribution.
- Step 7** Click **Device Count** to view the number of unique MAC addresses identified in a particular area.
- Step 8** Click **Crowding** to view the density of people within a particular area over a time period.

The following information is displayed when you click a particular node:

- Zones and Areas
- Time
- Devices to give more detailed measurements of behavior in the selected zone.
 - Number of devices
 - Number of visits
 - Number of points

Figure 5-1 Distribution of Devices Throughout the Day

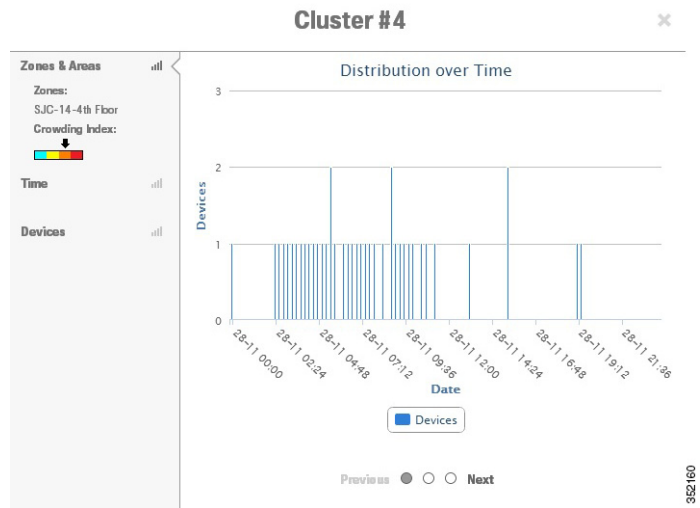


Figure 5-2 Dwell Time Distribution.

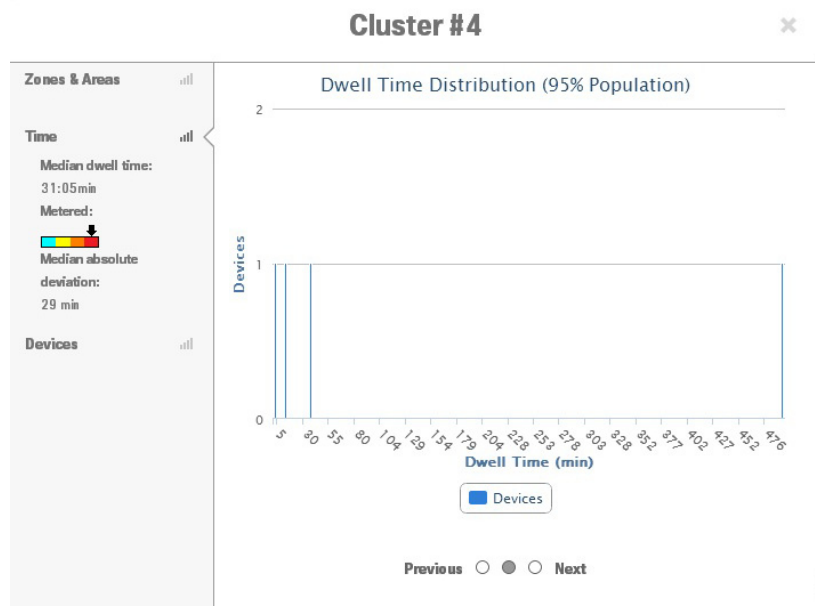
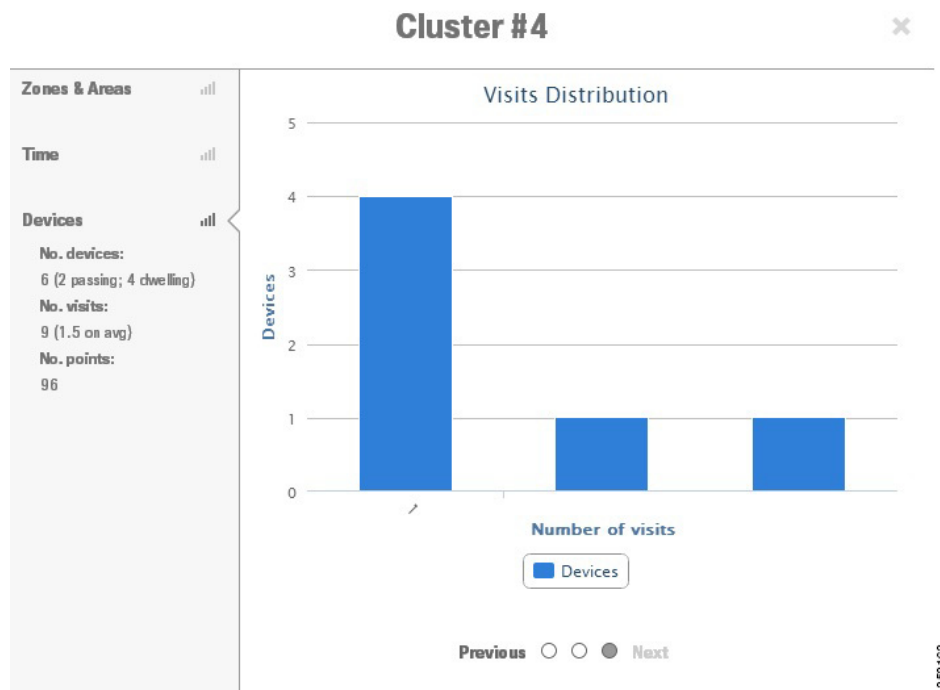


Figure 5-3 Average Visits and Repeat Visit Distribution



Alternative Path Analysis

The alternative path analysis allows you to determine the device flow between different areas in the building. It shows a break down of the percentage of devices going to each destinations from each starting point and vice versa. If a device visits multiple destinations after visiting a starting point, then only the first one is considered for the analysis.

This analysis helps you to understand different directions that people take while leaving one point to go to another point. It also allows you to set up arbitrary areas and estimate the time it takes to move between those areas. This analysis starts by identifying all paths passing within a certain radius of a circle whose center is the source point. This uses the same method for each of the destinations and the radius around them.

Analyze with Alternative Path Analysis

To analyze different areas of the building using the alternative path analysis, follow these steps:

-
- Step 1** Click **Analytics** from the CMX Locations home page.
- Step 2** Do the following in the Rules pane:
- From the Building drop-down list, select the building where you want to conduct this analysis. The drop-down list contains all buildings that are synchronized with the MSE.
 - From the Type drop-down list, choose **Alternative Path**.

Step 3 You can apply the parameterized rules to your analysis in the Rules Pane. See [Options Pane, page 4-5](#) for more information.



Note In order to run alternative path analysis, you need to define both starting destination points. You can define these points by clicking the map or building.

Step 4 Navigate to the appropriate floor on which you want to place the beacon point. You can define these points on different floors.

Step 5 Define starting and destination points in the Beacons group box located in the right pane:

- Enter the radius in the Radius text box. The radius specifies the catchment area of each point. The device should pass through the catchment area to be considered for analysis.
- Select the **Start** radio button and click the map to place the starting point.
- Select the **Destination** radio button and click the map to place the destination point.

Step 6 Click **Run**.

Step 7 Click **3D** or **2D** view on the navigation toolbar at the bottom of the right pane to view the results in 3D environment or 2D environment.

The alternative path results give you breakout lines from the source to the destination and their colors indicate the percentage of split between them.

Figure 5-4 *Alternate Path Analysis*



The following information is displayed when you click a particular node to show the distribution of durations and speeds:

- Basic Information
 - Number of devices filtered
 - Number of filtered devices passing source beacon
 - Number of those devices not passing by any destination
- Source
 - Average Duration
 - Average speed
 - Number of devices

- Percentage
- Destination
 - Average duration
 - Average speed
 - Number of devices
 - Percentage

Figure 5-5 **Number of Devices From Source to Destinations**

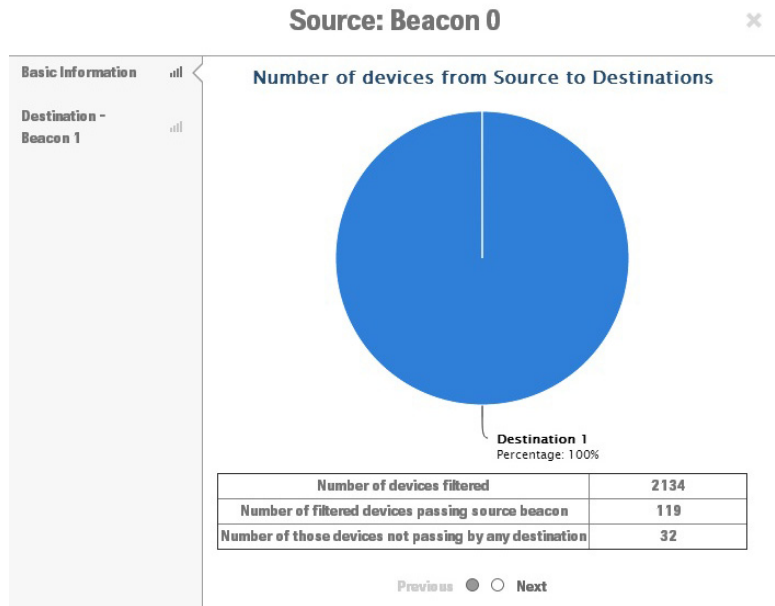
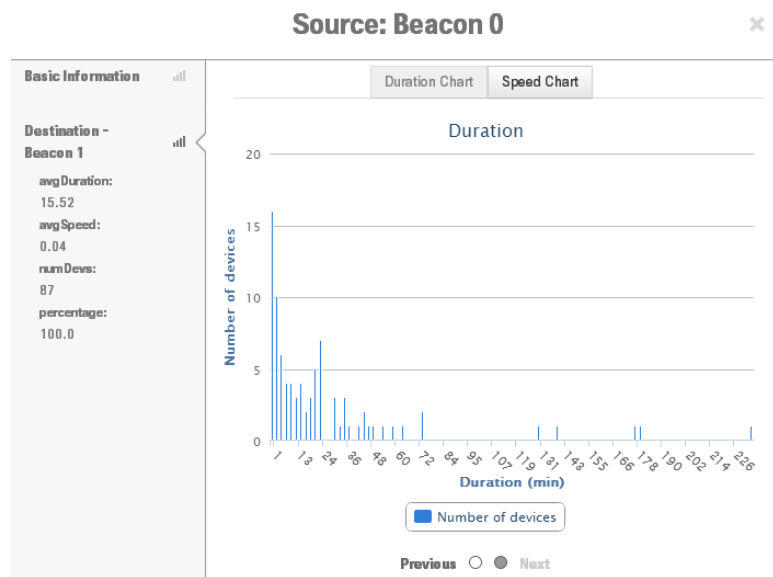


Figure 5-6 Distribution and Speed Chart

Heat Maps

The heat map is a graphical representation of point data and allows you to view all on the map in such a way that the busy areas or where there is a greater presence of data within the venue is represented in darker colors.

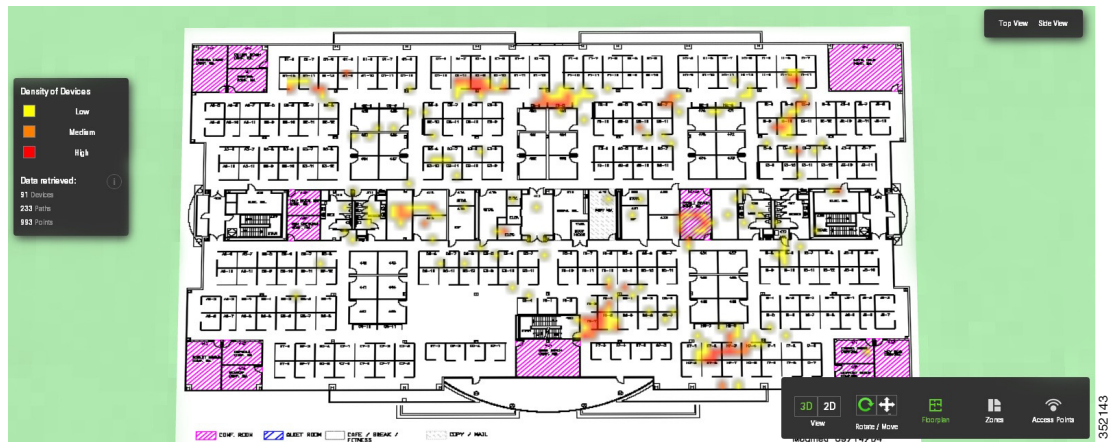
Analyze with Heat Maps Analysis

To run the heat maps analysis, follow these steps:

-
- Step 1** In the Analysis group box, do the following:
 - From the Building drop-down list, choose the building that you want to consider for analysis.
 - From the Type drop-down list, choose **Heat Maps**.
 - Step 2** You can apply the parameterized rules to your analysis from the Rules group box. See [Options Pane, page 4-5](#) for more information.
 - Step 3** Click **Run**.
 - Step 4** Click **3D** or **2D** view on the navigation toolbar at the bottom of the right pane to view the results in 3D environment or 2D environment.

The heatmap distribution for each floor is displayed in the right pane.

Figure 5-7 Heat Maps Analysis



Typical Locations

The typical location analysis determines different areas of the building and measures the behavior of visitors within them. The location analysis is a way of segmenting all points detected into representative areas on which parameters are calculated.

The location analysis process starts by clustering all devices into areas determined by the geographical layout of observations. Each point is allocated to a particular area and each area is represented by a center point. Once the set of areas are established, all parameters associated with each area are calculated, that reflects the movement of people in that part of the building.

The result of carrying out a location analysis is a set of areas represented by center points indicating the spread of points over the Wi-Fi detected area.



Note

The dwell time is reported for all devices. There is no filtering between passing and staying devices. Instead the path duration filter provides this, if required.

Areas and Zones

The concept of areas and zones are different but they work together. You need to consider the following while defining areas and zones:

- Zone is a user-defined space with a name and it is used for reporting or for path rule purposes. The zones can be overlapping and need not cover the entire building, although every floor is also a zone.



Note

Zones correspond to the coverage areas in the Prime Infrastructure.

- Areas are defined by mathematical clustering on the detected Wi-Fi based locations.
- Cluster areas are used when there is no known zones established or to ensure that all parts of the location space are accounted for. Typical location analysis is directed to a single zone and it displays areas of high and low dwell areas.

- Each area is associated with a set of behavior parameters that are represented by icons.

There following are the different behavior measurements:

- Dwell Time— Dwell time or wait time is an estimate of the time, that a person is spending in an area as they move through the building.
- Crowding— Crowding is measured by the density of people within a particular area over a time period.
- Number of devices—This shows the number of unique MAC addresses identified in a particular area and is defined based on filtered conditions.

Analyze with Typical Locations Analysis

To run typical locations analysis on different areas of the building, follow these steps:

- Step 1** Click **Analytics** from the CMX Locations home page.
- Step 2** Do the following in the Rules pane:
 - From the Building drop-down list, select the building where you want to conduct this analysis. The drop-down list contains all buildings that are synchronized with the MSE.
 - From the Type drop-down list, choose **Typical Locations**.
- Step 3** You can apply the parameterized rules to your analysis in the Rules pane. See [Options Pane, page 4-5](#) for more information.
- Step 4** Click **Run**.
- Step 5** Click **3D** or **2D** view on the navigation toolbar at the bottom of the right pane to view the results in 3D environment or 2D environment.
- Step 6** Click **Dwell** to view the dwell time distribution.
- Step 7** Click **Device Count** to view the number of unique MAC addresses identified in a particular area.
- Step 8** Click **Crowding** to view the density of people within a particular area over a time period.

Figure 5-8 Typical Location Analysis



The following information is displayed when you click a particular node:

- Zones

- Crowding Index
- Median Dwell time
- Median absolute deviation
- Number of devices
- As % of all filtered devices
- No of visits
- Number of points
- Current analysis

Figure 5-9 Distribution Over Time

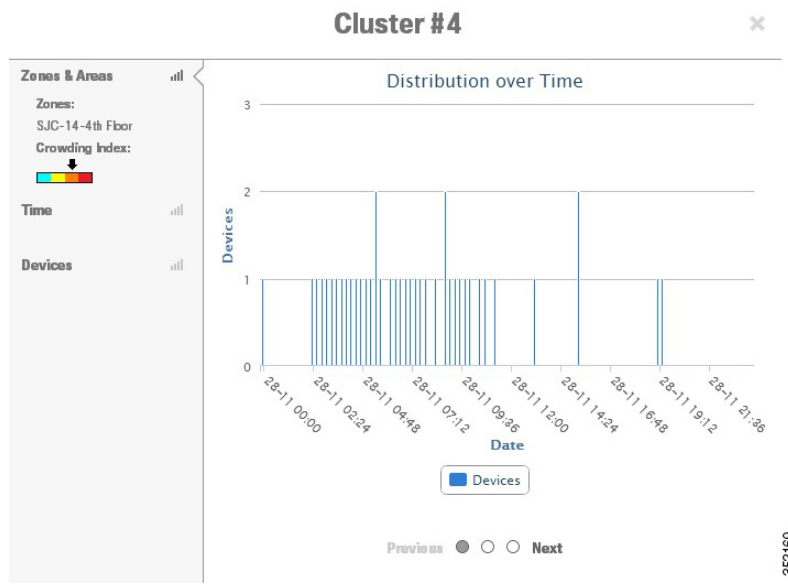


Figure 5-10 Dwell Time Distribution

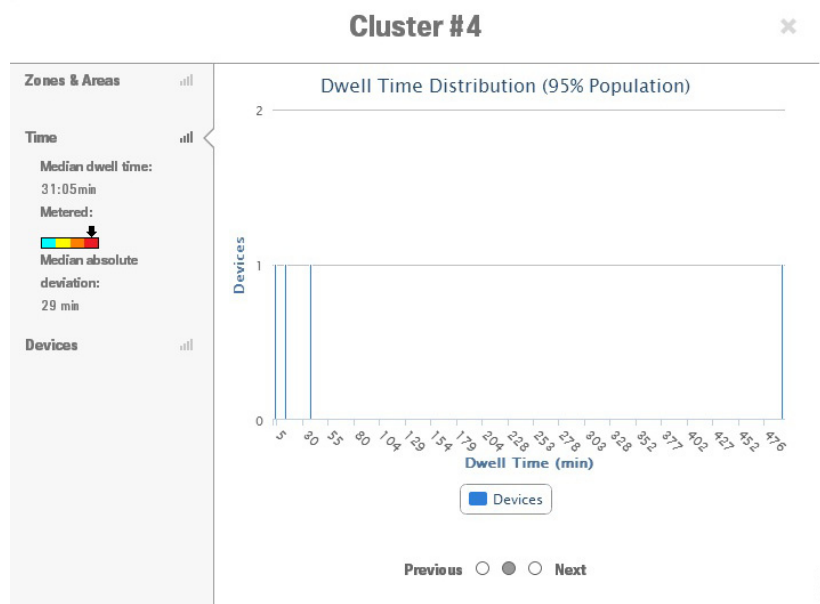
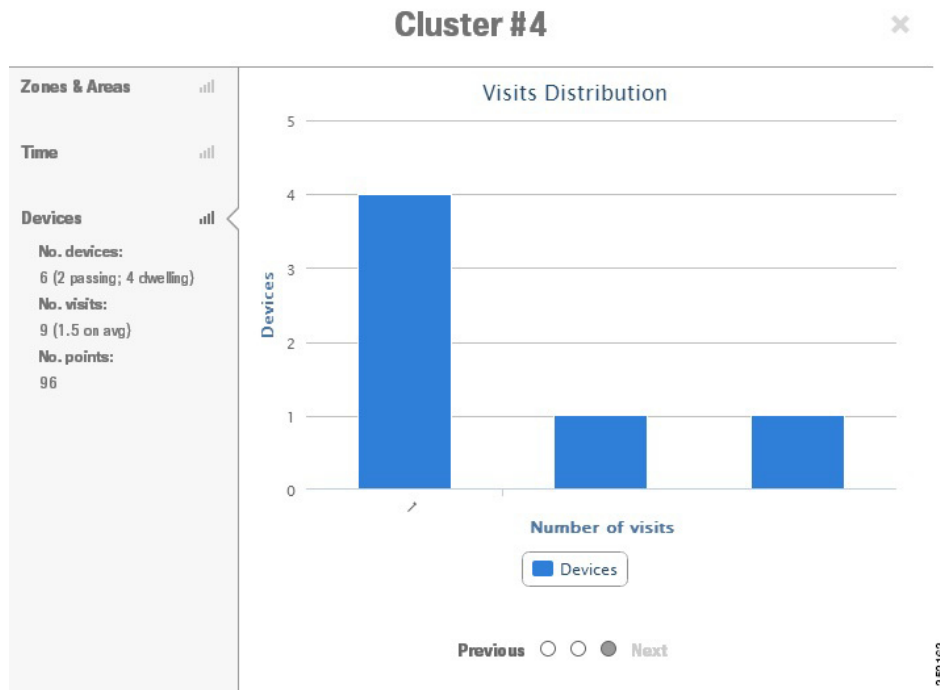


Figure 5-11 Visits Distribution





Presence Analytics

With the CMX location analytics, organizations get a lot of useful business intelligence from the wireless and location technologies. For location technology to work, you require precise maps and triangulated computation from at least three Access Points (APs). In case of organizations with one or two APs, it is not possible to do a triangulated location computation. With presence analytics, the organizations with one or two AP deployments can still use the wireless technology to understand the customer pattern and behavior.

Presence analytics is a comprehensive location analytics and engagement platform that detects presence of visitors via their mobile devices using the access points.

Cisco APs detect probing requests from wireless devices and forward those messages to Wireless LAN Controllers (WLC) through Control and Provisioning of Wireless Access Points (CAPWAP) tunnel. The WLC sends those messages as measurement notifications to Mobility Services Engine (MSE) through (Network Mobility Services Protocol (NMSP) protocol. The probe requests are transmitted at regular intervals from the wireless devices and contain information that can be used to identify the visitor trends, dwell time, and new vs. repeat visitor information within a range of wireless hotspot. These devices can be detected by the access points irrespective of its wireless association state. Even if a device is not connected to the access point, its presence is still detected if the device is within the signal range and the wireless is turned on.

The presence analytics uses Received Signal Strength Indication (RSSI), along with the duration of high signal strength to determine whether a client device is in the site or just passing by. Data collected by the APs is reported in the Analytics dashboard.

Presence Analytics provides:

- Location statistics to improve customer engagement and loyalty across sites.
- Insight into mobile behavior across locations and enables you to enhance your on site customer experience, make better decisions about how to engage the visitors, and optimize business strategies.
- Statistics on the number of first visitors vs. repeat visitors and number of devices passing by vs. devices spending time in the store.



Note

When the CMX analytics service is enabled, the presence analytics gets enabled. Presence works only on the access points that belong to a presence site. If you have not configured any presence sites, then no presence data will be collected and no dashboard wizards and reports will run.

Importing Access Points

Since presence analytics does not require maps to be created, you should manually import access points from the Prime Infrastructure (PI) to Mobility Services Engine (MSE).

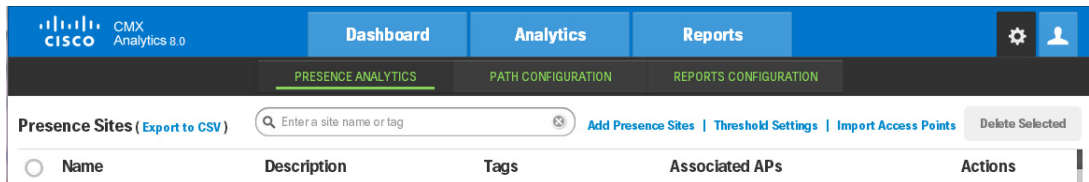
You can import access points from the PI to MSE in the following ways:

- [Importing Access Points from the Prime Infrastructure NBAPI](#)
- [Exporting Access Points from the Prime Infrastructure Report](#)

Importing Access Points from the Prime Infrastructure NBAPI

To import access points from the Prime Infrastructure (PI) Northbound API(NBAPI), follow these steps:

- Step 1** Click the **Settings** icon located at the top right side of the CMX Analytics home page.
The Presence Analytics tab appears.



- Step 2** Click the **Import Access Points** link. The page for importing access points from the PI appears.
- Step 3** Enter the IP address or hostname of the server where you have installed the PI in the PI Host/IP text box.
- Step 4** Enter the PI username in the Username text box.
- Step 5** Enter the password in the Password text box.
- Step 6** Click **Import** to get all access points from the Prime Infrastructure into the presence analytics.
A dialog box appears.



Note

All access points will be imported. The access points that are already in the MSE will be preserved with original information.

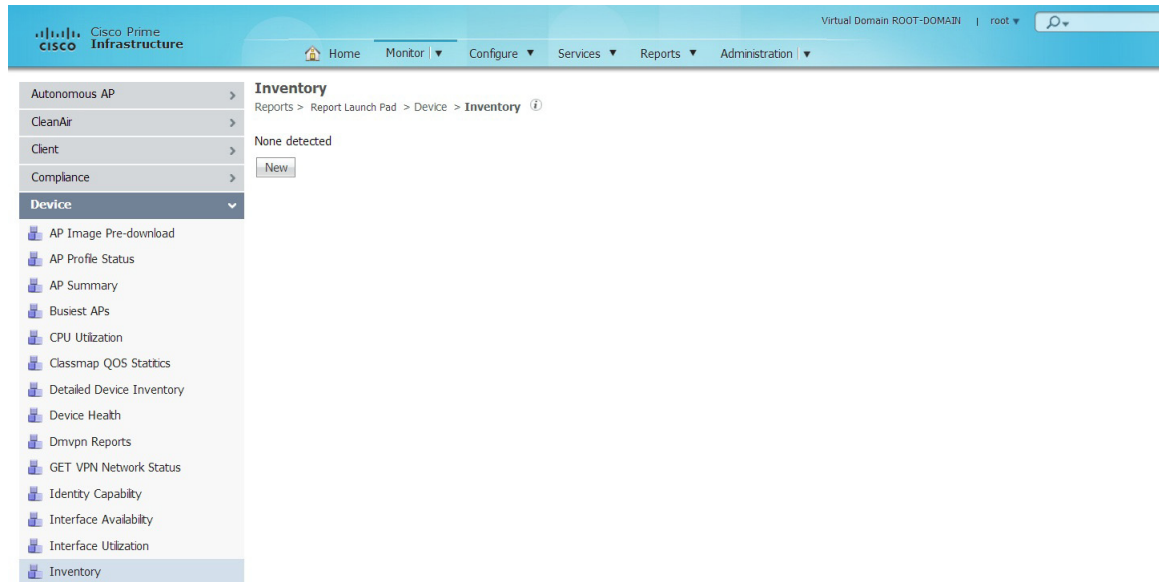
- Step 7** Click **OK**.

Exporting Access Points from the Prime Infrastructure Report

You can generate a report for access points in the Prime Infrastructure and import it to MSE. To export access point from the Prime Infrastructure report, follow these steps:

- Step 1** Log into the Prime infrastructure user interface through a web browser.
- Step 2** Choose **Reports > Report Launch Pad**.

Step 3 Choose **Device > Inventory** from the left sidebar menu.



Step 4 Click **New**.

This report allows you to generate inventory related information for access points, controllers, and MSEs managed by PI.

Step 5 In the Inventory Report Details page, configure the following:

- Report Title—Enter a report name.
- Report Type—Choose **Combined Inventory** report.
- Click **Customize Report** and configure the following:
 - Custom Report Name—Choose **AP Inventory** from the Custom Report Name drop-drop list.
 - Available data fields/Data fields to include—Use the **Add >** or **< Remove** buttons to move the highlighted fields between the Available data fields and Data fields to include columns. Ensure that **AP Name** is in the Data fields to include column.
 - Data field sorting—Indicate your sorting preference by the **AP Name** in the Data field sorting drop-down list.
 - Click **Apply**.
- Scheduling—Select the **Enable** check box to run the report on the set schedule.
- Export Format—Choose **CSV** as format to export the report results after a report is run.
- Destination—Choose your destination type (**File** or **Email**). Enter the applicable file location or the email address.
- Click **Save and Export**.

Step 6 Click **Download** in the Export Results page.

Step 7 Open the .csv file and remove all unrelated rows above and below the access point section.

Step 8 Save the .csv file. You can use this file while importing the site list. See [Importing a site list](#).

Managing Presence Sites

A presence site is nothing but a store with group of access points and associated attributes. Presence analytics works only on the access points that belong to a presence site. If you have not configured any presence site, then no presence data will be collected and no dashboard wizards and reports will run.



Note

You cannot assign the same access point to multiple presence sites.

You can choose one of the options for site listing:

- [Creating a Presence Site](#)
- [Importing a site list](#)

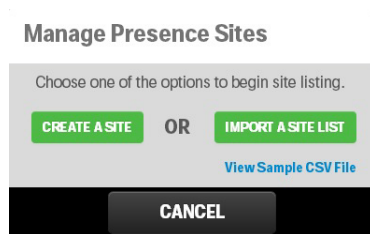
Creating a Presence Site

To create a presence site, follow these steps:

Step 1 Click the **Settings** icon in the CMX Analytics home page.

Step 2 Click the **Add Presence Sites** link.

The Manage Presence Sites window appears.



Step 3 Click **CREATE A SITE**.

The Create Presence Site Entries Sites window appears.

Create Presence Site Entries

① Provide Site names and description that are easy to remember

Presence Site Name

Presence Site Description

Tags

Associated Access Points

AP Name	IP Address
<input type="radio"/> 1100-LAP-G-54-CMR	40.40.20.54
<input type="radio"/> AP-3602l-2-3-496	40.40.100.242
<input type="radio"/> AP-3602l-2-3-655	40.40.100.244
<input type="radio"/> AP-3602l-2-3-657	40.40.100.237
<input type="radio"/> AP-3602l-2-3-700	40.40.100.239
<input type="radio"/> AP-3602l-2-3-741	40.40.100.240
<input type="radio"/> AP-3602l-Local	40.40.100.234
<input type="radio"/> AP001a.a2b	10.10.1.2
<input type="radio"/> AP1041H_121F	20.20.90.69

CANCEL **SAVE AND CREATE NEXT** **SAVE AND CLOSE**

Step 4 Configure the following in the Create Presence Site Entries window:

- Presence Site Name—Enter a name for the presence site. A site name can be any store and must be unique between presence sites and location zones.
- (Optional) Presence Site Description—Enter a brief description for the presence site.
- (Optional) Tags—Mark presence sites with any additional tags or labels that can be used to filter the site list. You can tag sites by location, size of store, etc.
- To associate APs with the presence site, do the following:
 - For a quick search of the access points, enter a partial or complete AP name or IP address in the Associated Access Points search text box and select the appropriate AP name or IP address or select the radio button next to AP Name.



Note You can associate multiple access points to a site but cannot associate the same access points to multiple sites.

- (Optional) Expand the Threshold Settings panel and configure the following. You can specify threshold settings on each presence site that overrides the global settings inherited from the global settings. See [Reports](#) for more information.
 - Signal Strength—It is the measurement that a mobile device sends to the access point. You can use the sliders to either increase or decrease the threshold levels. Use the first slider to lower the threshold settings and the second slider to higher the threshold along with the dwell time to determine whether a device is in the site.
 - Dwell—Dwell time is used along with the signal strength to determine whether a device is in the site or not.

Step 5 Click **SAVE AND CREATE NEXT** to create another presence site.

Step 6 Click **SAVE AND CLOSE** after creating all presence sites.

The presence site created appears in the presence site list.


Importing a site list

To import a site list, follow these steps:

-
- Step 1** Follow [Step 1](#) through [Step 8](#) to export access points from the Prime Infrastructure (PI) to Mobility Services Engine (MSE).
 - Step 2** Click the **Settings** icon in the CMX Analytics home page.
 - Step 3** Click the **Add Presence Sites** link.
 - Step 4** In the Manage Presence Sites window, click **Import a Site List**.
 - Step 5** Browse to and import the saved CSV file from anywhere in your file system, and click **Open**.
 - Step 6** Click **Confirm** in the CSV Import dialog window.
-


Editing a Presence Site

To edit a presence site, follow these steps:

-
- Step 1** Click the **Settings** icon in the CMX Analytics home page.
 - Step 2** From the Presence Sites list, select the radio button next to the presence name and click  icon. The Modify Presence Site window appears.
 - Step 3** Make appropriate changes and click **SAVE AND CLOSE**.
-

Deleting a Presence Site

You can either delete a single presence site or multiple sites. To delete a presence site, follow these steps:

-
- Step 1** Click the **Settings** icon in the CMX Analytics home page.
 - Step 2** To delete a single presence site, highlight and select the radio button next to presence site and click  icon.
 - Step 3** To delete multiple presence sites, select the sites radio button and click **Delete Selected**.
 - Step 4** Click **Confirm** in the confirmation dialog box to complete the deletion.
-

Threshold Settings

Presence analytics uses signal strength of a device along with the duration of high signal strength to determine whether a client device is in the site or just passing by. Signal strength alone cannot determine if the device is in the site or not. Presence analytics uses the following two Received Signal Strength Indication (RSSI) threshold settings to determine whether a device is in the site or not:

- **Lower threshold**—The default lower threshold value is -95 dBm. You can ignore those devices whose RSSI is -95 dBm or lower.
- **Higher threshold**—The default higher threshold value is -65 dBm. If a device strength is higher than the higher threshold value for over *X* number of minutes, then that device is considered as visitor or in the store.
- **Dwell**—Dwell time is used along with the signal strength to determine whether a device is in the site or not.

You can manage threshold levels in the following ways:

- [Global Threshold Settings](#)
- [Site Threshold Settings](#)
- [Multi-Site Threshold Settings](#)

Global Threshold Settings

The global threshold settings are default for all presence sites that do not have specific threshold settings. To set the global settings, follow these steps:

-
- Step 1** Click the **Settings** icon in the CMX Analytics home page, The Presence Analytics tab appears.
 - Step 2** Click the **Threshold Settings** link.
 - Step 3** Configure the following in the Threshold Settings window:
 - **Signal Strength**—You can use the sliders to either increase or decrease the threshold levels. Use the first slider to lower the threshold and the second slider to higher the threshold along with the dwell time to determine whether a mobile device is in the store.
 - **Dwell**—Dwell time is used along with signal strength to determine whether a device is in the site.

Site Threshold Settings

You can specify threshold settings on each presence site that overrides the global settings inherited from the global settings. You can specify the threshold settings either while creating the presence site or while editing the presence site.

See [Creating a Presence Site](#) and [Editing a Presence Site](#) for more information.

Multi-Site Threshold Settings

To change the threshold settings for multiple sites, follow these steps:

-
- Step 1** Click **Settings** icon in the CMX Analytics home page, The Presence Analytics tab appears.
 - Step 2** Select multiple sites by clicking the radio button next to the presence site or for a quick search of the presence site, enter a partial or complete presence site name in the search box at the middle of the window and click **Threshold Settings** link.

Step 3 Make the necessary changes and click **SAVE**.

Adding a Widget for Presence Sites

To add a widget for presence site, follow these steps:

- Step 1** Click the page selector icon located at the top left side of the dashboard page.
- Step 2** Click **+ Add Page** from the left pane. Four widget dashlets appear in the right pane.
- Step 3** Enter a name for dashboard in the Untitled Page text box and click **Save**. The newly added dashboard appears in the left pane.
- Step 4** Click **+ Add Widget** to add a new widget to the dashboard. Configure the following in the Add a Widget window:
- Analytic tab—Choose one of following parameter for your widget.
 - **Dwell**—Displays the average time that a device is spending in the site.
 - **Device Count**—Displays the number of devices in the site.
 - **Conversion Percentage**—Displays the ratio between the devices that are coming into the store vs devices that are passing by. Hover your mouse to see the number of visitors and total.
 - Visualization tab—Choose the display format for your widget: **Line Chart** or **Bar Chart**.
 - Zones tab—Select the presence site for analysis. You can either do a quick search of the presence site by entering a partial or complete site name in the search text box or select the presence site radio button.
 - Date & time tab—Configure the following:
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets are **Today**, **Yesterday**, **This Week**, and **This Month**.
 - Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch time**, **Afternoon**, and **Evening**.
- Step 5** Click **ADD WIDGET** to add a this widget to the dashboard.
- The newly added widget with the data appears in the dashboard. The data provides information on the visitor traffic trends, dwell time, new vs. repeated visitor, etc. You can make use of this statistics to improve the customer engagement.

Figure 6-1 Dwell Wizard

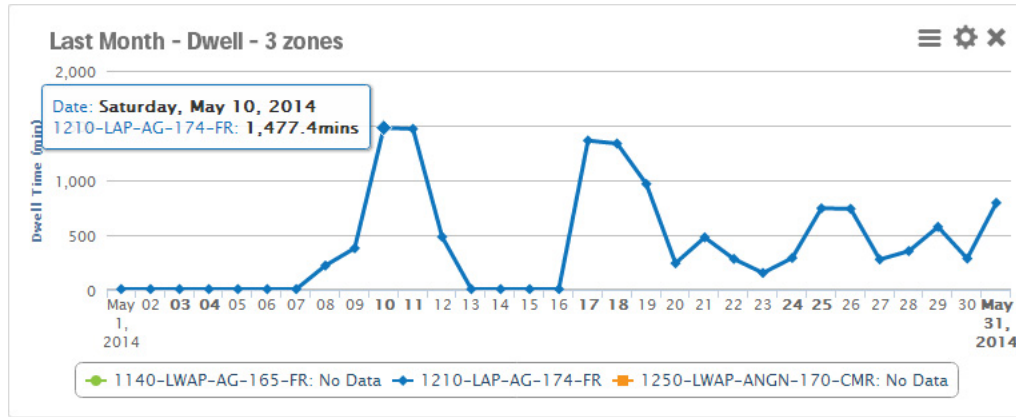


Figure 6-2 Device Count Wizard

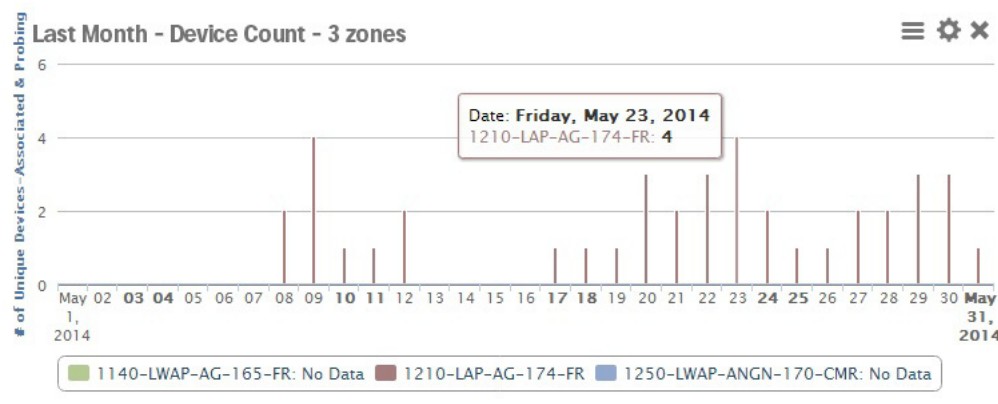
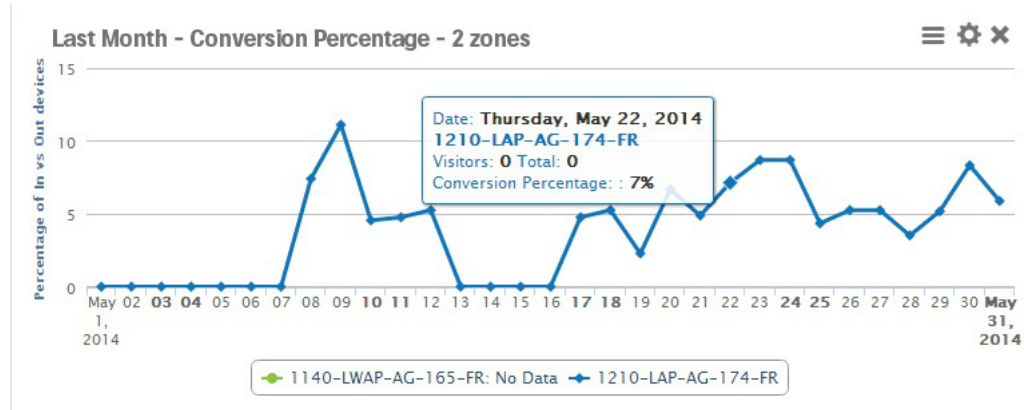


Figure 6-3 Conversion Percentage Wizard

Reports

Presence analytics supports the following reports. For more information on reports, see [Chapter 7, “Reports”](#).

- [Conversion Percentage, page 7-2](#)
- [Daily Visitors and Dwell Time, page 7-3](#)
- [Hourly Visitors and Dwell Time, page 7-5](#)
- [Repeat Visitors, page 7-9](#)



Reports

The CMX analytics provides different reports to understand and monitor the behavior patterns of devices within a particular venue.

The analytics reporting facility provides a more regular and manager-oriented set of information through the provision of parameterized templates to measure various common trends and patterns that occur over a period of time in a particular zone.

The time window for reports is typically longer for Analytics. Reports operates off an aggregated databased which is considerably smaller than the full analytics database, which is restricted by default to 8 million points. For this reason you may likely to see less history available for Analytics than for Reporting.



Note

The data in the dashboard tab is filtered to include devices that were seen for more than 5 minutes and less than 10 hours. To change these dwell time parameters, goto Settings > Presence Analytics > Threshold settings menu.



Note

The available parameters for the reports are self-configurable. Hence while choosing a data or time, the other options may be restricted. This is to ensure that around 30-40 data points are displayed along the X-axis and ensuring clarity.

This chapter contains the following sections:

- [Conversion Percentage, page 7-2](#)
- [Detected vs. Connected Devices, page 7-4](#)
- [Hourly Visitors and Dwell Time, page 7-5](#)
- [Hourly Visitors and Dwell Time, page 7-5](#)
- [Movement Between Zones, page 7-7](#)
- [Repeat Visitors, page 7-9](#)

Conversion Percentage

This report shows the percentage of people who visited a target zone/site that were also seen in the surrounding zone. This indicates how many people who were in the vicinity actually entered the target zone/site.

For example, in case of a shop, the report shows percentage of people seen outside the shop before entering the shop.

See the [Configuring Conversion Percentage, page 7-2](#) for more information.

Configuring Conversion Percentage



Note

You can run this report for location and presence enabled site.

To run the conversion percentage report, follow these steps:

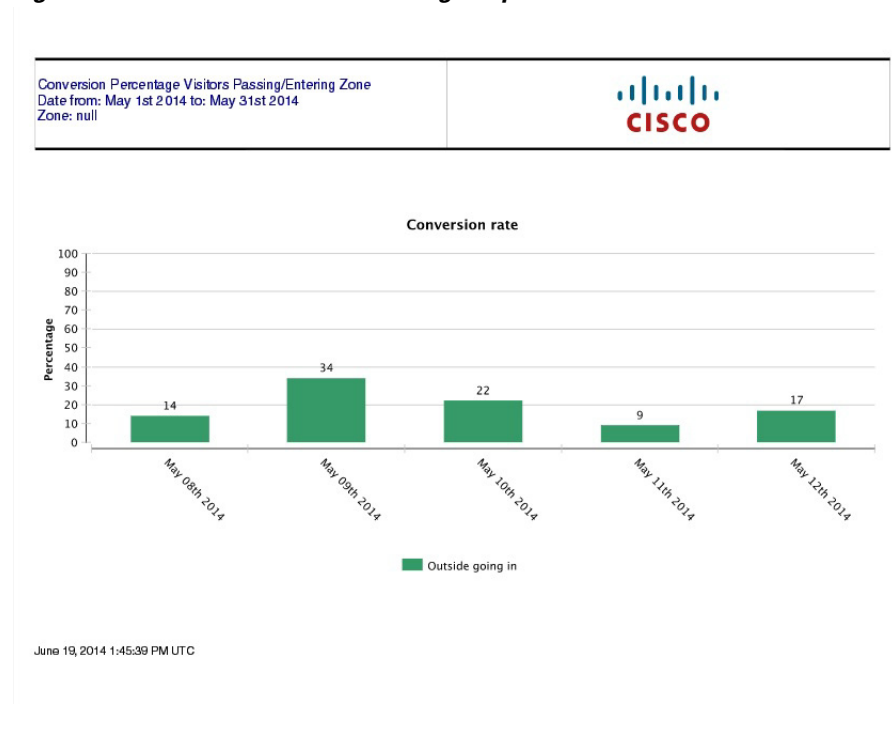
-
- Step 1** On the CMX Analytics main page, click **Reports**.
- Step 2** From the Report Type drop-down list, choose **Conversion Percentage**.
- Step 3** Choose either zone or site from What percentage visited drop-down list:
- To run this report on location zones, you must set up two zones. The first is the focus zone where people enter and the second is the catchment zone, that contain potential visitors.
 - To run this report on presence sites, you need to select only one presence site.
 - Configure the following in the Date/Time Selection group box:
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday**, **Last Week**, and **Last Month**.
 - Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.
- Step 4** Click **Run Report**.
- The PDF of the report shows the percentage of visitors passing or entering the focus zone/site over a number of days in the right pane.



Note

Use the zoom controls at the top of the report to enlarge, or decrease the size of the report view. Click Download icon at the right corner to save the report.

Figure 7-1 Conversion Percentage Report



Daily Visitors and Dwell Time

This report compares the number of devices in several dwell time categories for the same time window over a number of days in the target zone/site. See the [Configuring Daily Visitors and Dwell Times](#), page 7-3 for more information.

Configuring Daily Visitors and Dwell Times



Note

You can run this report for location enabled zones and presence enabled site.

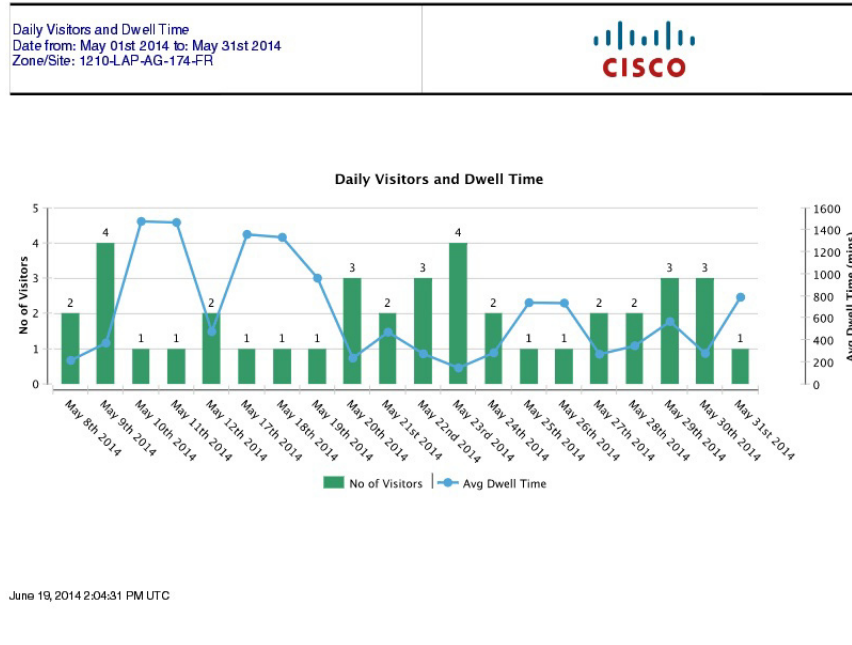
To run the daily visitors and dwell time report, follow these steps:

- Step 1** On the CMX Analytics home page, click **Reports**.
- Step 2** From the Report Type drop-down list, choose **Daily Visitors and Dwell Time**.
- Step 3** To run this report on location zones, choose the zone that you want to reference as a zone of interest.
- Step 4** To run this report on presence sites, choose a presence site.
- Step 5** Configure the following in the Date/Time Selection group box:
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday**, **Last Week**, and **Last Month**.

Step 6 Click **Run Report**.

The report shows both the number of devices and the average time spent in a zone/site across several days.

Figure 7-2 *Daily Visitors and Dwell Times Report*



Detected vs. Connected Devices

This report shows an overview of the number of devices that were connected to the network and the devices that were merely probing during a given time period for a particular zone.

See the [Configuring Detected vs. Connected Devices on the Selected Zone, page 7-4](#) for more information.

Configuring Detected vs. Connected Devices on the Selected Zone



Note

You cannot run this report for presence enabled site.

To run the detected vs. connected devices report on the selected zone, follow these steps:

- Step 1** On the CMX Analytics home page, click **Reports**.
- Step 2** From the Report Type drop-down list, choose **Detected vs. Connected Devices**.
 - Configure the following in the Date/Time Selection group box:

- Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday**, **Last Week**, and **Last Month**.
- Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.
- From the Zone drop-down list, choose the zone.

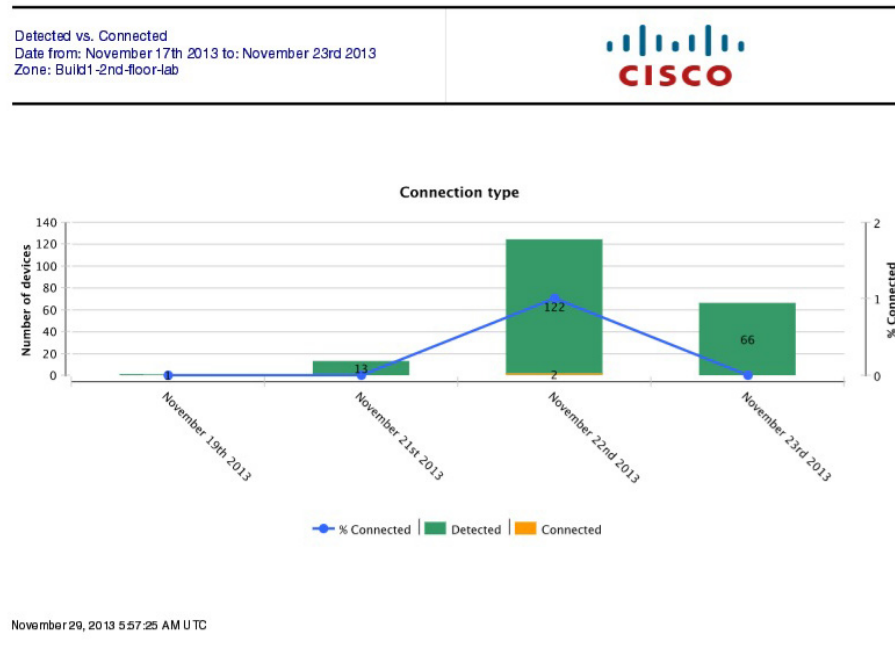
Step 3 Click **Run Report**.

The report shows the associated versus probing devices for a selected zone.

The result of this report contains the following:

- A chart displaying the associated, detected, and connected devices in the selected area over a time period.
- An image showing the distribution of devices on the floor.

Figure 7-3 *Detected Vs. Connected Devices Report*



Hourly Visitors and Dwell Time

This report compares the number of devices in several dwell time categories for the same time window over a number of days in the target zone/site. In order to limit the clutter of results, time windows are only selectable for single days. The exception is Daily Visitors and Dwell time.

See the [Configuring Hourly Visitors and Dwell Time](#), page 7-6 for more information.

Configuring Hourly Visitors and Dwell Time



Note

You can run this report for location enabled zones and presence enabled site.

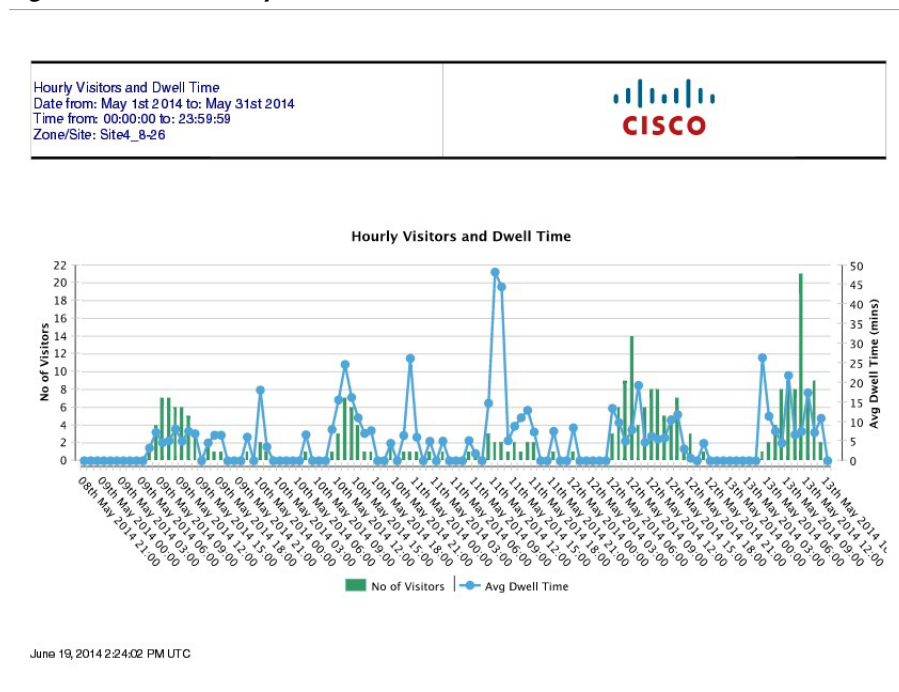
To run the hourly visitors and dwell time report, follow these steps:

- Step 1** On the CMX Analytics home page, click **Reports**.
- Step 2** From the Report Type drop-down list, choose **Hourly Visitors and Dwell Time**.
- Step 3** To run this report on location enabled zones, choose the zone that you want to reference as a zone of interest from the Zone drop-down list.
- Step 4** To run this report on presence enabled sites, choose a presence site from the Zone drop-down list.
- Step 5** Configure the following in the Date/Time Selection group box:
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday**, **Last Week**, and **Last Month**.
 - Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.

- Step 6** Click **Run Report**.

The hourly visitors and dwell time report is displayed in the right pane.

Figure 7-4 Hourly Visitors and Dwell Time



Movement Between Zones

The movement between zones report provides a breakdown of all zones at specific points as devices pass to and from the focus zone. This report gives the following information:

- The zone where the device was first detected.
- The immediate zone before and after where the device was last detected.

Configuring Movement Between Zones



Note

You cannot run this report for presence enabled site.

To run the movement between zones, follow these steps:

Step 1 On the CMX Analytics home page, click **Reports**.

Step 2 From the Report Type drop-down list, choose **Movement between Zones**.

- Configure the following in the Date/Time Selection group box:
 - Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday** and **Last Week**.
 - Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.
- From the Zone drop-down list, choose the zone you want to reference as a focus zone.

Step 3 Click **Run Report**.

The movement between zones report is displayed in the right pane.

Figure 7-5 *Devices At the Entrance Zone*

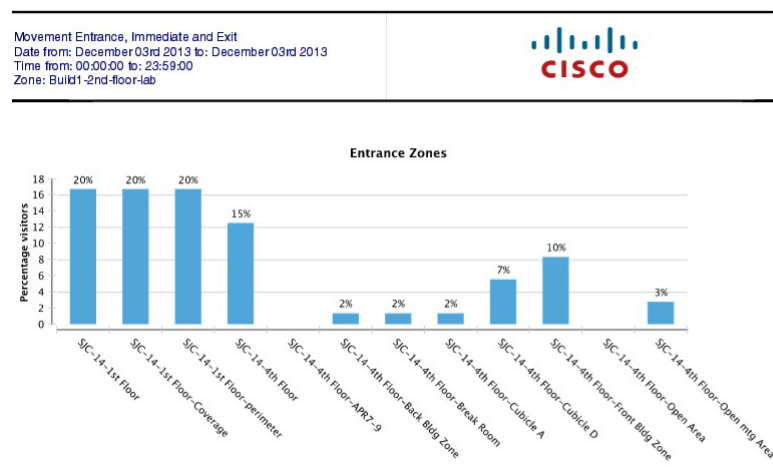


Figure 7-6 *Devices At the Exit Zones*

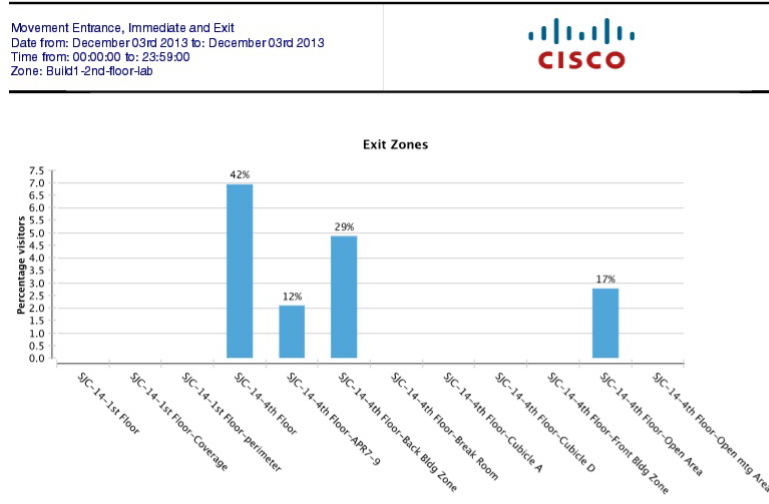


Figure 7-7 *Devices Seen Before Visiting the Target Zone*

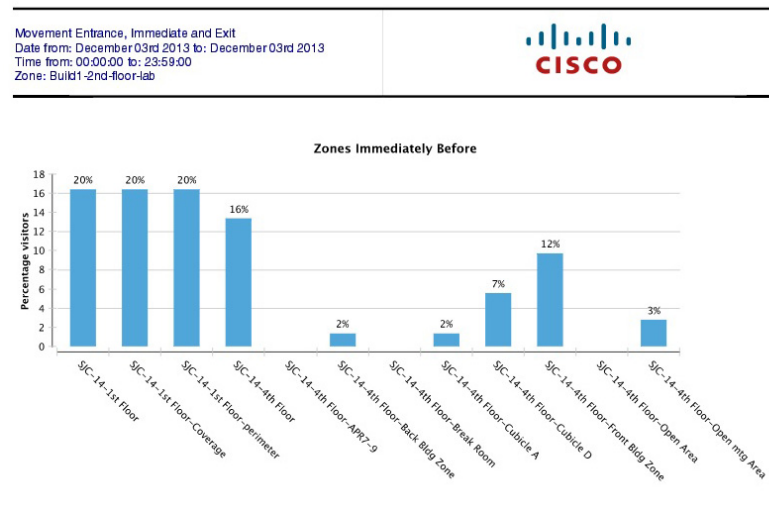
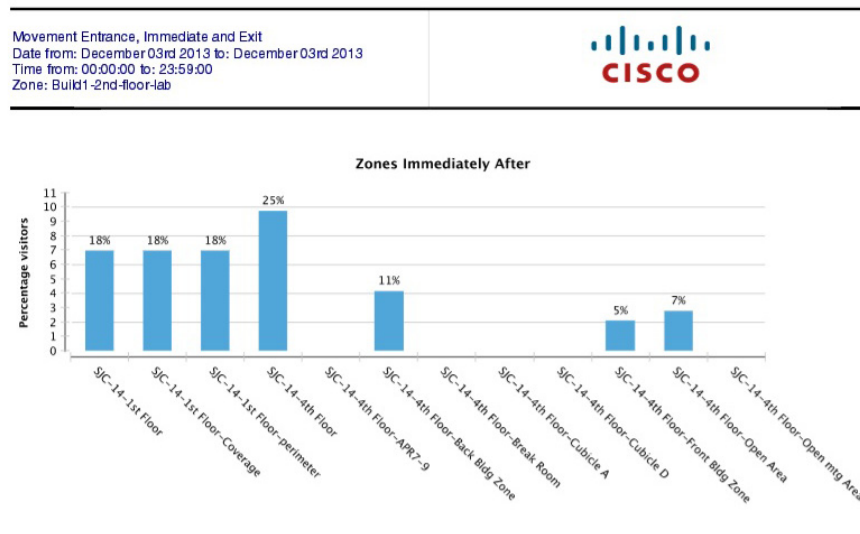


Figure 7-8 Devices Seen After Visiting the Target Zone

Repeat Visitors

This report shows a breakdown of what percentage of devices visited the selected building/site a certain number of times. The Date/Time selection identifies a window of time which gives a reference set of dates. “Counting visits since” gets how often these chosen devices have appeared from that date up to the Date/Time selection. For example, of the devices that came into the venue this week, how frequently did they visit over the last month.

See [Configuring the Repeat Visitors](#), page 7-9 for more information.

Configuring the Repeat Visitors

To run the frequency of visits, follow these steps:

- Step 1** On the CMX Analytics, click **Reports**.
- Step 2** From the Report Type drop-down list, choose **Repeat Visitors**.

The following parameters are displayed:

- From Counting visits since drop-down list, choose a particular start date.
- From the Building drop-down list, choose the building.
- Click the calendar icon to choose the start date and end date or choose a preset value from the Select from a Preset drop-down list. The presets available are **Yesterday** and **Last Week**.
- Click the time icon to choose the time, hour, and minute or choose a preset value from the Select from a Preset drop-down list. The presets available are **All day**, **Business hours**, **Morning**, **Lunch Time**, **Afternoon**, and **Evening**.

Step 3 Click **Run Report**. The report is displayed in the right pane.



CMX Analytics System Messages

This appendix lists and describes system messages for Cisco CMX analytics service. The system software sends these messages to the console during operation.

This appendix contains the following sections:

- [During Setup, page A-1](#)
- [During Analytics, page A-2](#)
- [Analytics Error Message, page A-4](#)

During Setup

The below table lists the error messages that you may get while setting up the CMX analytics system.

Table A-1 **Error Messages During Setup**

Error Message	Recommended Actions
No UI is displayed at all	<ul style="list-style-type: none"> • Check if Jboss is running. Use Telnet to connect and if it is not accepting connections on localhost, then connect using the IP address of the machine.
Can't login to application	<ul style="list-style-type: none"> • Check if the MSE database is up and running and is accepting connections. • Execute <code>“java -jar QueryTool.jar “select count(*) from point”“</code>. Check it displays a number > 0. If not, then, check if the MSE API is up and accepting connections by running the MSE client. If not, check whether the MSE is running.
Invalid Username/Password	CMX analytics uses the same login and password that you give at the time of selecting the service in the Prime Infrastructure UI.
3D Environment appears but all floors are black	<ul style="list-style-type: none"> • Clear the browser cache. • Check that there are not large floor plan being loaded.
Can't select dates	When the application starts up, it downloads information from the Oracle database. This may take a little time before available dates are present

Table A-1 Error Messages During Setup

Error Message	Recommended Actions
No zones are referenced or shown	The user needs to enter the coverage areas in the Prime Infrastructure, which correspond to zones. Stop the Analytics and add zones and then restart.
Latest available date is not current	Login to the MSE and check /opt/mse/logs/analytics/mse.log for the latest download of data. This shows the latest data. Also check the MSEclient process (java -jar MSEclient.jar run) is running as this transfers data from the MSE to the CMX analytics. Check if the Prime Infrastructure is showing the current clients.

During Analytics

The below table lists the error messages that you may during analytics.

Table A-2 Error Messages During Analytics

Error Messages	Recommended Action
Analytics hangs - no analytics results shown	<ul style="list-style-type: none"> Restart jboss to see if that frees up some resources that were required but not available. Check server.log to see the analytics progressing and look for which step does not succeed.
Points shown outside map or not where expected	<ul style="list-style-type: none"> There may be an outdoor area defined in which case this is deliberate. However, it typically indicates that points are being located outside the building by the MSE triangulation algorithm. One way to address this is to make sure the floors have the default inclusion region, which is usually the boundary of the image. The inclusion region makes sure, that anything located outside the floor is snapped to the closest boundary. Check GPS marker placements on NCS map (for 2D) to confirm they are correctly placed. Check for recent changes in dimensions of floor plan which puts historical points outside. Check also AP placement

Table A-2 Error Messages During Analytics

Error Messages	Recommended Action
No results appear in reports	<ul style="list-style-type: none"> • This may be because the parameters specify no solution. • Check that the same type of analysis can be done in the analytics.
Analytics not relating to believed reality	<ul style="list-style-type: none"> • There are many aspects which may not match expectations (busier in areas which are meant to be calm, dwell times shorter than expected, etc.) The main ones are the number of the number of devices being shown and where they are located within the building. • Historically, we have seen areas of high interference in which many more devices were detected than were in the area, even from up to 100m away. However, this should not be apparent in well configured networks with few, if any rogue APs. • There are many places to check to see if everything is in order. <ul style="list-style-type: none"> – 1.Examine the heatmap option. This shows where points have been located and the density of them. Typically, the darker colors should be in areas of high traffic. You should not be seeing inordinate amounts of traffic in areas with believed few people. If the distribution of points is skewed, and/or with artefacts, then you are perhaps looking at a suboptimal network layout. See example below. In addition, the user can turn on the AP locations and verify that detected points are around them. – The points on which the analytics take place are taken directly from the MSE history database. The Analytics is a way of visualizing this data, and at the same time it may show times at which the MSE or network was down where there is lack of device presence. Check the previous availability of the MSE. Analytics brings in each point from the MSE and builds a database of device/paths. Therefore, by looking directly at the Analytics database will show what the subsequent analytics is based up. – To check the number of devices for a certain rules in the analytics, select "Typical locations" with "no of locations" set to 1. The balloon on the resulting single node will indicate the number of devices/paths and points. This facility will be made more explicit in future releases. <p>3.Look at the reports as they show long term behavior and so the user should be seeing things like weekend trends or peak times. This may help focus the diagnosis into particular parts of the databases.</p>

Analytics Error Message

The below table lists the Analytics error messages.

Table A-3 **Analytics Error Message**

Error Message	Recommended Action
not enough data, please broaden your search terms"	No data was found for the specified set of rules. Try to remove or extend some of the filters to see if that makes the message go away. If it does not, then you need to check that there is data in the database.
Max Point Limit Reached, using sample	Too much data was found for the specified set of filters. A maximum of 250k points are currently considered for the analysis. This means that the figures for number of devices is fixed below the actual detected level, however the other parameters such as dwell, crowding are still valid. This is a hard limit at the moment.
Please provide correct beacon points"	No beacon points have been set to carry out alternative path analysis.
Internal server error	Need to contact CMX analytics Team (mse-analytics@cisco.com)