



## Analysis

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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](#)
- [“Most Popular Paths Analysis” on page 4](#)
- [“Alternative Path Analysis” on page 6](#)
- [“Heat Maps” on page 9](#)
- [“Typical Locations” on page 10](#)



### Note

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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.

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## Zone Analysis

The zone analysis breaks down the data into the predefined zones. The centre 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 analysed. The results are first presented by a colored marker at the centre of the zone. The color indicates the value range for one of the zone parameters.



### Note

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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.

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## Analyze with Zone Analysis

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- 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 [Rules Pane, page 4-4](#) 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

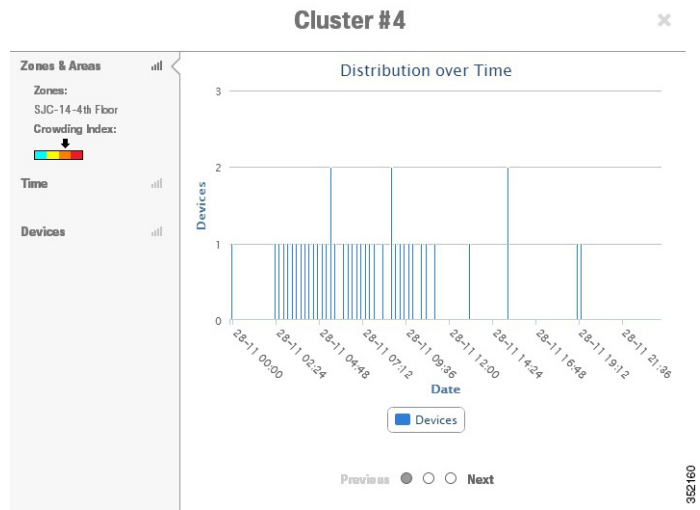
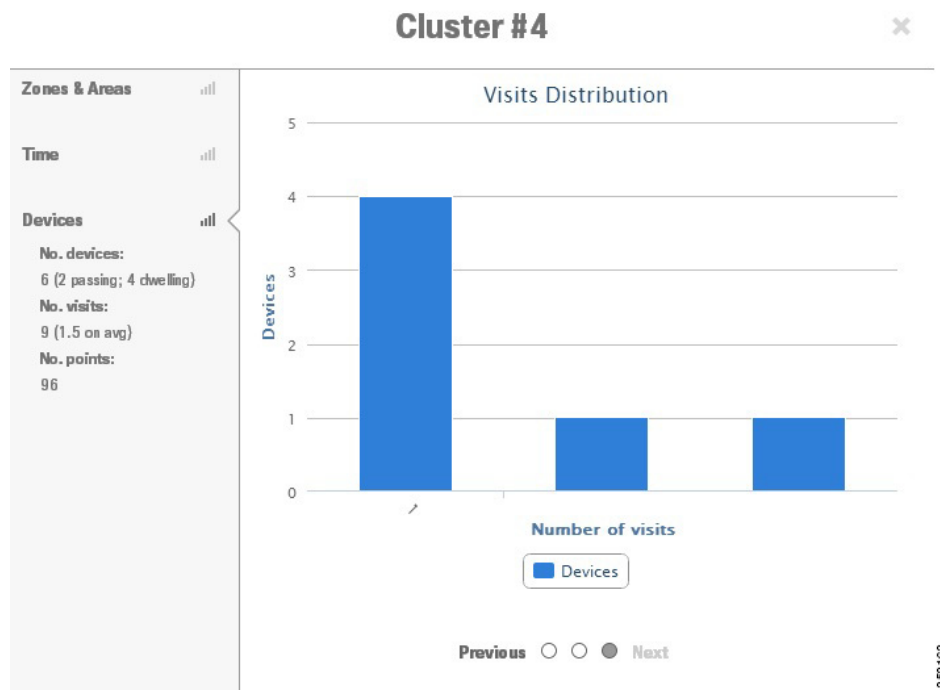


Figure 5-2 Dwell Time Distribution.



Figure 5-3 Average Visits and Repeat Visit Distribution



## Most Popular Paths Analysis

The most popular paths analysis analyses the behavior of devices or people as they move through the building. This analysis provides you with a set of typical paths taken by the devices on a particular day and time.

This analysis is carried out using the mathematical path clustering technique, that aggregates the paths into sets which are equivalent. Each resulting set is represented by an actual path and is shown graphically by a set of observed points linked by a straight line. The clustering allows you to identify the common routes that people usually take.



### Note

The CMX analytics application has a limit on the size of images that it can handle. This depends on the hardware, browser, and the device drivers present on your machine. Sometimes black floor plans are shown in the 3D environment. Google chrome on PC and Firefox on MAC seem most resilient. For better performance, keep the image files as small as necessary.

## Analyze with Most Popular Paths Analysis

To run the most popular path analysis on 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 **Most Popular Paths**.
- Step 3** You can apply the parameterized rules to your analysis in the Rules Pane. See [Rules Pane, page 4-4](#) 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.

The most popular path presents you with a set of paths taken and the parameters associated with them in the right pane.

The following figure shows the most popular path taken by the visitors through the building with a route that follows a feasible set of edges. This is one path that a device followed and is meant to represent a set of similar paths.

**Figure 5-4 Most Popular Paths in 3D Environment**

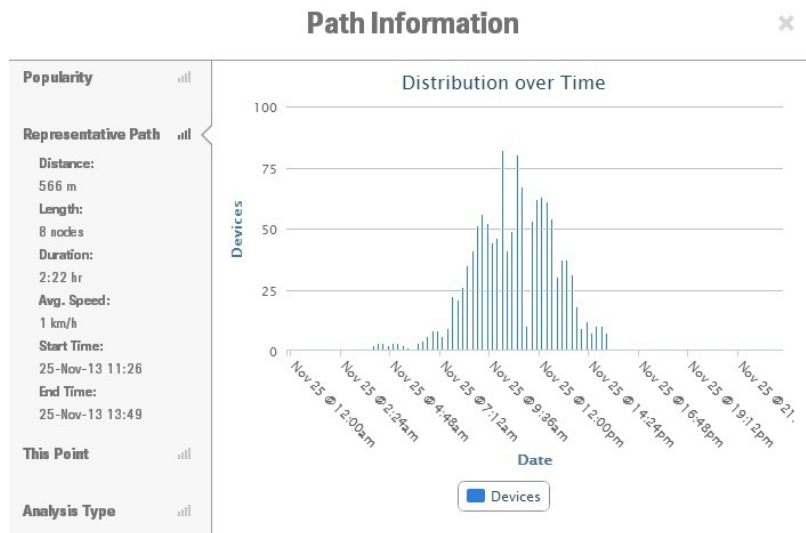


Each node on the path has additional information associated with it. The following information is displayed when you click a particular node:

- Cluster
  - Number of paths
- Representative Path
  - Overall distance travelled
  - Length
  - Duration
  - Average speed along the path (km/hr)
  - Date and time of the first and the last recorded point on the path
- This Point
  - Arrival date and time
  - Zones located within
  - Any tags associated with this point
  - Dwell Time
  - Dwell Index

- Analysis Type
  - Current Analysis
  - Date and time

**Figure 5-5** *Distribution Over Time*



## 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 [Rules Pane, page 4-4](#) 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 5-6** *Alternate Path Analysis*

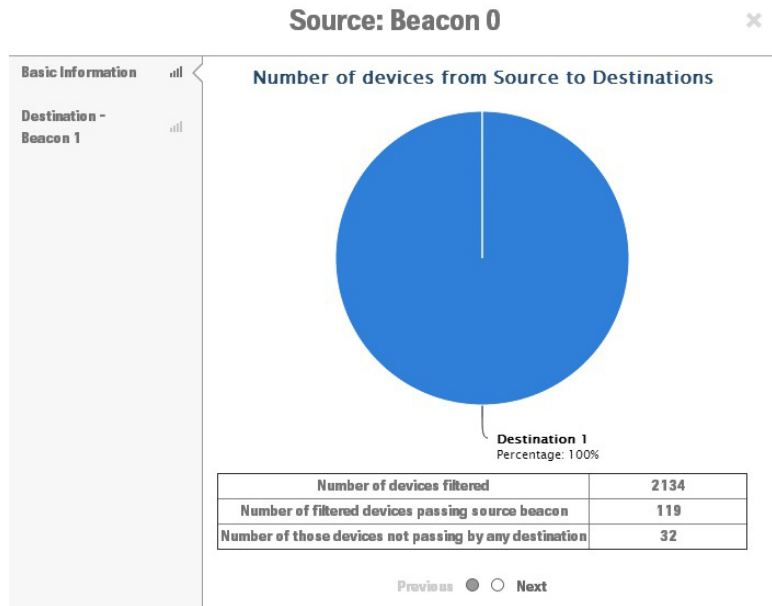


The following information is displayed when you click a particular node to show the distribution of durations and speeds:

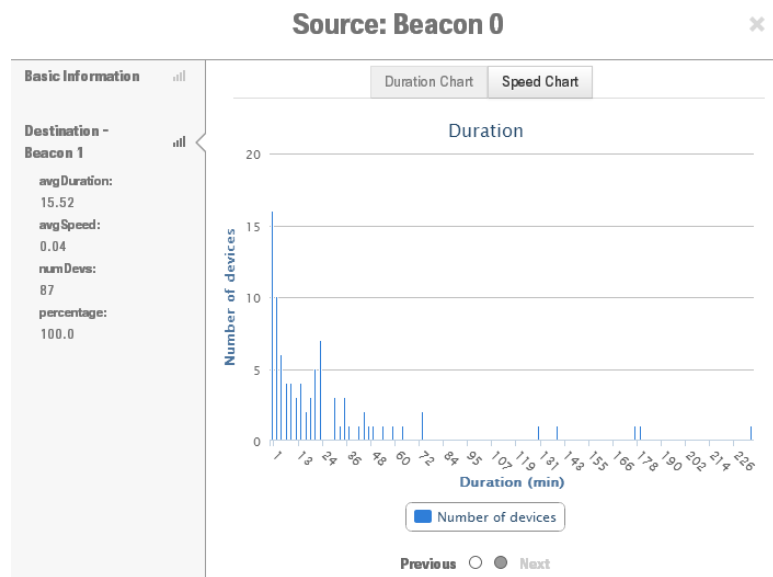
- Basic Information
  - Number of devices filtered
  - Number of filtered devices passing source beacon
  - Number of those devices not passing by any destination
- Source
  - Average Duration
  - Average speed
  - Number of devices

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

**Figure 5-7**      **Number of Devices From Source to Destinations**





**Figure 5-8** 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.

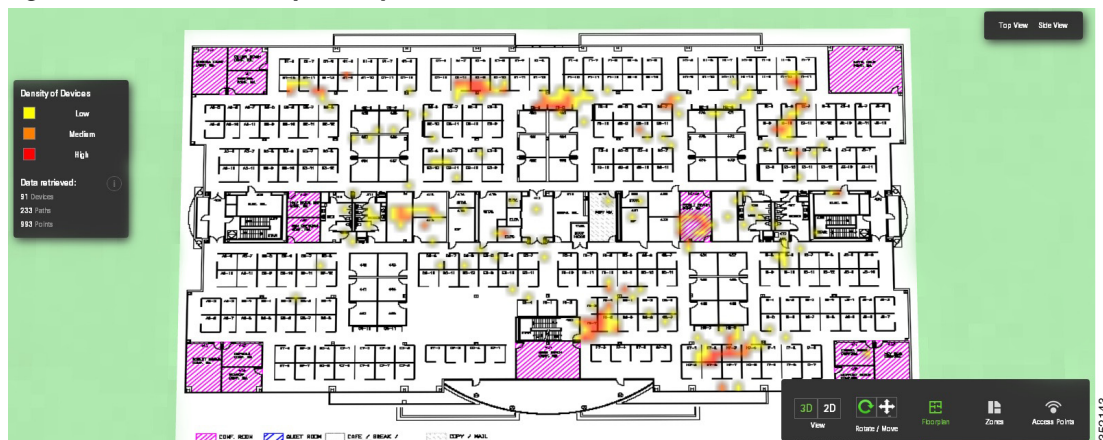
## Analyze with Heat Maps Analysis

To run the heat maps analysis, follow these steps:

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- 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 [Rules Pane, page 4-4](#) 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 5-9 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 [Rules Pane, page 4-4](#) for more information.box.
- 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 5-10** 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 5-11 Distribution Over Time

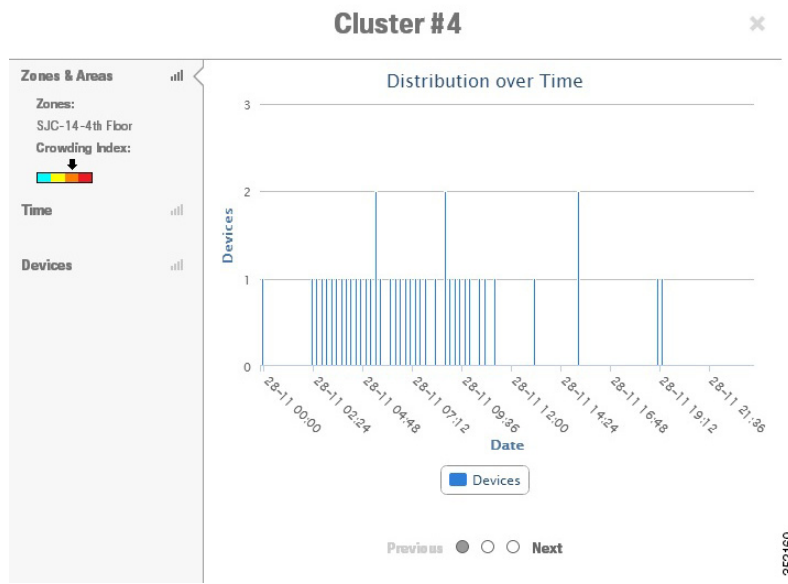


Figure 5-12 Dwell Time Distribution

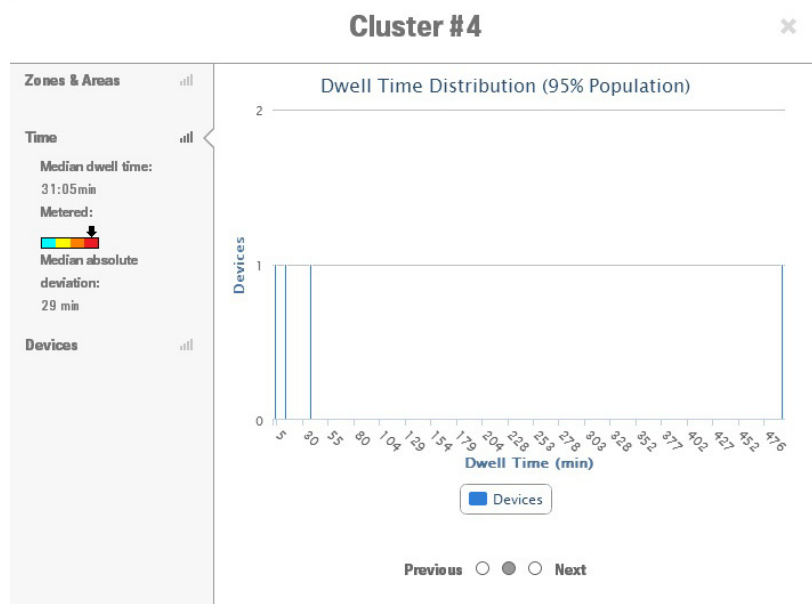


Figure 5-13 Visits Distribution

