Managing Cisco CMX System Settings

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Overview of the System Service

The Cisco CMX **System** service comprises the following tabs, which help you perform a variety of system-related tasks, including, but not restricted to, those listed here:

- **Dashboard**—Enables you to have an overall view of the system.
- **Alerts**—Enables you to view live alerts.
- **Patterns**—Enables you to detect patterns of various criteria, such as Client Count, CPU Usage, Memory Usage, and so on.
- **Metrics**—Enables you to view system metrics.

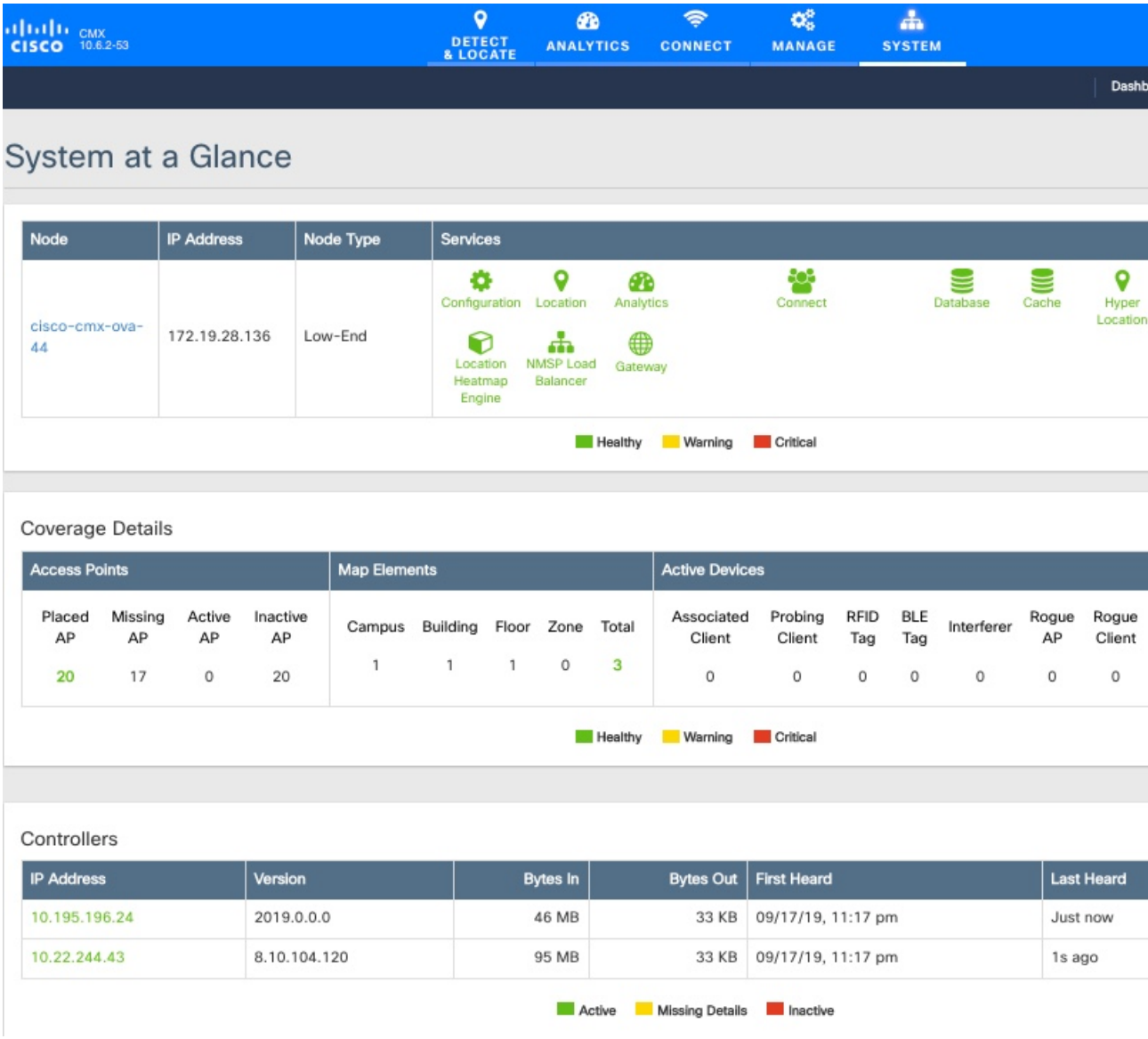
Viewing the Overall System Health

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.

The **System at a Glance** window (see the image below) is displayed.



Step 3 View the following sections:

- Node Table. For details, see #unique_146.
- System Update Table. For details, see #unique_147.
- Coverage Details Table. For details, see Understanding the Coverage Details Table, on page 4.
- High Availability Table.
- Smart License Table. For more information, see #unique_149.
- Controllers Table. For details, see Understanding the Controllers Table, on page 5.

Understanding the Node Table

The **Node** table in the **System at a Glance** window displays the following Cisco CMX node information:

- **Node**—Lists all the associated Cisco CMX nodes.
  - Click a node name to view its metrics. See Viewing CMX Node Metrics, on page 37.
- **IP Address**—Shows the IP address of the Cisco CMX node.
- **Node Type**—Shows the type of the Cisco CMX node.
- **Services**—Lists all the services for each Cisco CMX node.
  - The colors of the icons pertaining to these services indicate the status of these services. Ensure that the services are in green color; this indicate a healthy status.
  - Click a service icon to view the corresponding service or system metrics.
- **Memory**—Shows the load on the memory, in percentage.
  - Click it to view the **Live Alerts** window. See Viewing Live System Alerts, on page 35.
- **CPU**—Shows the load on the CPU, in percentage.
  - Click it to view the **Live Alerts** window. See Viewing Live System Alerts, on page 35.

Understanding the System Update Table

The **Time** table in the **System at a Glance** window displays information about the current running duration of Cisco CMX services and the overall server running duration.

The table displays the following details:

- **Current Time**: Displays the current system time.
- **Server Uptime**: Displays the VM or server duration in days since the last reboot.
- **Longest Running Service**: Displays the longest running process or service since the last restart.

Use the **cmxctl config uptimethreshold setthresholddays** command to configure the uptime threshold configuration settings. The default threshold is 90 days. An alert is generated when the system uptime crosses the configured threshold value. You can configure the threshold as the system performance may vary for different users, based on the load or capacity on the system, and the users must be alerted accordingly.

Note

- The system update time value is displayed in green if greater than 90 days.
- The system update time value is displayed in yellow if lesser than 90 days.

Understanding the Coverage Details Table

The **Coverage Details** table in the **System at a Glance** window displays the following information:

- **Access Points**—Shows the number of access points placed on Cisco CMX map.
  - **Placed AP**—Shows the total count of access points placed on Cisco CMX map.
  - **Missing AP**—Shows the number of access point which has sent location details but not found on the map. This could impact the accuracy of the location.
  - **Active AP**—Shows the number of active access points. This helps to troubleshoot and determine if there are access points that are not placed on Cisco CMX map. An AP is considered as active when Cisco CMX receives RSSI measurements for clients and tags from the AP. An AP will remain in active status until midnight and post midnight all AP status (such as Active / Missing / Inactive) are flushed out. Depending on the Cisco CMX map and RSSI measurements AP status will be readjusted. Note that the AP status will also be readjusted when you import a map on Cisco CMX.
  - **Inactive AP**—Shows the number of inactive access points. By default all APs are in inactive status when you add a Cisco Prime Infrastructure map. After a controller is added and Cisco CMX starts receiving RSSI measurements, an AP is considered as active.
- **Map Elements**—Shows the number of elements available on Cisco CMX map.
  - **Campus**—Shows the number of campuses in Cisco CMX.
  - **Building**—Shows the total number of buildings in Cisco CMX.
  - **Floor**—Shows the total number of floors in Cisco CMX.
  - **Zone**—Shows the total number of zones in Cisco CMX.
  - **Total**—Shows the summation of all the previous elements. This is the total elements in Cisco CMX .
- **Active Devices**—Shows the number of active devices available on Cisco CMX map.
  - **Associated Client**—Shows the number of associated clients.
  - **Probing Client**—Shows the number of probing clients.
  - **RFID Tag**—Shows the number of active RFID tags.
  - **Interferer**—Shows the number of interferers.
  - **Rogue AP**—Shows the number of rogue access points.
  - **Rogue Client**—Shows the number of rogue clients.
  - **BLE Tags**—Shows the number of bluetooth devices.
  - **Total**—Shows the summation of all the previous devices.
- **System Time**—Shows the current system time with the time zone set as on Cisco CMX system .

Understanding Smart License

The **Smart License** table in the **System at a Glance** window displays the Cisco CMX smart license and related AP information.

The table displays the following details:

- **License Type**: Displays the Cisco CMX smart license type.
- **Reported AP**: Displays the total number of installed APs reported by Cisco CMX to the CSSM smart account.
- **Last Reported On**: Displays the date when Cisco CMX last reported the installed APs to CSSM smart account. If there are no reporting failures, this is always the previous date.

Understanding the Controllers Table

The **Controllers** table in the **System at a Glance** window lists the controllers that are sending Network Mobility Services Protocol (NMSP) data to Cisco CMX.

The table displays the following details for each Cisco controller:

- **IP Address**: The color of the table border to the left of each IP address indicates whether the controller is active or not.
- **Version**: Controller software version. Cisco CMX must have the latest controller password to display the correct controller version.
- **Bytes In and Bytes Out**: Number of bytes received from and sent to the controller.
- **First Heard**: Number of seconds since the first communication received from the controller.
- **Last Herad**: Number of seconds since a communication was received from the controller.
- **Action**: Allows you to modify the details of an existing controller or delete an existing controller. Click **Edit** to edit the controller details in the Edit Controller window. Click the plus icon to view the **Controllers and Map Setup** tab details in the **Settings** window.

Note

- Click the plus icon to add new controllers. The **SETTINGS** window is displayed with **Import from Cisco Prime** tab. For more information about adding controllers, see Importing Maps and Controllers into Cisco CMX, on page 15.
- Active contollers are shown in green. Inactive contorllers are shown in red. Controllers with missing SNMP or SSH credentials are also shown in yellow.

Managing Dashboard Settings

The **Settings** option in the **System at a Glance** window enables you to manage the configurations and other settings related to the **Cisco CMX System** service.

Setting Device-Tracking Parameters

Procedure

Step 1 Log in to Cisco Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.
The **System at a Glance** window is displayed.

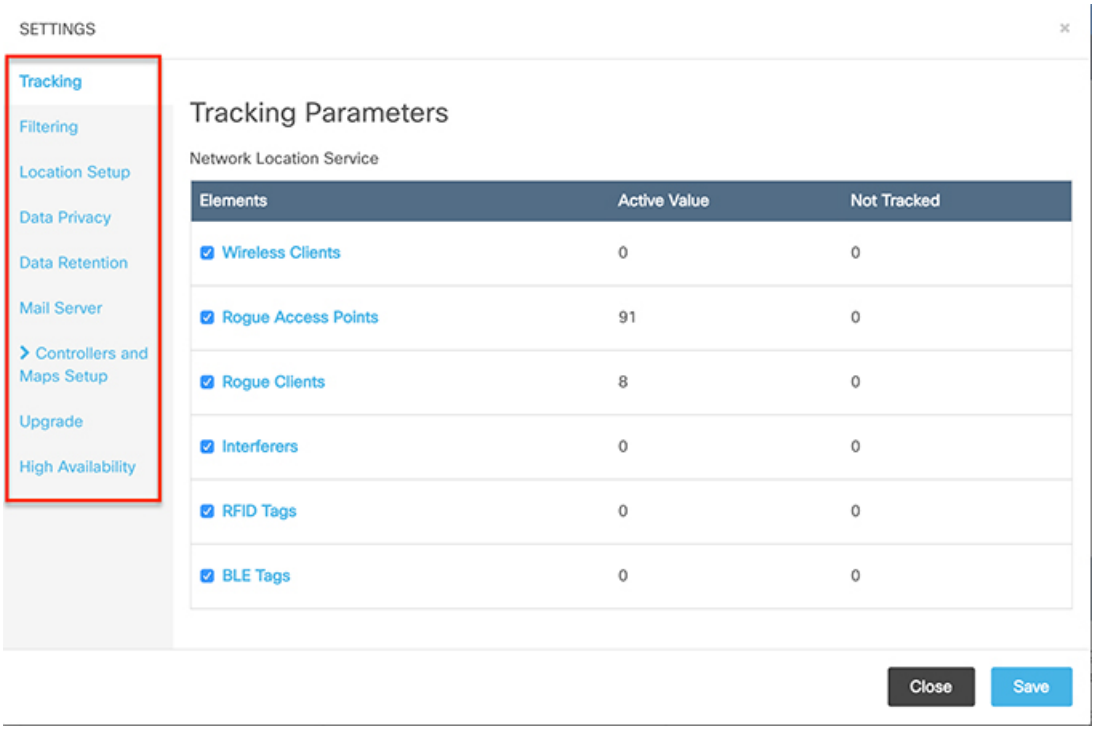
Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** window is displayed.

Note By default, the **Tracking Parameters** tab is displayed.

Step 4 In the **Elements** column, check the check box of the device that you want to select for tracking.

Figure 1: Tracking Parameters



Only the elements selected here will be tracked by the Network Location service and will appear on the **Activity Map** window.

The following elements are available for tracking:

- Wireless Clients
- Rogue Access Points
- Rogue Clients
- Interferers
- RFID Tags
- BLE Tags

Note

- BLE-capable APs are discovered by Cisco Prime Infrastructure. Use Cisco Prime Infrastructure to place the APs on the maps and export the maps. Cisco CMX utilizes the map file exported from Cisco Prime Infrastructure.
- BLE beacons are detected in 2 ways:
  - **Clean air over NMSP**—To enable this tracking method, check the **Interferers** option. You require Cisco WLC with software Release 8.0.115.0 or later for this method.
  - **Fast path over UDP**—To enable this tracking method, check the **BLE Beacons** option. You require Cisco WLC with software Release 8.6.1.146 or later for this method.
- BLE tags are supported on high-end appliance only.

Step 5 Click **Save**.

Setting Filtering Parameters

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Dashboard**.
The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** window is displayed.

Step 4 In the left pane, click **Filtering**.

Here, you can configure the following filtering parameters:

- **Duty Cycle Cutoff (Interferer)**: This is a percentage value. Interferers with a Duty Cycle that is less than the specified cutoff will not be tracked.
- **Severity Cutoff (Interferer)**: This numeric value represents percentage of time. Interferers must be seen on the network before Cisco CMX starts tracking them. Sometimes, interferers are very short lived with **Duty Cycle** as 0% and overwhelms Cisco CMX. This filter helps Cisco CMX to discard such short lived

interferers as they come and go. The default value is 10 which means that the interferer must be seen 10% of the time in the network before Cisco CMX starts processing it.

Note Cisco CMX will process interferers only when the **Duty Cycle** and **Severity Cutoff** filters are satisfactory. Interferer must be reported with DutyCycle 10% or above and Severity value 1 or above. Interferes that do not follow this criteria would be moved to the category **Not Tracked** under **System > Settings > Tracking** option.

- **RSSI Cutoff (Probing Only Clients)**: This is the radio signal strength cutoff for filtering. The default is -85 dBm.
- **Exclude Probing Only Clients**: Check this check box to filter out clients that are only probing. This is the best effort to stop detecting probing clients. However, a small percentage of probing clients may appear for short duration. So this should not be considered as complete probing client removal from the system. If you check this option, the **Probing Client Filtering** service is enabled on Cisco WLC 8.7 or later, and then Cisco CMX will not receive any probing client information.
- **Enable Location MAC Filtering**: Check this check box to filter out specific MAC addresses. For example, you can use this to filter out MAC addresses of employees' devices. After checking this, you can either specify a MAC address that you want to allow or disallow, or choose to allow, disallow, or delete previously entered MAC addresses.
- **Enable Location SSID Filtering**: Check this check box so that the Location service excludes all visitor devices associated to a particular SSID.

  a. Click **Enable SSID Filtering**.

  b. Click **Select SSID**, and select a particular **SSID**. If no SSIDs appear in the list, make sure that a Cisco WLC is active, and then click **Fetch SSIDs** to refresh the list.

  Note
  - With Cisco CMX Release 10.5.1 or later, Cisco CMX relies on WLC notification (INFO messages) to populate the SSID list. For all earlier Cisco CMX releases, this was achieved using SNMP polling.
  - Cisco CMX would clear the blocked SSID's every midnight (as part of midnight cleanup job) and require the blocked clients to be reported again from the blocked SSID's. So you may see the blocked clients being tracked again past midnight. If you want Cisco CMX to not clear the blocked SSID's by midnight job, then set the **featureflags location.filteredssidscleanupatmidnight** configuration as **false**. Run the following commands to configure:

    1. To set featureflag location parameters, run the following command **cmxctl config featureflags location.filteredssidscleanupatmidnight false**

    2. To restart Cisco CMX agents, run the following command **cmxctl agent restart**

    3. To stop and start the location and NMSP, run the following commands **cmxctl location stop; cmxctl nmsplb stop** and **cmxctl location start; cmxctl nmsplb start**

  c. Click **Filter SSID** to add the selected SSID to the filter list.

Step 5 Click **Save**.

Setting Location Calculation Parameters

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** dialog box is displayed.

Step 4 In the left pane, click **Location Setup**.

Here, you can configure the following **Location Calculation Parameters**:

- **Enable OW Location**—Check this check box to enable the use of Outer Walls (obstacles) for location calculation. The Calibration model includes information regarding the Walls. This setting controls whether the CMX should honor the walls while calculating the heatmaps or not.
- **Enable Location Filtering**—Check this check box if you want the system to use previous location estimates for estimating the current location. This parameter will be applied only for client location calculation. Enabling this parameter reduces location jitter for stationary clients and improves location tracking for mobile clients. This parameter is enabled by default.
- **Use Default Heatmaps for Non Cisco Antennas**—Check this check box to enable the usage of default heat maps for non-Cisco antennae during location calculation.
- **Chokepoint Usage**—Check this check box to enable the usage of chokepoint proximity to determine the location of a device. This applies only to Cisco-compatible tags that are capable of reporting chokepoint proximity. This parameter is enabled by default.
- **Enable Hyperlocation/FastLocate/BLE Management**—Check this check box to enable hyperlocation, fastlocate, and BLE management in Cisco CMX.

  Note This option will not be displayed if the system is not a large OVA installation. Hyperlocation requires a high end system to run and if run on lower system the option is hidden. For high end system (20 vCPU) and Bare metal (3365), Hyperlocation option is enabled by default and displayed in the GUI. For standard (16 vCPU) and low end system (8 vCPU), Hyperlocation option is hidden.

- **Optimize Latency**—Check this check box to enable latency optimization. If you enable this option, Cisco CMX enables faster location computation over less data affecting accuracy due to not using the fully available data for computation. By default, this option is not enbaled. If not enabled, Cisco CMX will provide location updates at default intervals computed over full available data. If you check this option, the **Relative discard RSSI time** and **Relative discard AoA time** values will be changed to 30. You will not be able to edit these values. We recommend you to enable this option only if recommended by Cisco.

- **Use Chokepoints for Interfloor conflicts**—Use this drop-down list to specify the frequency to determine the correct floor during interfloor conflicts.
- **Chokepoint Out of Range Timeout (secs)**—After a Cisco-compatible tag leaves a chokepoint proximity range, RSSI information will be used again to determine the location only after this timeout value is exceeded. Specify a timeout value, in seconds, accordingly.
- **Relative discard RSSI time (secs)**—Enter the time, in seconds, after which the RSSI measurement should be considered obsolete and discarded from use in location calculations. This time is from the most recent RSSI sample, and not an absolute time. For example, if this value is set to 3 minutes, and two samples are received at 10 minutes and 12 minutes, both the samples will be retained. However, an additional sample received at 15 minutes will be discarded. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.
- **Relative discard AoA time**—Enter the time, in secondsß, after which the AoA mesaurement should be considered as obsolete and discarded from use in location calculations. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.
- **Absolute discard RSSI time**—Enter the time, in minutes, after which the RSSI measurement should be considered obsolete and discarded from use in location calculations regardless of the most recent sample. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.
- **RSSI cutoff**—Enter the RSSI cutoff value, in dBm, at which you want the server to discard AP measurements. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.

You can also set the following **Movement Detection Parameters**:

- **Individual RSSI change threshold**—Enter a threshold, in dBm, beyond which you want individual RSSI movement recalculation to be triggered. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.
- **Aggregated RSSI change threshold**—Specify the Aggregated RSSI movement recalculation trigger threshold. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.
- **Many new RSSI change percentage threshold**—Specify the trigger threshold recalculation (as a percentage) for many new RSSI changes. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support. This parameter indicates the threshold for comparing against the aggregated APs value. This compariosn will help you to decide whether the location computation is required.
- **Many missing RSSI percentage**—Specify the trigger threshold recalculation (as a percentage) for many missing RSSI changes. We recommend that you do not modify this parameter without the guidance of Cisco Technical Support.

Step 5 Click **Save**.

Setting Data Privacy

The EU General Data Protection Regulation (GDPR) places the onus on organizations to be more accountable for data protection and deploy appropriate security controls. MAC address hashing is one of the requirements for GDPR compliance.

Cisco CMX is a system that enables organizations locate wireless clients. To identify these clients, Cisco CMX uses the MAC address of the corresponding wireless devices. In the content of the GDPR, the MAC address or IP address of the wireless clients are considered as personal identifiable information (PII). Cisco CMX stores location information in multiple ways and processes it to generate analytics data. In the context of the GDPR, Cisco CMX acts as a data controller as well as a data processor.

Attention Consult your legal department and your GDPR data privacy officer to achieve a Cisco CMX configuration that is compliant with your requirements.

The Setting Data Privacy feature prevents personally identifiable information (MAC address) from being directly accessed. Using a salted hashing algorithm, the MAC address for a particular user is transformed to a hashed value. You cannot recover the original MAC address from the hashed value. You can change the salt value for a particular date or range of dates. If the salt value is not set for a particular date, the salt value from the preceding date or date range is used. If a salt value is not set, the hash function does not use salt in the hashing algorithm.

Procedure

Step 1 Log in to Cisco Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.
The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

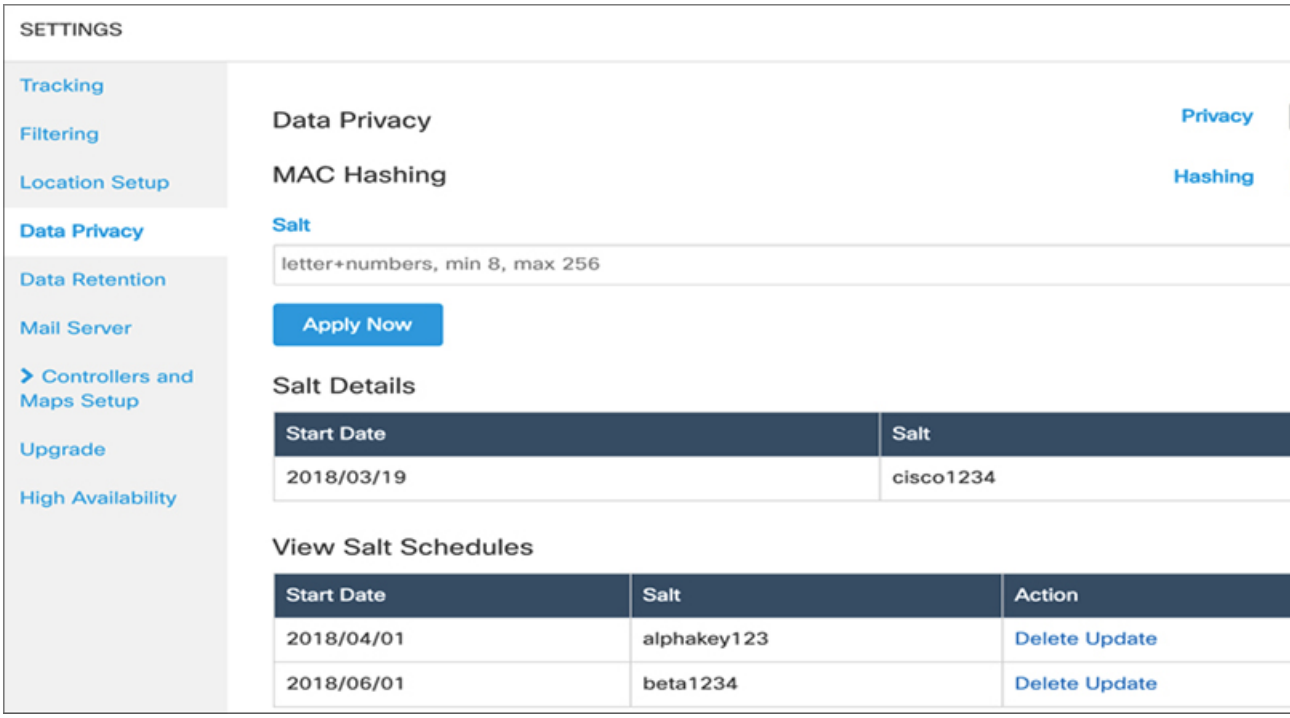
The **SETTINGS** window is displayed.

Step 4 In the left pane, click **Data Privacy**.

Step 5 To enable data privacy, set **Privacy** to **On**.

Step 6 To enable MAC hashing, set **MAC Hashing** to **On**.

Figure 2: MAC Hashing



Note When you enable Data Privacy and MAC Hashing, Cisco CMX generates dashboard alerts and email notifications. Ensure that you set up a mail server configuration to receive notifications.

Step 7 In the **Salt** field, enter a value. This is the alphanumeric value used for hashing on the real MAC address.

Step 8 Click **Apply Now**. You can apply salt for the current date or a future date. The new salt details are displayed in the **Salt Details** section. If you are adding salt for the first time, the salt is applied for the current date. You also can add a salt for a future date.

Step 9 In the **Salt Details** section, view the following:

- **Start Date**—Displays the date on which salt was applied first.
- **Salt**—Displays the salt value.

Step 10 In the **View Salt Schedules** section, click the eye icon to view the following:

- **Start Date**—Displays the date on which salt was applied first.
- **Salt**—Displays the salt value.
- **Action**—Click **Update** to open the **Update Salt** dialog box and update the salt details. Click **Delete** to delete the salt details.

Step 11 To add salt for a future date, click the plus icon.

The **Add Future Salt Schedule** dialog box is displayed.

Step 12 In the **Add Future Salt Schedule** dialog box, enter the **Salt** details and the **Start Date** in mm/dd/yyyy format, and click **Add**.

Step 13 In the **Subscription Details** section, view the following:

- **Category**—Displays the list of categories.
- **Active Value**—Displays the active value.
- **Action**—Click **Add** to open the **Add Opt-In Device** dialog box and add the device MAC address. Click **Delete** to delete the category details.

Step 14 In the **Device MAC Address** field, enter the MAC address that you want to hash.

Step 15 Click **Hash**.

The hashed MAC address is displayed in the **Hash MAC Address** field.

Step 16 Click **Save** to save the data privacy settings.

Setting Data Retention Parameters

Data Retention is a part of Data Privacy feature. Data Retention configurations help Cisco CMX to retain data such as location history, analytics data, and so on.

Procedure

Step 1 Log in to Cisco Cisco Mobile Connected Experiences (Cisco CMX).

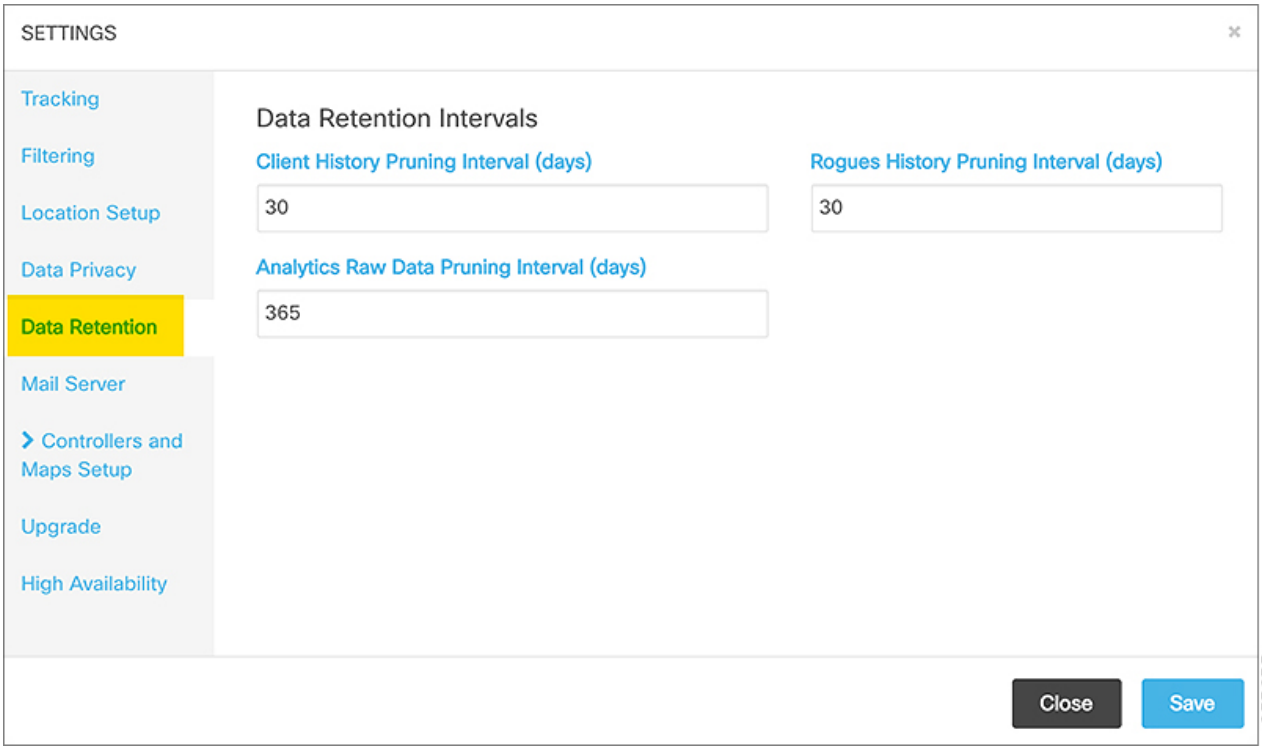
Step 2 Choose **System > Dashboard**.
The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** window is displayed.

Step 4 In the left pane, click **Data Retention**.

Figure 3: Data Retention



Step 5 In the **Client History Pruning Interval (days)** field, enter the interval value, in days. The default value is 30 days.

Step 6 In the **Rogues History Pruning Interval (days)** field, enter the interval value, in days. The default value is 30 days.

Step 7 In the **Analytics Raw Data Pruning Interval (days)** field, enter the interval value, in days. The default value is 365 days.

Step 8 Click **Save**.

Configuring the Mail Server for Notifications

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **Settings** dialog box is displayed.

Step 4 In the left pane, click **Mail Server**.

Here, you can configure the following:

- **From Email Address**—Email address of the mail server host.
- **To Email Address**—Enter the email addresses to which the notifications should be sent. You can add multiple email addresses sepearted using the delimiters comma, semi-colon, and space.
- **Server**—Mail server URL.
- **Port**—Port number for the mails. The default is port 25.
- **Authentication**—Option to enable or disable email authentication.
- **SSL**—Option to enable or disable email security with Secure Sockets Layer (SSL) to prevent third parties from potentially viewing your email messages.
- **TLS**—Option to enable or disable email secured with Transport Layer Security (TLS).

Step 5 To test your settings, click **Save and Test Settings**.

Step 6 Enter the email address and then click **Send e-mail**.

Step 7 Click **Save** to save your settings if the test is successful.

Importing Maps and Controllers into Cisco CMX

Note (CSCvf77237, CSCvf93122) (related to CSCvf21552) The following are considerations when using Cisco Prime Infrastructure:

- Cisco Prime Infrastructure Release 3.2 supports either Cisco CMX or Cisco MSE, but it does not support both at the same time.
- Only data is synchronized between Cisco Prime Infrastructure and Cisco CMX. Changes to maps are not synchronized.
- Addresses are not imported from Cisco Prime Infrastructure. You must set the address of the campus manually on Cisco CMX. For more information, see Adding a Campus Address.

To import maps and controllers directly from Cisco Prime Infrastructure, do the following:

Before you begin

Ensure that while exporting maps from Cisco Prime Infrastructue, check the **Include Calibration Information** option. Cisco CMX will not be able to compute the location for network elements (Clients/ Interferers / Tags) for maps having no calibration information.

Import operation for map archive files will fail if **Include Calibration Information** option is not selected in the Prime Infrastructure while importing maps. While importing maps, ,the upload utility validates if the calibration model is available for each floor in the given maps archive file. If not available, map import will fail with an error message: 'Calibration model is missing in the uploaded map archive. Please select the option 'Include Calibration Information' on Prime Infrastructure GUI while exporting maps archive.

Note (CSCwb72332) Cisco CMX does not support Exchangeable image file format (Exif) orientation data for floor map images. If a floor image with Exif orientation data is uploaded, Cisco CMX displays the floor image in its original orientation.

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

Step 4 Choose the **Controllers and Maps Setup** > **Import** tab, and enter the following parameters:

a) **Username**—Username of the Cisco Prime Infrastructure server.

b) **Password**—Password of the Cisco Prime Infrastructure server.

c) **IP Address**—IP address of the Cisco Prime Infrastructure server. Ensure that the SNMP community string is properly configured in Cisco Prime Infrastructure.

- To save the Cisco Prime Infrastructure credentials, check the **Save Cisco Prime Credentials** check box.
- To override the existing maps that currently exist in Cisco CMX while importing, check the **Delete & replace existing maps & analytics data** check box.
- If you import a map with a new campus, you need not check the **Delete & replace existing zones** check box. Cisco CMX will automatically process all the zones added in the map.
- If you reimport an existing map, ensure that you check the **Delete & replace existing zones** check box. If you check the **Delete & replace existing zones** check box, the existing zones in Cisco CMX will be replaced by zones that you import from Cisco Prime Infrastructure.
- To override the existing zones that currently exist in Cisco CMX while importing, check the **Delete & replace existing zones** check box.

Note We recommend exporting updated maps only from Cisco Prime Infrastructure. In addition, when importing updated maps to Cisco CMX, make sure the **Delete & replace existing maps & analytics data** check box and the **Delete & replace existing zones** check box are unchecked.

Step 5 Click **Import Controllers and Maps**.

Step 6 Click **Save**.

Importing Maps and Adding Controllers

You can manually import maps and add Cisco Wireless Controllers into Cisco CMX using the web interface.

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

Step 4 Choose the **Conrollers and Maps Setup > Advanced** > tab.

Step 5 To manually import a map, perform the following:

a) Under the **Maps** area, click **Browse**.

The File Upload dialog box is displayed.

Note

- If you check the **Delete & replace existing maps & analytics data** check box , the maps existing in Cisco CMX will be replaced by the maps that you import from Cisco Prime Infrastructure. Existing zones are also removed when you override the maps.
- If you import a map with a new campus, you need not check the **Delete & replace existing zones** check box. Cisco CMX will automatically process all the zones added in the map.
- If you reimport an existing map, ensure that you check the **Delete & replace existing zones** check box.

  If you check the **Delete & replace existing zones** check box, the existing zones in Cisco CMX will be replaced by zones that you import from Cisco Prime Infrastructure.

Ensure that while exporting maps from Prime, check the **Include Calibration Information** option. Cisco CMX will not be able to compute the location for network elements (Clients/ Interferers / Tags) for maps having no calibration information.

b) Navigate to the location of the map file, select the map file, and then click **Open**.

c) Click **Upload**.

d) Click **Save**.

Step 6 To import a Cisco WLC, configure the following parameters under the **Controllers** area:

a) **Controller type**—Choose from **Cisco WLC** or **Unified WLC**.

b) **IP address / Hostname**—IP address or hostname of the controller.

c) **Controller Version**—(Optional) Software version of the controller.

d) **Applicable Services**—Check the CAS check box if Context Aware Service (CAS) is applicable.

e) **Controller SNMP version**—Choose from **v1**, **v2c**, or **v3**.

f) **Controller SNMP Write Community**—Enter the controller SNMP write Community string. The default is *private*.

g) Click **Add Controller**.

Note

- Cisco CMX does not support Cisco Catalyst 9800 Series Wireless Controllers with special characters > or # in the message-of-the-day (MOTD) banner.
- After adding controllers, you must verfiy if the controller status is up and running. Using the CLI, you can run the command **cmxctl config controllers show** to display the list of controllers with the status. An **Active** status indicates an established connection.
- To validate the controller status using user interface, you need to navigate to the **System** tab. The controllers list is displayed in the tab and the new controller should appear in green. For more information, see Understanding the Controllers Table, on page 5.
- If you are adding Unified WLC, ensure that SSH is enabled on the controller before adding it to Cisco CMX.

Step 7 Click **Save**.

Importing Maps from Cisco DNA Center

Cisco CMX allows you to import maps from Cisco DNA Center. When you import a map from Cisco DNA Center to Cisco CMX, all elements of map data is imported to Cisco CMX in the same manner when you import maps from Cisco Prime Infrastructure, such as access points information, floor images, calibration model/antenna patterns, inclusion/exclusion region, GPS markers, zones and so on.

After you add Cisco CMX in Cisco DNA Center and perform a map synchronization, Cisco DNA Center pushes the maps to Cisco CMX and overwrites the existing maps in Cisco CMX. For more information, refer to About Cisco Connected Mobile Experiences Integration, Create Cisco CMX Settings.

Cisco DNA Center sends regular API queries to Cisco CMX to get client information and map files. To troubleshoot client and map synchronization issues, you can use Cisco DNA Center API calls. Refer to Devnet for details on the APIs.

In Cisco DNA Center, the **Network Hierarchy** tab under **Design** helps you to create network hierarchy and apply them to different areas of the organization. When you add maps using **Network Hierarchy**, map data can have nested campus/site structure. For example, under Global map, you can add U.S.A as a site and can add San Jose and RTP as sub-sites.

When you import maps in Cisco CMX, the map utility imports map data following a simple three element structure: "**Campus > Building(s) > Floor(s)**". However, when you import maps from Cisco DNA Center, map data pushed to Cisco CMX can include nested campus/site structure. For example, "**US>CA>SJC>Milpitas>CiscoBuilding24>FirstFloor**" which is different from the typical three element structure "**Milpitas>CiscoBuilding10>FirstFloor**" as in Cisco CMX.

When you import maps from Cisco DNA Center to Cisco CMX, Cisco CMX will only import the sites/campuses with a building element. For an imported map, if the **Network Hierarchy** on Cisco DNA Center is **US>CA>SJC>Milpitas>CiscoBuilding24>FirstFloor**, Cisco CMX will only show partial **Network Hierarchy** that is **Milpitas>CiscoBuilding24>FirstFloor**. However, Cisco CMX maintains a list of the parent elements in the database as **US>CA>SJC** and this information is only displayed in the API response and Northbound Notification messages, but not on the Cisco CMX GUI.

In Cisco CMX, you can view the Network Hierarchy using the following three options:

1. REST API version 1 (HTTP GET /api/location/v1/<element-type>/)

2. REST API version 3 (HTTP GET /api/location/v3/clients/)
3. Northbound Notification messages

Following are the limitations when you import maps from Cisco DNA Center **Network Hierarachy**:

- Cisco CMX does not import the address and latitude/longitude of the sites from the Cisco DNA Center.
- No limitation for the number of nested sites. Cisco DNA Center allows you to create a maximum of four nested sites. As the number of nested sites increase, the **locationMapHierarchy** or **mapHierarchyString** attribute value will also increase accordingly.
- It is not recommended to have duplicate site names. When map data is imported from Cisco DNA Center with the Network Hierarchy: **US>CA>SJC>Campus-One>CiscoBuilding24>FirstFloor** and **US>CA>RTP>Campus-One>CiscoBuilding24>FirstFloor**, Cisco CMXwill overwrite the parent list of **Campus-One** from **US>CA>SJC** to **US>CA>RTP** which is the last incoming parent list for that campus.

Upgrading Cisco CMX

After you install Cisco CMX 10.2, future upgrades can be performed via the Cisco CMX GUI or by using the **cmxos upgrade** CLI command and the .cmx file, for example, cmxos upgrade <**CISCO_CMX$$$.cmx**>, while logged in as cmxadmin.

To upgrade Cisco CMX to a future release using the GUI, perform the following task:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

Step 4 In the **SETTINGS** dialog box, click the **Upgrade** tab and then click **Upgrade**.

Step 5 Either choose a local .cmx file or point to the URL of the .cmx file

Before selecting the local file option, ensure that the .cmx file is available on the machine from which access to the web GUI is being made.

The upgrade process involves the following tasks:

a. The .cmx file is copied to /opt/image/newimage.

b. The **cmxos upgrade** command is executed in the background:

- Services are stopped
- New files are copied and configured
- Services are restarted

What to do next

For more information about upgrading Cisco CMX using CLI, see Upgrading Cisco CMX Using CLI.

Enabling High Availability for Cisco CMX

High Availability (HA) is a simple and reliable failover mechanism. It helps Cisco CMX host and support multiple mobility applications seamlessly without any interruption.

The definition of servers described in this section are as follows:

- **Active Server**—The Cisco CMX server that is actively serving traffic from the controllers. The virtual IP address (VIP) for the High Availability pair should point to the current active server. The VIP address is optional.
- **Primary Server**—The Cisco CMX server that will be initially active in the High Availability pair.
- **Secondary Server**—The CMX server that will be the backup or standby server in the High Availability pair.

Cisco CMX High Availability requires two servers. The primary server acts as the active Cisco CMX server. Cisco CMX server can use virtual IP addresses too. The primary Cisco CMX server is installed by selecting the Location or Presence node type. In an active High Availability deployment, data on the primary server will be continuously synchronized with the secondary server. If the primary server encounters any issues, the secondary server will take over the responsibility as the active server.

Install Cisco CMX Release 10.3.x on both the servers. From the web installer, choose either **Presence** or **Location** as the node type. Both the servers should have the same node type. After installation completes, each server is considered a standalone server and has the primary High Availability role. High Availability requires both primary and secondary servers, the role for one server needs to change. To change the High Availability role of a server from primary to secondary, use the **cmxha secondary convert** command in cmxadmin mode.

The Cisco CMX High Availability Admin interface is hosted on Cisco CMX port 4242 and can be accessed using http://*cmx_ip_address*:4242/. Log in to the web interface using *cmxadmin* as user ID and the password configured for cmxadmin during the primary and secondary server installation. This Cisco CMX High Availability Admin interface is different from the regular Cisco CMX interface that can be accessed at http://*cmx_ip_address*. Use the Cisco CMX High Availability Admin interface specifically monitoring and managing High Availability.

Every active Cisco CMX instance is backed by another (inactive) instance. The second CMX instance is not active until the failover procedure is initiated, either manually or automatically.

Initial High Availability configuration is dependent on data size. For example, for 5 GB of data, initial configuration could take up to 1 hour to complete. The average time for a failover condition is 7 minutes, depending on your systems. The failback time is dependent on the amount of data to resynchronize. For example, for 5 GB of data, the expected time for failback to complete is 1.5 hours.

You can enable High Availability by using either Cisco CMX web UI or CLI.

If your Cisco CMX setup with High Availability requires a forward proxy for internet access, you must configure the proxy and restart your Cisco CMX services. For more information about setting up outbound proxy, see Setting Up Outbound Proxy in HA-Enabled Setup.

Note

- We recommend that you use the Cisco CMX web UI for High Availability configuration.
- The High Availability feature on Cisco CMX is part of the Cisco CMX Base license, which you would install on the primary High Availability server. The secondary High Availability server automatically receives a copy of the Cisco CMX license during sync up. There is no High Availability-specific license to install.
- Some processes running on the primary and secondary servers use Virtual Router Redundancy Protocol (VRRP). VRRP uses multicast address 224.0.0.18 and protocol number 112.

Tip Cisco CMX High Availability documentation is embedded in the product. From the Cisco CMX user interface, choose **Documentation** from the drop-down list on the top-right corner.

Pre-requisites for High Availability

- Both the primary and the secondary server should be of the same size and the same type (VM or physical appliance).
- Both the primary and the secondary server should have the same Cisco CMX version.
- Both the primary and the secondary server should be connected on the same subnet.
- Both the primary and the secondary server should be connected on the same subnet if Layer 2 High Availability is required.
- Both the primary and the secondary server should be IP connected with delay of less then 250ms if Layer 3 High Availability is used.
- From Cisco CMX release 10.6.2, NTP server settings must be configured on both Primary and Secondary server instance before High Availability pairing starts. We recommend that you use the same NTP server on both Primary and Secondary. As a Cisco CMX admin you can also use a dedicated NTP for Primary and Secondary.

SSH Login Failure Issue

With bug CSCwb54539, SSH login fails to a Primary High Availabilty server when accessing from a Secondary High Availabilty server.

The secondary Cisco CMX server fails to setup the SSH key as it was altered and hence not able to establish a connection with the Primary server. The IP address of the Primary server is added to the Secondary server host list. However, the IP address of the Secondary server is not added to the Primary server.

To work around this issue, setup the SSH key in the Secondary server and also add the IP address of the Secondary server in the Primary server's known_host list.

We recommend that you follow these steps to work around this issue:

1. Log in to the Primary server and run the **cmxha config enable** command.
2. Enter the IP address of the Secondary server and virtual IP address (if used).

Enabling High Availability for Cisco CMX Using the Web UI

Procedure

Step 1 Log in to Cisco Connected Mobile Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.

The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **Settings** dialog box is displayed.

Step 4 Click the **High Availability** tab.

Step 5 Configure the following parameters:

- **Secondary IP Address**—Enter the IP address of the secondary server. The primary server will be continuously synchronized with the secondary server. If the primary server encounters any issues, the secondary server will take over the responsibility as the active server.
- **Secondary Password**—Enter the password for the *cmxadmin* user on the secondary server.
- **Use Virtual IP Address**— By default, this option is checked. (If you do not check this option, the **Virtual IP Address** field is dimmed, and this address will not be used for HA configuration.)

  If you decide to retain the default, enter the corresponding virtual IP address.
- **Virtual IP Address**—(Optional) Enter the virtual IP address for the HA pair if the **Use Virtual IP Address** check box is checked. .
- **Failover Type**—From the **Failover Type** drop-down list, choose **Auto** or **Manual**.

  Note
  - If you choose **Auto**, Cisco CMX automatically fail over to the secondary server when a serious issue is detected.
  - We recommend that you run the **cmxha failover** command on the primary active Cisco CMX appliance to verify automatic failover configuration.
  - You must not use the **cmxos shutdown**if the failover configuration is automatic.
  - If you choose **Manual**, manual intervention is required to initiate failover from the web interface or command line. The failure will be reported via a notification, but no action will be taken.

- **Notification Email Address**— Enter the email address to which HA notifications are to be sent. You can add multiple email addresses.

Step 6 To enable HA, click **Enable**.

Cisco CMX will verify the HA settings and start enabling HA between the primary and secondary servers.

NTP server settings must be configured on both Primary and Secondary server instance before HA pairing starts. Use the **cmxos ntp type** command to configure the NTP server.

```
[cmxadmin@server]# cmxos ntp type
Current NTP Type = <Not Set>
```

```
Select NTP Type [1] Unauthenticated, [2] Authenticated or [3] Skip [3]: 1

Changing the NTP Type = Unauthenticated
Please enter the NTP server name (blank for no NTP server) []: ntp.xyz.com
Setting ntp server ntp.xyz.com
```

Step 7 Click **Save**.

The initial synchronization of the primary and the secondary server takes time and the **System at a Glance** window displays the state as **Primary Syncing** while the synchronization is in progress. After the synchronization is complete, the primary server will be in the state **Primary Active** state. Also, after synchronization, an informational alert is generated in Cisco CMX and an email is sent to the addresses that have been provided, indicating that HA is enabled and synchronized successfully.

Tip Click the **Help** link in the top-right corner of the **Settings** dialog box to launch the HA online help. For more information about the HA installation process, see http://*cmx_server*/docs/ha/.

Enabling High Availability Using CLI

Procedure

Step 1 To enable HA using CLI, run the **cmxha config enable** command.

Step 2 Follow the command prompt and enter the HA parameters.

The HA options are similar to the ones available in Cisco CMX Web UI:

```
$ cmxha config enable

Are you sure you wish to enable high availability? [y/N]: y
Please enter secondary IP address: 192.0.2.250
Please enter the cmxadmin user password for secondary:
Do you wish to use a virtual IP address? [y/N]: y
Please enter the virtual IP address: 192.0.2.251
Please enter failover type [manual|automatic]: automatic
Please enter an email address(es) for notifications (Use space, comma or semicolon to
separate): email@cisco.com
Attempting to configure high availability with server: 192.0.2.250
Configuring primary server for HA
Configuring secondary server for HA
.....................................................................
Synchronizing Postgres data from primary to secondary
.........
Synchronizing Cassandra data from primary to secondary
.....................
Syncing primary files to secondary
Successfully started high availability. Primary is syncing with secondary.
```

High Availability State Information

The HA nodes are expected to be in the following states:

Table 1: High Availability State Information

Configuration Description	Node State
CMX High Availability is not configured. Two different standalone boxes and they are not paired.	Primary is not configured. Secondary is not configured.
Pairing has just started and system is attempting to synchronize data from the primary server to secondary server.	Primary is synchronizing. Secondary is synchronizing.
CMX High Availability is established, and Primary is actively synchronizing with the secondary server. Primary is serving in master role and secondary is in backup role.	Primary is active. Secondary is active.
The system has failed over to the secondary and the secondary is serving.	Primary failover is active. Secondary failover is active.

Replacing a Cisco CMX High Availability Unit

If you want to replace a failed primary server, follow the steps:

Procedure

Step 1 Perform a backup from the secondary HA server considering primary server is down.

Step 2 To disable HA, run the following command:

cmxha config disable

Note We recommend that before you disable HA ensure that all the services are up and running on the secondary server. After disabling HA, the secondary server will continue to serve and all the services on the secondary will be up and running.

Step 3 To convert the current secondary server into primary server, run the following command:

cmxha primary convert

Step 4 Replace the primary Cisco CMX box.

Step 5 Install the required SSL certificates on the new Cisco CMX box. For more information, see Installing Certificates in Cisco CMX. Certificates can be only installed on a primary server.

Step 6 Configure the new Cisco CMX box as a secondary server.

As part of synchronization, license will be automatically copied from active server.

Step 7 To enable HA configuration, run the following command:

cmxha config enable

High Availability Synchronization with Cisco MSE

High Availability synchronization with Cisco MSE 8.0.150.x and older versions is reporting a failure at 10% due to oracle certification validation issue. Cisco MSE exchanges Oracle Database Certificate between primary and secondary Cisco MSE. The validity of the Oracle Database Certificate is 10 years and once the validity of the certificate expires, Cisco MSE displays an error: ORA-29024: Certificate validation failure.

This certificate validation issue is not seen on standalone Cisco MSE. The primary MSE health-mointor.log displays the error: ORA-29024: Certificate validation failure, only when you pair HA. We recommend to install the patch on all Cisco MSE HA pairs as the validity of oracle certificate expired on 29 July 2021. This issue is not experienced with an existing working HA immediately, however, you will encounter this issue when you perform a HA pair setup again in future.

We recommend that you follow these steps to apply the patch:

Procedure

Step 1 Download the patch from the following path: http://172.19.35.252/mse8-releases/patches/oracle-cert-patch.tar.gz.

Step 2 Copy the patch under */root*.

README file and script to install the patch is available in this location.

Step 3 Follow the installation instructions in the README file.

Smart License

Smart License is a flexible approach that streamlines the process of managing your software licenses. Use Cisco Smart Software Manager (CSSM) to view and manage Cisco CMX Smart Licenses for your Cisco Smart account.

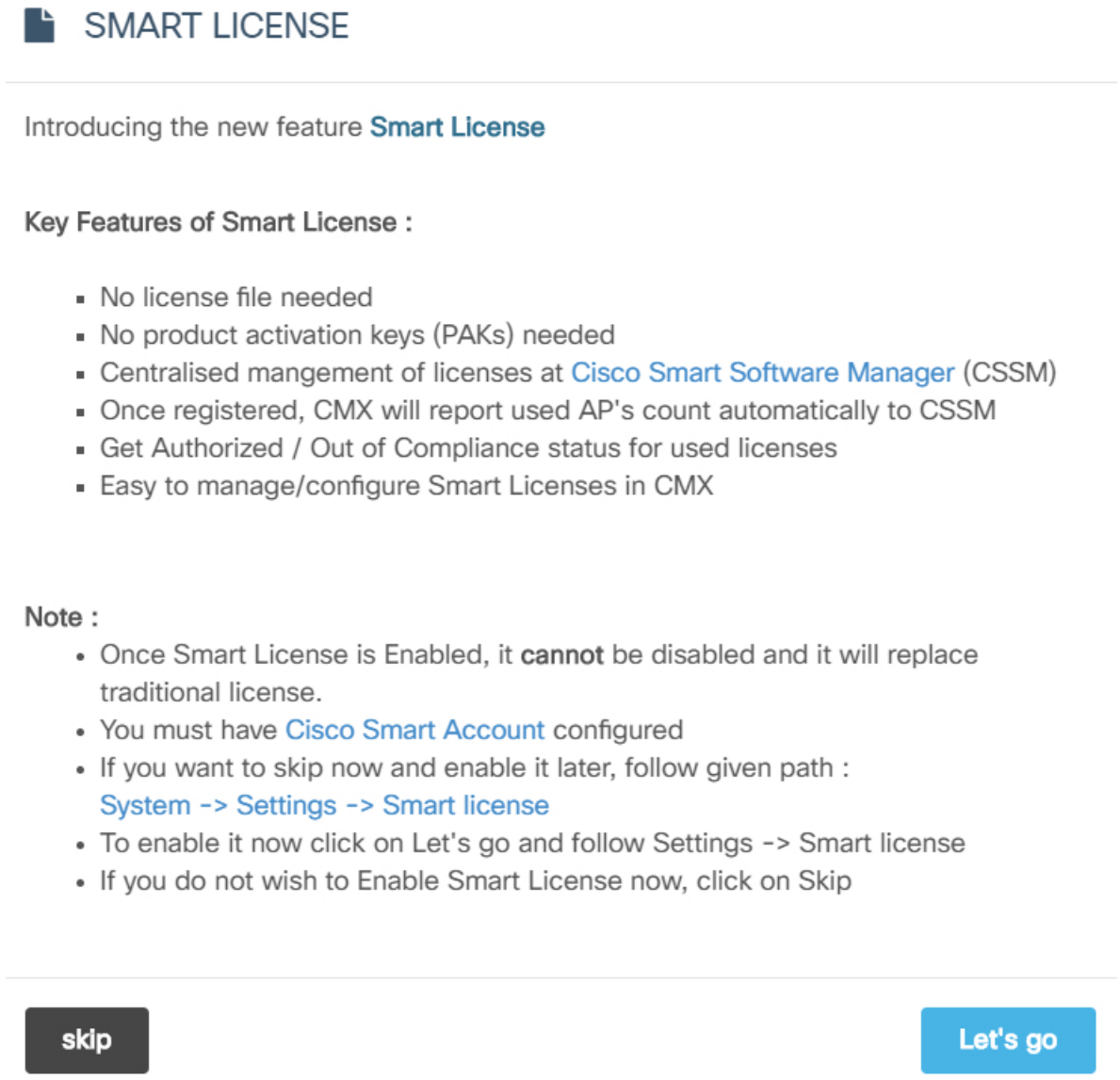
Smart License support in Cisco CMX helps you to maintain the licensing information with CSSM central repository and to manage software licenses easily. Smart License in Cisco CMX helps to eliminate storing of Product Activation Keys (PAK) and reduce the efforts in gathering information during license renewal.

Use Cisco CMX GUI or CLI to configure Smart License. Use CLI to configure Smart License setup for High Availability.

Use the **Settings** option under the **System** tab to configure Smart License. You can view AP count and status by choosing **System** > **Dashboard**.

When you login to Cisco CMX for the first time after upgrading to Cisco CMX Release 10.6.3, a pop-up message is displayed with Smart License information. You can choose to enable Smart License or skip. If you want to enable Smart License later, navigate to **System** > **Settings** > **Smart License** > **Enable**.

Figure 4: Smart License



Each Cisco CMX instance reports the installed or placed AP count to CSSM. An uninterrupted internet connectivity is required for Smart License to report the AP count to CSSM. Cisco CMX attempts AP count reporting every 24 hours and internet connectivity is required to establish this communication with CSSM.

If the AP count exceeds the purchased license count for a particular Smart Account, all registered Cisco CMX instances of that account becomes out of compliance.

The Report Count Timer Task job reports the installed AP count and is scheduled to run every 24 hours.

Note

- Smart License configuration is optional. If you set up Smart License, then traditional licensing is disabled permanently. A fresh Cisco CMX installation is required if you want to revert to traditional licensing setup.
- Smart License configuration is same for both Cisco CMX physical appliances (Cisco 3375 Appliance for Cisco Mobile Experiences and Cisco 3365 Mobility Services Engine (MSE)) and virtual machine.

Set Up Smart License on Cisco CMX with High Availability

You must provide the secondary Cisco CMX UDI in primary Cisco CMX before enabling Smart License. Use the CLI to setup Smart License on Cisco CMX with High Availability.

Before you begin

You must start with Smart License setup only after a successful High Availability setup. Before setting up Smart License, ensure that Smart Account (CSSM account) is setup for Cisco CMX and the Entitlement (license) types. We recommend that you also create a token ID for the registration process.

Procedure

Step 1 In the secondary Cisco CMX, run the **cmxos smartlicenseudi** command to get secondary Cisco CMX UDI.

Step 2 Copy the UDI and serial number of the secondary Cisco CMX.

Step 3 In the primary Cisco CMX, run the **cmxctl config smartlicense secondaryudi** command.

Step 4 Provide the copied UDI and serial number of the secondary Cisco CMX.

Note

- Note that the UDI of primary and secondary CMX is same. However, serial number is different.
- If you get an error message `Primary and Secondary udi does not match`, run the **cmxos smartlicenseudi** command on both primary and secondary Cisco CMX to verify the UDI.
- Re-registration and registration renewal are not allowed in secondary CMX when the failover state is active.
- In case of a restore action on another node or Cisco CMX or VM, the UDI and serial number differs and hence a re-registartion is required.
- If High Availability is disabled, re-register on the primary Cisco CMX to use it as a standalone Cisco CMX that is associated with the corresponding CSSM account.

What to do next

After sucessfully configuring secondary UDI, you can proceed to set up and register standalone Smart License. Verify the smart license details after the registration is complete.

Set Up Smart License on Cisco CMX (GUI)

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System** > **Dashboard**.
The **System at a Glance** window is displayed.

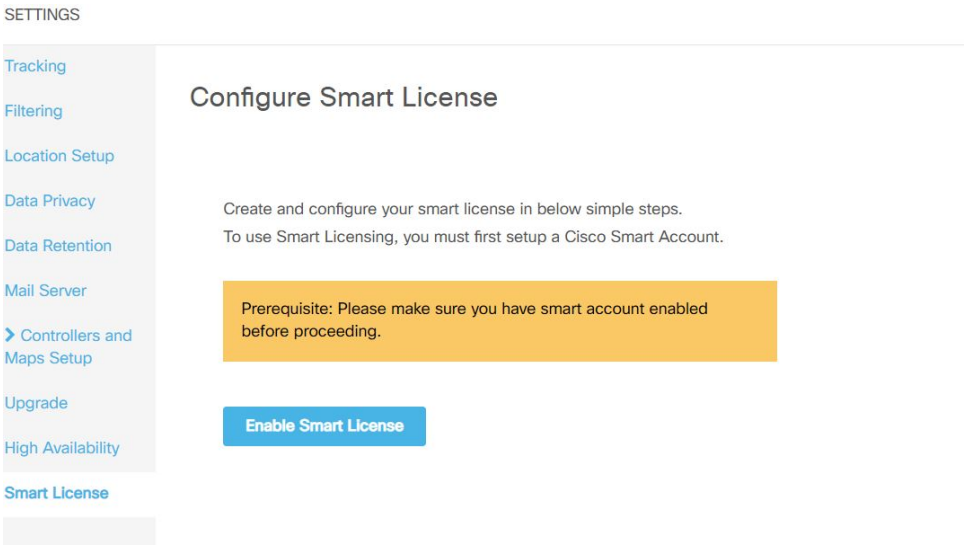
Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** window is displayed.

Step 4 In the left pane, click **Smart License**.

Step 5 Click **Enable Smart License**.

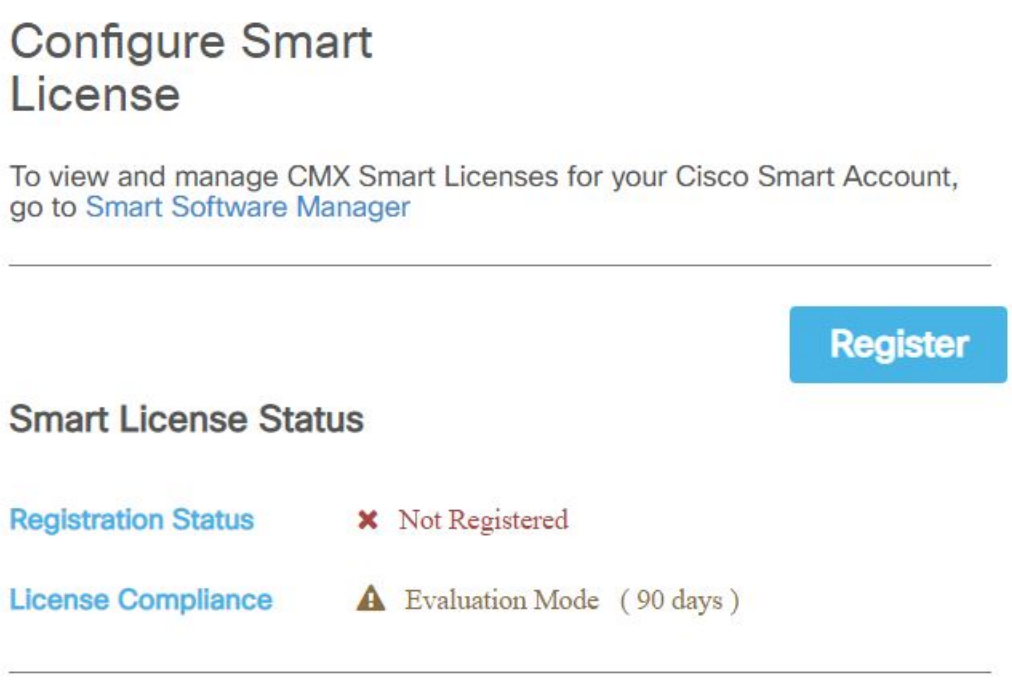
Figure 5: Configure Smart License > Enable Smart License



The Smart License Status window is displayed.

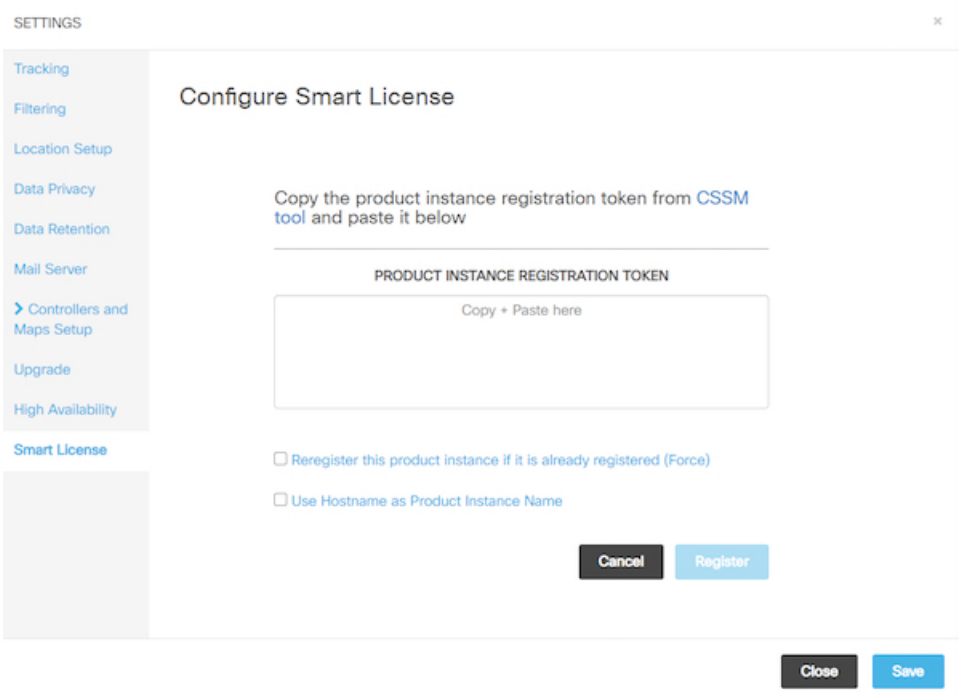
Step 6 Click **Register** to register the product instance.

Figure 6: Configure Smart License > Register



Step 7 In the Product Instance Registration Token field, enter the token ID from the CSSM smart account.

Figure 7: Product Instance Registration Token



Step 8 Click **Register**.

A success notification message is displayed in green color. All error messages are displayed in red color.

Step 9 (Optional) If an error is encountered, do either of the following:

- If token ID is invalid or expired, then verify token ID in Smart Account and try again with the correct token ID.
- If a communication error message is displayed, then check your network connectivity and try again.

After registering, the Smart License Status window is displayed.

Step 10 In the Smart License Status window, verify the Registration Status, License Compliance, Smart Account Name, Virtual Account, and Product Instance Name.

Note If hostname sharing configuration is selected at the time of registration, then hostname is displayed as "Product Instance Name". Otherwise, by default a combination of UDI_PID and UDI_SN is displayed in Cisco CMX as well as in Smart Account.

After Smart License is enabled, various Cisco CMX services are available depending on the Cisco CMX license types SEE, EXTEND, and ACT. By default, Cisco CMX pulls ACT licenses.

The following table lists the services available for the corresponding license type:

Table 2: License Types and Services

License Type	Services Enabled	Services Disabled
ACT	Analytics or Hyperlocation Configuration	NA
EXTEND	Analytics or Hyperlocation Configuration	Analytics and Hyperlocation Configuration
SEE	NA	**a.** Analytics **b.** Hyperlocation Configuration **c.** Partner Stream Notification

Set Up Smart License on Cisco CMX (CLI)

Before you begin

Ensure that all Cisco CMX services such as location, database and configurations are successfully running.

Procedure

Step 1 Connect to Cisco CMX through the console.

Step 2 To enable Smart License, run the **cmxctl config smartlicense enable** command.

A message is displayed when Smart License is enabled successfully. We recommend that you try again if you get a failure message.

Step 3 To register Smart License, run the **cmxctl config smartlicense register** command.

Step 4 Enter the token ID from CSSM smart account to register the Cisco CMX product instance.

After Smart License is successfully registered, AP count along with license type in use reporting is initiated.

If the registration process is a failure, one of the following messages is displayed prompting you to take appropriate action:

Message	Action
`Invalid / Expired Token ID`	Verify token ID in Smart Account and try to register again with the correct token ID.
`Already registered`	Try to re-register using the **cmxctl config smartlicense reregister** command.
`Communication error`	Check the network connectivity and try to register again.

Note We recommend that you try to register again if you see any other message than the ones mentioned above.

Step 5 (Optional) To verify the registration status, run the **cmxctl config smartlicense status** command.

Registration status is displayed as `Registered` and license compliance status as either `Authorized/Out of Compliance/Evaluation Mode` depending upon the reported AP count.

Configure Smart License

Before you begin

Use the Configure Smart License window to manage Cisco CMX smart licenses. You can renew authorization and registration, re-register and de-register Cisco CMX smart licenses.

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

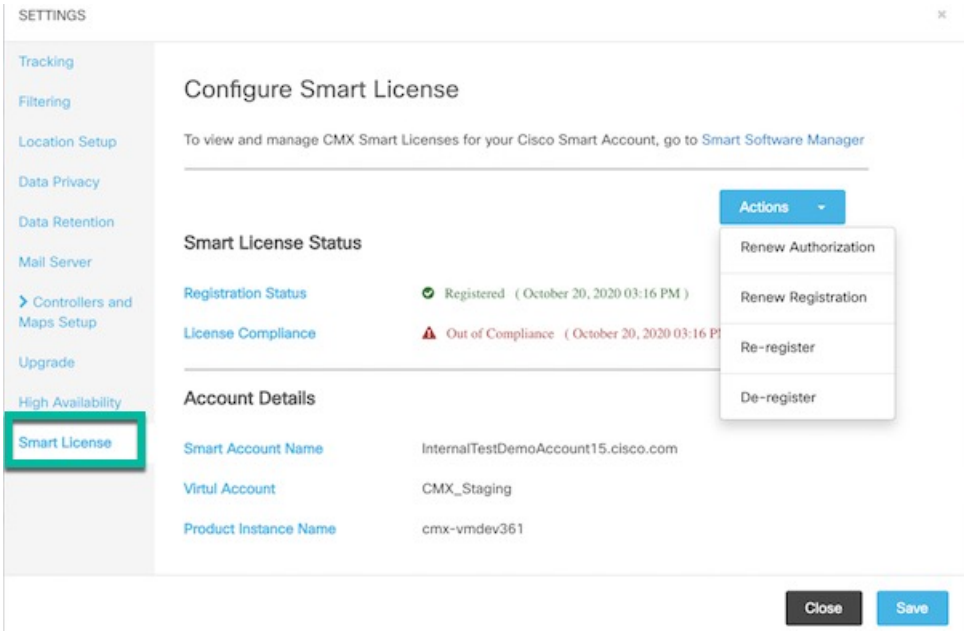
Step 2 Choose **System > Dashboard**.
The **System at a Glance** window is displayed.

Step 3 Click **Settings** at the top-right corner of the window.

The **SETTINGS** window is displayed.

Step 4 In the left pane, click **Smart License**.

Figure 8: Configure Smart License



Step 5 In the **Smart License Status** area, the following information is displayed:

- **Registration Status**: Displays the Cisco CMX smart license registered status.
- **License Compliance**: Displays the Cisco CMX smart license compliance details.

Step 6 In the **Account Details** area, the following information is displayed:

- **Smart Account Name**: Displays the Cisco CMX smart license account name.
- **Virtual Account**: Displays the Cisco CMX virtual account name.
- **Product Instance Name**: Displays the Cisco CMX product instance name.

Step 7 Click **Actions** drop-down list to view the following options:

- **Renew Authorization**: Click to renew Cisco CMX smart license authorization.

  Note
  - This action is optional as renew authorization is performed automatically when Cisco CMX communiccates with CSSM. Alternatively, Smart License agent performs renew authorization automatically after every 30 days from backend. As Cisco CMX reports installed AP count to CSSM daily, renew authorization is initiated automatically from backend.
  - We recommend that you perfrom this action if you want to troubleshoot or renew authorization manually if status is `Out of Compliance`. You also can renew authorization manually to reflect any recent Smart Account updates to reflect in Cisco CMX.

- **Renew Registration**: Click to renew Cisco CMX smart license registration.

Note
- This action is optional as renew registration is performed by Cisco CMX automatically in backend at the time of registration.
- This action renews the Registration ID and Certificate with CSSM. Cisco CMX performs this action automatically every 6 months from backend.

- **Re-register**: Click to re-register Cisco CMX smart license in the CSSM.

Note
- This action forcefully re-registers Smart License and overrides any existing registered instance. This action results in reported data lose of that particular instance in Smart Account.
- We recommend that you perfom this action to troubleshoot Smart License or when High Availability pair updates are complete.

- **De-register**: Click to de-register Cisco CMX smart license in the CSSM.

Note We recommend that you perform this action if Cisco CMX is not in use and you want to deregister the instance from CSSM.

Troubleshoot Smart License

Possible Cause

All Cisco CMX instances are out of compliance because it exceeds the number of purchased licenses in Smart Account.

Solution

Manage the installed APs within the same instances in a way to adhere with the requirements of your purchased license count or purchase additional licenses from Smart Account. After this is done, status off all Cisco CMX instances becomes **Authorized** automatically when Cisco CMX reports the installed AP count to CSSM next time. If you want to change the status manually, do either of the following:

- Cisco CMX GUI: Navigate to **System** > **Settings** > **Smart License** and choose **Renew Authorization** from **Actions** drop-down list
- Cisco CMX CLI: Run the **cmxctl config smartlicense renewauthorization** command.

Possible Cause

If Cisco CMX with High Availability is in split-brain state, what is the expected behaviour and recovery process of Smart Licensing?

Solution

Both primary and secondary CMX reports the installed AP count to CSSM simultaneously and create duplicate AP count report. This changes the status of product instance as `Out of Compliance`.

To resolve this issue, deregister Smart License from secondary CMX using CLI or Cisco CMX GUI or remove secondary CMX from Smart Account itself. In primary CMX, perform **Renew Authorization** action. This changes primary CMX status as `Authorized` and acts as a standalone CMX Smart Licensing.

After High Availability pair is recovered successfully, set up Smart License for High Avaliability again.

Possible Cause

Cisco CMX shows Smart License status as `Not registered` and displays unknown instances in Smart Account.

Solution

To resolve this issue, remove the unknown instances from Smart Account under **Actions** menu in the Product Instance page. Then, proceed to register or re-register from Cisco CMX.

Possible Cause

Smart License reporting fails.

Solution

Smart License reporting is scheduled to run every 24 hours. If it fails one time due to unexpected network issue, it automatically tries to report again after 24 hours. As long as Smart License is registered successfully and authorization is in place, Smart License reporting works as expected.

Possible Cause

Getting `Communication error` message for Smart License actions performed.

Solution

Verify Cisco CMX network status to ensure that internet access is available and retry again. If the issue persists, check the proxy settings.

Possible Cause

High Availability setup was not working and a new setup is configured.

Solution

Set up Smart License for High Availability again.

Possible Cause

When you perform Smart License deregistration action for the very first time or retry deregistration action and still the `Product Instance is not valid` message displays.

Solution

The product instance you are trying to deregister is already removed from CSSM. Expect a delay in CSSM to process the action but the product instance is already de-registered successfully. We recommend that you proceed with registering or re-registering action.

Possible Cause

Following messages displays:

- `Authorization Failed` message on GUI or CLI
- `Product Already Registered` message displays when you try to register eventhough you deregistered the product instance using GUI or CLI
- `Authorization Failed` or `Id certificate does not match` or `Renew Registration failed` message displays on GUI or CLI after a successful High Availability failback.
- If backup restore was done on another node or CMX or VM and the UDI is diffferent

Solution

Perform **Re-register** using CLI or use **Actions** in Smart License Status page.

Viewing Live System Alerts

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **System > Alerts**.

Step 3 In the **Live Alerts** window that is displayed, sort the alerts **By Severity, By Node,** or **By Service** using the drop-down list at the top-right corner.

To dismiss an alert, in the **Actions** column adjacent the corresponding node name, click the **Dismiss** icon.

Viewing Patterns

The **Patterns** window shows the pattern of a specific feature, such as client count, unique devices, and so on over the week for a selected time period. For example, if you select client count for the last 1 month, it shows which days or times of the week had the most client counts in the last 1 month. The larger dots indicates a larger count for the specific feature. You can hover cursor over the dots to interpret the pattern details.

- **Client Count**—Displays the total devices seen at a given time.
- **Location Calculation Time**—Displays the average amount of time, in milliseconds, taken by the Location algorithm, to calculate a client's location.
- **CPU Usage**—Displays the percentage of used CPU on a per-node basis.
- **Memory Usage**—Displays the percentage of used memory on a per-node basis.
- **Redis Connections Received**—Displays the total number of connections received by the cache service.
- **Locally Administered MAC count**—Displays the total number of iOS devices.

Note In Cisco CMX Release 10.2.3:

- The following pattern details are no longer available: Incoming Rate, Dropped Notifications, and NMSP LB Read Operations.
- In the **Select Criteria** drop-down list, the **iOS8 Devices** option is renamed to **Locally Administered MAC count**.

To view patterns:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Patterns**.

The **Patterns** window is displayed.

Step 3 From the **Select Criteria** drop-down list, choose the criteria for which you want to view pattern data.

Step 4 From the **Select Date Range** drop-down list, choose the time frame for the criteria pattern.

Note By default, the pattern data is displayed for the last one week for all the nodes in the cluster. You can view the average for the days from Monday to Sunday at all times for the selected time frame.

Step 5 Optionally, from the **Select Server** drop-down list, choose the Cisco CMX node for which you want pattern data to be displayed. By default, the pattern data for all the Cisco CMX nodes in a cluster is displayed.

Understanding the Metrics Tab

The **Metrics** tab in the Cisco CMX System service enables you to view system metrics, database metrics, cache metrics, location metrics, and analytics notification mertics. Metrics information related to the following criterias are displayed:

- System Summary
- Node Mertics
- Database Metrics
- Cache Mertics
- Location Metrics
- Analytics Notification Metrics

Viewing System Summary Metrics

The **System Summary Metrics** window displays the following information:

- **Number of Active Clients**
- **Number of NMSP messages processed by the system per second, in the last one minute**
- **Overall CPU usage metrics**
- **Overall memory usage metrics**
- **Overall disk usage metrics**

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

The **System Summary** tab in the left pane is selected by default, and the corresponding details are displayed.

Viewing System Summary Metrics Using the Dashboard

Alternatively, to view the System Summary metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 In the **Services** column, click the **Configuration, Location Heatmap Engine, NMSP Load Balancer,** or **Proxy** icon to view the corresponding **System Summary** metrics.

Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing CMX Node Metrics

The **CMX Node Metrics** window for a Cisco CMX node displays the following information:

- **Number of active clients**
- **Location latency time**
- **Number of incoming and outgoing NMSP messages**
- **Number of Controllers**
- **CPU uesage metrics for each service**
- **Memory usage metrics for each service**

- **Disk IO metrics**
- **Disk usage metrics**
- **redis-iops**
- **jdbc-iops**
- **redis-errors**
- **jdbc-errors**

To view the Node metrics for a Cisco CMX node:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).
Step 2 Choose **SYSTEM > Metrics**.
Step 3 In the left pane, click a Cisco CMX node name to view the metrics for that node.

Viewing CMX Node Metrics Using the Dashboard

Alternatively, to view the node metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).
Step 2 Choose **SYSTEM > Dashboard**.
The **System at a Glance** window is displayed.
Step 3 In the **Node** column, click a Cisco CMX node name to view the metric details for that node.
Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing Database Metrics

The **Database Metrics** window displays the following metrics:

- **Databse Size**—Shows the active memory used by the Cassandra and Postgres database.

To view the Database metrics:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

Step 3 In the left pane, click **Database Metrics**.

Note Hover your cursor over the Database metrics graph for descriptions and details regarding the database usage.

Viewing Database Metrics Using the Dashboard

Alternatively, to view the database metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 In the **Services** column, click the **Database** icon.

Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing Cache Metrics

The **Cache Metrics** window displays the following metrics:

- **Blocked connections**—Shows the number of clients pending on a blocking call to finish.
- **Connected clients**—Shows the number of client connections in use.
- **Used memory**—Shows the total number of bytes allocated by Redis using its allocator .
- **Evicted keys**—Shows the number of evicted keys due to maxmemory limit.

To view the Cache metrics:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

Step 3 In the left menu, click **Cache Metrics**.

Viewing Cache Metrics Using the Dashboard

Alternatively, to view the Cache metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 In the **Services** column, click the **Cache** icon.

Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing Location Metrics

The **Location Metrics** window displays the following metrics for each Cisco CMX node:

- **Location Counts**—The total computations done per second.
- **Location Times**—The location calculation time includes the mathematical portion of the location computation, and in most cases, is about 10 to 20 milliseconds. The location latency is the total time of latency computation from when the message comes from NMSPLB, to location, aggregation, creating cache, and calculation.
- **Location and Nmsplb Location and Nmsplb**—The rate of Network Mobility Service Protocol (NMSP) messages coming in to the NMSPLB.
- **Hyperlocation Rates**—The rate of incoming hyperlocation messages.
- **Location Computation**—The chart for location computation.

To view the Location metrics:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

Step 3 In the left pane, click **Location Metrics**.

Viewing Location Metrics Using the Dashboard

Alternatively, to view the Location metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Dashboard**.

The **System at a Glance** window is displayed.

Step 3 In the **Services** column, click the **Location** icon.

Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing Analytics Notification Metrics

The **Analytics Notification Metrics** window shows the most important performance indicators relating to the Analytics service. A notification is sent from the Location service to the Analytics service when significant movement is detected from a device. Each notification contains an update on the location of a single device.

The Analytics Notification Metrics window displays the following metrics for each Cisco CMX node:

- **Notification processing time**—The average time taken to process an incoming notification. This time will depend on a number of factors, but most notably, the size of the network, that is, the number of buildings, floors, zones, tags, and so on. This metric is relatively stable although you can expect peaks when the system is starting up.
- **Notification queue size**—The size of the queue for incoming notifications, which are queued before being processed. Depending on the system load, the Location service will send the notifications in batches. Therefore, you can always expect a queue of size greater than 0. This mechanism may also result in a very irregular graph at some zoom levels, that is, one with many ups and downs. This is the expected behavior. The queue size is expected to rise when the incoming rate increases. If it continues to grow, you will begin to see dropped notifications in the Notification dropped rate metric
- **Notification dropped rate**—The size of the queue for incoming notifications is limited. Hence, if the queue gets too big, notifications will be rejected. The **Notification dropped rate** graph shows how many notifications are rejected per second. Ideally, you require this chart to show a flat line of 0. If it does not show 0, you should consider adding another server to the cluster for running the Analytics service. This will distribute the load over the two servers.
- **Notification incoming rate**—This is the number of notifications received by the Analytics service per second. This trend should roughly equal the client count, that is, the more clients are detected by the Location service, the more notifications are expected. However, the trend is also influenced by the clients' movement rates because notifications are only sent when the location of a device changes.

To view the Analytics Notification metrics:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

Step 3 In the left pane, click **Analytics Notification Metrics**.

Viewing Analytics Notification Metrics Using the Dashbaord

Alternatively, to view the Analytics Notification metrics from the Dashboard:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Dashboard** .

The **System at a Glance** window is displayed.

Step 3 In the **Services** column, click the **Analytics** icon.

Note Hover your cursor over the metrics and graphs for descriptions and details.

Viewing Presence Metrics

The **Presence Metrics** window displays the following metrics:

- **Presence Counts**
- **Presence Rates**

To view the Presence metrics:

Procedure

Step 1 Log in to Cisco Mobile Connected Experiences (Cisco CMX).

Step 2 Choose **SYSTEM > Metrics**.

Step 3 In the left pane, click **Presence Metrics**.