Add and Organize Devices

Which Device Software Versions Are Supported by Cisco EPN Manager?

All devices should be running a *certified* device software version. However, certain devices must be running the *minimum* device software version. Follow the instructions in the table below on how to find out about a device software version.

To find this information:	**Do the following:**
A list of all certified device software versions	Refer to Cisco Evolved Programmable Network Manager Supported Devices.
	Choose **Help** > **Supported Devices** and hover over the "i" in the **Software Version** column to display a popup.

Devices that require a minimum device software version	Choose **Help** > **Supported Devices** and check the **Software Version** column for text similar to **>=x.x** (For example, **>=12.2** would indicate that the device must run at least device software version 12.2).

Generic Device Support

Cisco EPN Manager provides management of generic Cisco and non-Cisco devices which are not officially supported (features), with limited inventory and fault functions.

Table 1: Generic Device Support

Generic Device Type	Supported Features	Supported MIBs	Supported Faults
Cisco device	System - Summary System - Environment System - Civic Location System - Modules System - Physical Ports System - Sensor Interfaces - All Interfaces Interfaces - Ethernet Interfaces Physical Links	SNMPv2 ENTITY-MIB IF-MIB LLDP-MIB CISCO-ENTITY-FRU-CONTROL-MIB	Linkup/ Linkdown (IF-MIB) Warm start (SNMPv2-MIB) Cold start (SNMPv2-MIB) Authentication Failure (SNMPv2-MIB) BDI interface down/ up (Link down/up localized to BDI) (IF-MIB) entSensorThresholdNotification (CISCO-ENTITY-SENSOR-MIB)
Non-Cisco device	System - Summary System - Modules System - Physical Ports Interfaces - All Interfaces Physical Links	SNMPv2 ENTITY-MIB IF-MIB LLDP-MIB	Linkup/ Linkdown (IF-MIB) Warm start (SNMPv2-MIB) Cold start (SNMPv2-MIB) Authentication Failure (SNMPv2-MIB)

Inventory Discovery Process

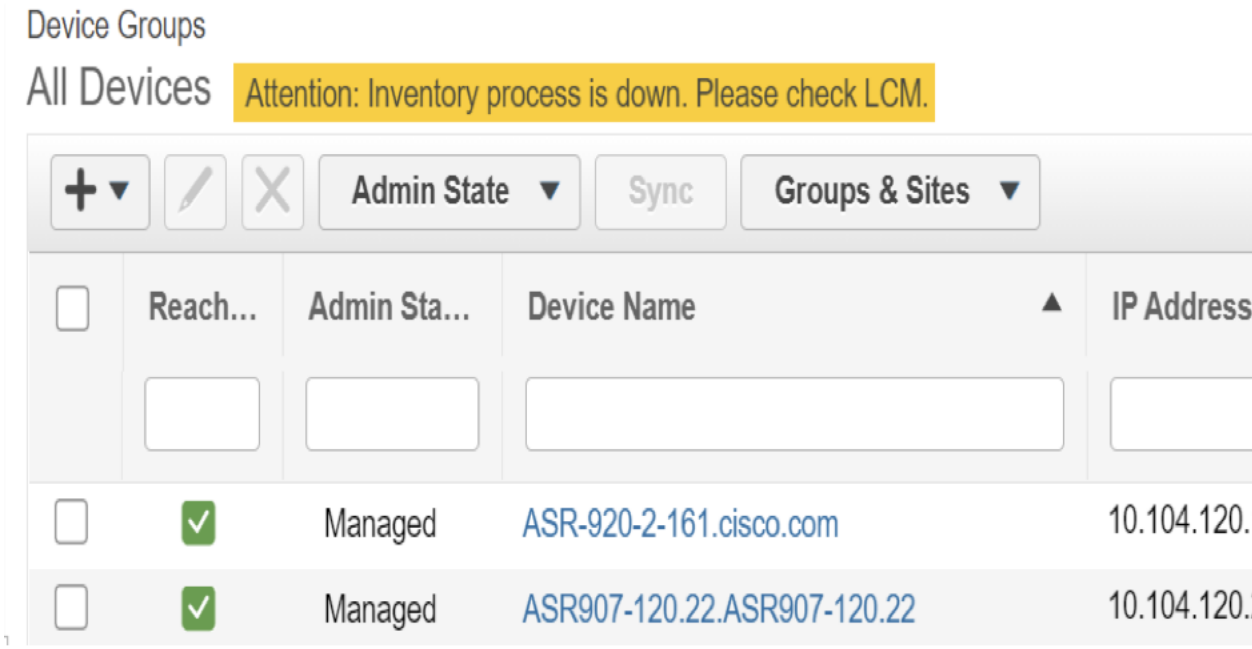
To enable scaling of devices in Cisco EPN Manager, the inventory discovery component of the EPNM process is run as a separate process (inventory-discovery-process). All functions related to inventory collection (including adding or importing devices, manual sync, granular and reactive sync, failed feature sync, switch inventory, and user-defined inventory discovery) are performed by inventory-discovery-process.

Note Configurations done through an open config interface in IOS-XR devices are not discovered in EPNM.

What happens when inventory-discovery-process is down

Cisco EPN Manager displays an error message in the **Network Devices** page when inventory-discovery-process is down.

Note You will not be able to perform any inventory operations when the inventory-discovery-process is down. Please wait for the process to come up before resuming any inventory operations.



Logs related to inventory-discovery-process are stored at `/opt/CSCOlumos/logs/inventory-discovery-process`. See Inventory Discovery Process Logs for more information.

The status of inventory-discovery-process (started, stopped, reachable, unreachable, and restarting) is displayed as a system-generated event in the **Monitor** > **Alarms and Events** page.

For example, the event "Process inventory-discovery-process is unreachable and will try to restart" indicates that inventory-discovery-process is not reachable and will be restarted automatically.

Important The event "Process inventory-discovery-process reached auto-restart limit" indicates that the inventory-discovery-process has failed to restart automatically inspite of multiple retries. In this case, it is recommended that you open a support case with Cisco Technical Assistance Center (TAC). See Open a Cisco Support Case.

Add Devices to Cisco EPN Manager

Cisco Evolved Programmable Network Manager uses device, location, and port groups to organize elements in the network. When you view devices in a table or on a map (network topology), the devices are organized in terms of the groups they belong to. When a device is added to Cisco EPN Manager, it is assigned to a group named **Unassigned Group**. You can then move the device into the desired groups as described in Create Groups of Devices for Easier Management and Configuration, on page 37.

Note

- To add a Cisco WLC to Cisco EPN Manager, make sure it does not have any unsupported Access Points (APs), otherwise Cisco EPN Manager will not discover any APs from that WLC.
- Cisco EPN Manager does not support multiple independent networks that share the same IP addresses. Ensure the network element that you add does not contain conflicting IP addresses.

Table 2: Methods for Adding Devices

Supported Methods for Adding Devices	See:
Add multiple devices by discovering the neighbors of a seed device using:	Add Devices Using Discovery, on page 5.
• Ping sweep and SNMP polling (Quick Discovery)	• Run Quick Discovery, on page 6
• Customized protocol, credential, and filter settings (useful when you will be repeating the discovery job)	• Run Discovery with Customized Discovery Settings, on page 7
Add multiple devices using the settings specified in a CSV file	Import Devices Using a CSV File, on page 9.
Add a single device (for example, for a new device type)	Add Devices Manually (New Device Type or Series), on page 11

These topics provide examples of how to add a Carrier Ethernet and an Optical device to Cisco EPN Manager:

- Example: Add a Single Cisco NCS 2000 or NCS 4000 Series Device, on page 12
- Example: Add a Network Element as an ENE Using Proxy Settings, on page 12

Add Cisco ME1200 devices in Cisco EPN Manager

Follow these settings while adding Cisco ME1200 devices in Cisco EPN Manager:

- SNMP - Use the same SNMP settings as that of other devices.
- CLI - Ensure that the protocol setting is set to SSH2. Though the device can be reached via telnet using a port, it is recommended to use SSH protocol. If telnet is used, then the custom telnet port used must be 2323.

- Remember that configuration changes to Cisco ME1200 devices are not automatically discovered by Cisco EPN Manager. After making a change, you must manually sync the device. To do this, select the required device (s) in the Network Devices table and click **Sync**.

Add Devices Using Discovery

Cisco EPN Manager supports two discovery methods:

- Ping sweep from a seed device (Quick Discovery). The device name, SNMP community, seed IP address and subnet mask are required. This method is not supported for discovering optical devices. See Run Quick Discovery, on page 6
- Using customized discovery methods (Discovery Settings)—This method is recommended if you want to specify settings and rerun discovery in the future. If you want to discover optical devices, use this method. See Run Discovery with Customized Discovery Settings, on page 7.

Note

- If a discovery job rediscovers an *existing* device and the device's last inventory collection status is **Completed**, Cisco EPN Manager does *not* overwrite the existing credentials with those specified in the Discovery Settings. For all other statuses (on existing devices), Cisco EPN Manager overwrites the device credentials with those specified in the Discovery Settings.
- Service discovery might take longer than usual when a large number of devices is added during database maintenance windows. Therefore, we recommend that you avoid large-scale operations during the night and on weekends.
- Autonomous APs are filtered out of the discovery process to optimize the discovery time. You need to manually add Autonomous APs using Import Devices or Credential Profile.

The discovery process of a device is carried out in the sequence of steps listed below. As Cisco EPN Manager performs discovery, it sets the reachability state of a device, which is: Reachable, Ping Reachable, or Unreachable. A description of the states is provided in Device Reachability and Admin States, on page 31.

1. Cisco EPN Manager determines if a device is reachable using ICMP ping. If a device is not reachable, its reachability state is set to **Unreachable**.
2. Server checks if SNMP communication is possible or not.
   - If a device is reachable by ICMP but its SNMP communication is not possible, its reachability state is set to **Ping Reachable**.
   - If a device is reachable by both ICMP and SNMP, its reachability state is **Reachable**.
3. Verifies the device's Telnet and SSH credentials. If the credentials fail, details about the failure are provided in the Network Devices table in the **Last Inventory Collection Status** column (for example, **Wrong CLI Credentials**). The reachability state is not changed.
4. Modifies the device configuration to add a trap receiver so that Cisco EPN Manager can receive the necessary notifications (using SNMP).
5. Starts the inventory collection process to gather all device information.
6. Displays all information in the web GUI, including whether discovery was fully or partially successful.

Note When Cisco EPN Manager verifies a device's SNMP read-write credentials, the device log is updated to indicate that a configuration change has been made by Cisco EPN Manager (identified by its IP address).

Verify SNMP Communication

Follow these steps if the reachability state of a device is set as **Ping Reachable**.

Note For Cisco NCS 2000 devices, verify the TL1 credentials, in addition (or instead) to SNMP credentials.

Step 1 Ensure that the credentials used by Cisco EPN Manager for device verification are correct.

Step 2 Verify that SNMP is enabled on the device and that the SNMP credentials configured on the device match those configured on Cisco EPN Manager.

Step 3 Check whether SNMP packets are being dropped due to configuration errors or due to your security settings (default behavior) in all the network devices that are participating in transporting SNMP packets between the managed devices and the Cisco EPN Manager server.

Specify the Management IP Address Type (IPv4/IPv6) for Discovered Devices

For discovered dual-home (IPv4/IPv6) devices, specify whether you want Cisco EPN Manager to use IPv4 or IPv6 addresses for management IP addresses.

Note Device inventory has a limited DNS name IPv6 support.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Discovery**.

Step 2 From the **IPv4/IPv6 Preference for Management Address** drop-down list, choose either **v4** or **v6**.

Note Ensure that the management IP address that you choose is not a mix of IPv4 and IPv6 addresses.

Step 3 Click **Save**.

Run Quick Discovery

Use this method when you want to perform a ping sweep using a single seed device. Only the device name, SNMP community, seed IP address and subnet mask are required. If you plan to use the configuration management features, you must provide the protocol, user name, password, and enable password.

Before you begin

See Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure your devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Discovery**, then click the **Quick Discovery** link at the top right of the window.

Step 2 At a minimum, enter the name, SNMP community, seed IP address, and subnet mask.

Step 3 Click **Run Now**.

What to do next

Click the job hyperlink in the **Discovery Job Instances** area to view the results.

Run Discovery with Customized Discovery Settings

Cisco EPN Manager can discover network devices using discovery profiles. A discovery profile contains a collection of settings that instructs Cisco EPN Manager how to find network elements, connect to them, and collect their inventory. For example, you can instruct Cisco EPN Manager to use CDP, LLDP, OSPF to discover devices, or just perform a simple ping sweep (an example of the results of a ping sweep is provided in Sample IPv4 IP Addresses for Ping Sweep, on page 8.) You can also create filters to fine-tune the collection, specify credential sets, and configure other discovery settings. You can create as many profiles as you need.

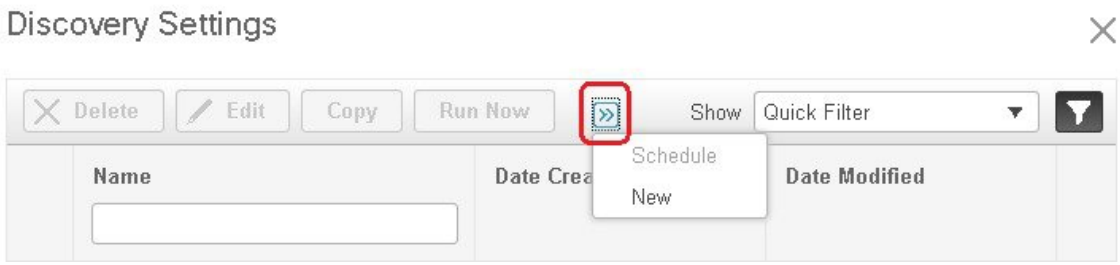
After you create a profile, create and run a discovery job that uses the profile. You can check the results of the discovery job on the **Discovery** page. You can also schedule the job to run again at regular intervals.

Before you begin

See Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure your devices are configured correctly so that Cisco EPN Manager can discover them.

Step 1 Choose **Inventory > Device Management > Discovery**, then click the **Discovery Settings** link at the top right of the window. (If you do not see a Discovery Settings link, click the arrow icon next to the Quick Discovery link.)

Step 2 In the **Discovery Settings** pop-up, click **New**.



Step 3 Enter the settings in the **Discovery Settings** window. Click "**?**" next to a setting to get information about that setting. For example, if you click "**?**" next to **SNMPv2 Credential**, the help pop-up provides a description of the protocol and any required attributes.

Step 4 Click **Run Now** to run the job immediately, or **Save** to save your settings and schedule the discovery to run later.

Sample IPv4 IP Addresses for Ping Sweep

The following table provides an example of the results of a ping sweep.

Subnet Range	Number of Bits	Number of IP Addresses	Sample Seed IP Address	Start IP Address	End IP Address
255.255.240.0	20	4094	205.169.62.11	205.169.48.1	205.169.63.254
255.255.248.0	21	2046	205.169.62.11	205.169.56.1	205.169.63.254
255.255.252.0	22	1022	205.169.62.11	205.169.60.1	205.169.63.254
255.255.254.0	23	510	205.169.62.11	205.169.62.1	205.169.63.254
255.255.255.0	24	254	205.169.62.11	205.169.62.1	205.169.63.254
255.255.255.128	25	126	205.169.62.11	205.169.62.1	205.169.63.127
255.255.255.192	26	62	205.169.62.11	205.169.62.1	205.169.63.62
255.255.255.224	27	30	205.169.62.11	205.169.62.1	205.169.63.30
255.255.255.240	28	14	205.169.62.11	205.169.62.1	205.169.63.14
255.255.255.248	29	6	205.169.62.11	205.169.62.9	205.169.63.14
255.255.255.252	30	2	205.169.62.11	205.169.62.9	205.169.63.10
255.255.255.254	31	0	205.169.62.11		
255.255.255.255	32	1	205.169.62.11	205.169.62.11	205.169.62.11

Example: Add Optical Devices Using Discovery

The following example shows how to use a seed device and the OTS protocol to discover Cisco NCS 2000 devices.

Before you begin

Check Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure the optical devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Discovery**, then click the **Discovery Settings** link at the top right of the window.

Step 2 In the **Discovery Settings** window, click **New** to create a new discovery profile.

a) Enter a discovery profile name—for example, **NCS2k_3_OTS**.

b) Enter the seed device and hop count information for the OTS protocol.

1. Click the arrow next to **Advanced Protocols** to open the discovery protocols list.

2. Click the arrow next to **OTS Topology** to open the OTS protocol window.
3. Check the **Enable OTS** check box.
4. Click the Add Row ("+") icon.
5. Enter the seed device IP address and hop count (for example, **209.165.200.224** and **3**), then click **Save** to add the seed device information.
6. Click **Save** in the OTS protocol window to close the window. If necessary, click outside of the OTS Protocol window to close it.

c) Enter the TL1 device credentials for the Cisco NCS 2000 seed device.

1. In the **Credential Settings** area, click the arrow next to **TL1 Credential** to open the TL1 credentials window.
2. Click the Add Row ("+") icon.
3. Enter the seed device IP address, username, password, and proxy IP address (if required).
4. For Secure TL1 access, choose **Enable** from the **SSH** drop-down list. For Unsecured TL1, choose **Disabled**.
5. Click **Save** to add the credential information.
6. Click **Save** in the TL1 Credentials window to close the window. If necessary, click outside of the TL1 Credentials window to close it.

Step 3 Click **Save** to save the new discovery profile. The new **NCS2k_3_OTS** profile is added to the Discovery Settings window.

Note If you receive an error message, make sure you have enabled the protocols. (This is a common error.)

Step 4 Select **NCS2k_3_OTS**, then click **Run Now** to begin the discovery job.

Step 5 Check the results of the job by choosing **Inventory** > **Device Management** > **Discovery**.

Import Devices Using a CSV File

Use a CSV file to add devices if you have an existing management system from which you want to import devices, or you want to specify different values in a spreadsheet.

- Create the CSV File, on page 9
- Import the CSV File, on page 10

Create the CSV File

Follow this procedure to create the CSV file.

Step 1 Create the bulk import CSV file using the template that is available from the **Bulk Import** dialog box. To open the dialog box, choose **Inventory** > **Device Management** > **Network Devices**, click the + icon above the Network Devices table, and choose **Bulk Import**. Use the bulk device add sample template.

Step 2 To find out what the different fields mean and which fields are required, use the information that is in the web GUI. The information is the same for adding a single device or adding devices in bulk. To get this information, choose **Inventory** > **Device Management** > **Network Devices**, click the + icon above the Network Devices table, then choose **Add Device**.

Mandatory fields are indicated by an asterisk; fields that require an explanation display a **?** icon next to them (hover your cursor over the **?** icon to view the field details).

Step 3 When you are done, save your changes and note the location of the file so you can import it as described in Import the CSV File, on page 10.

Import the CSV File

Follow this procedure to import and add devices using a CSV file.

Before you begin

See Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure your devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Bulk Import**.

Step 3 In the **Bulk Import** dialog:

a) Make sure **Device** is chosen from the **Operation** drop-down list.

b) Click **Browse**, navigate to the CSV file, then click **Import**.

Note Choose the CSV file that you have exported already as part of bulk device add sample template download. Do not edit the csv file manually.

Step 4 Check the status of the import by choosing **Administration** > **Dashboards** > **Job Dashboard**.

Step 5 Click the arrow to expand the job details and view the details and history for the import job. If you encounter any problems, see Validate Added Devices and Troubleshoot Problems, on page 33.

How Groups Work during Import

Note the following points about device groups during import:

- Before adding devices, check whether all device groups mentioned in the CSV file are present in Cisco EPN Manager.
- If a group associated with a device is not present, Cisco EPN Manager adds that device without mapping it to the group.
- Cisco EPN Manager retains any existing group mapping from before the import.
- If the CSV file contains both existing and new group mapping for a device, Cisco EPN Manager associates the device to the new groups in addition to the existing groups.
- Cisco EPN Manager lists devices added through the **Bulk Import** option under the **Add Device Manually** area, even if the associated device group has dynamic rules.
- To complete the device group mapping, perform synchronization after the import is complete. From the **Network Devices** table, select the devices, and click **Sync**.

Add Devices Manually (New Device Type or Series)

Use this procedure to add a new device type and to test your settings before applying them to a group of devices.

Before you begin

See Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure your devices are configured correctly.

Step 1 Choose **Inventory > Device Management > Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 In the **Add Device** dialog box, complete the required fields. Click the **?** icon next to a field for a description of that field.

Note Telnet/SSH information is mandatory for devices such as most Cisco NCS devices. Even if the default timeout for Telnet/SSH (60 sec) and SNMP (10Sec) differ between devices based on the network latency, the devices can be configured.

You can mandate the SSH key validation for the added device, by selecting the **Strict host check key for SSH** check box in the **Administration > Settings > System Settings > Inventory> Inventory** page. This enables you to specify the algorithm and SSH key under Telnet/SSH Parameters.

If you do not want to manually specify the algorithm and SSH key while adding the device, select the **Trust SSH key on first use** check box in the **Administration >Settings > System Settings > Inventory> Inventory** page. The SSH key sent from the device during its first communication will be trusted and added to the device credentials. This saved key will be auto populated when the device is added in future and used for validation.

Step 4 (Optional) Click **Verify Credentials** to validate the credentials before adding the device.

Step 5 Click **Add** to add the device with the settings you specified.

Note For NCS 2000 devices, provide a TL1 user with SuperUser profile, otherwise the devices will go to **Completed with Warning** status and the **Configuration > Security** tab will not be available in **Chassis View**.

Note Not providing Telnet/SSH credentials may result in partial collection of inventory data.

Note For NCS 2000 devices, the **Enable Single Session TL1** setting takes effect only for devices running release 11.0 onwards.

Note Cisco EPN Manager, by default, does not accept UCS with self-signed certification. User can enable it manually by adding the following lines in the */opt/CSCOlumos/xmp_inventory/xde-home/inventoryDefaults/ncsCIMC.def* file.

```
<default attribute="HTTPS_TRUST_CONDITION">always</default>

<default attribute="HTTPS_HOSTNAME_VERIFICATION_STRATEGY">allow_all</default>
```

Note Each device must have a Unique SNMP Engine ID. If same Engine Id is used in two devices, an alarm will be raised with conflicting device details. The SNMP Engine Id's unique check will happen only if we manage the device with SNMP v3 credentials.

Example: Add a Single Cisco NCS 2000 or NCS 4000 Series Device

Cisco NCS 2000 series devices are TL1-based devices, and Cisco EPN Manager uses the TL1 protocol to communicate with these devices. The number of recommend TL1 active session for the NCS2K devices is not more than 15. If the number of active sessions is more than 15, Cisco EPN Manager may not able to receive TL1 event from device for any granular or reactive inventory operations. Cisco NCS 4000 series devices, on the other hand, are Cisco IOS-XR devices, and Cisco EPN Manager uses the SNMP and Telnet/SSH protocols to communicate with these devices.

Before you begin

Check Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure the Cisco NCS devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 In the **Add Device** dialog box, complete the required fields. Click the **?** icon next to a field for a description of that field.

- Cisco NCS 2000 series and Cisco ONS 15454—Enter TL1 parameters
- Cisco NCS 4000 series—Enter SNMP and Telnet/SSH parameters

Step 4 Click **Verify Credentials** to validate that Cisco EPN Manager can reach the device.

Step 5 Click **Add** to add the device to Cisco EPN Manager.

Example: Add a Network Element as an ENE Using Proxy Settings

Messages sent to a particular network element must pass through other NEs in the network. To pass messages, one or more nodes can be a Gateway Network Element (GNE) and connect other NEs in your network. A node becomes a GNE when you establish a TL1 session and enter a command that must be sent to another node. The node that receives the TL1 message from another node for processing is an End-point Network Element (ENE). Messages from an ENE are transmitted through a GNE to other NEs in the network.

Before you begin

Check Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure your devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 In the **Add Device** dialog box, under **General Parameters**, enter the IP address or the DNS name of the ENE that you want to add. Click the **?** icon next to a field for a description of that field.

Step 4 Under **TL1 Parameters**, enter the primary and secondary proxy IP address for the node that you are using as an ENE.

Note The secondary proxy IP address is optional, and will be activated only in the event of failure of the primary proxy.

Step 5 Click **Verify Credentials** to validate that Cisco EPN Manager can connect to the device.

Step 6 Click **Add** to add the device to Cisco EPN Manager.

Example: Enabling a Single Session on Cisco NCS 2000 Series Devices

Cisco NCS 2000 series devices are TL1-based devices and Cisco EPN Manager uses the TL1 protocol to communicate with these devices. You can edit a newly added device or configure an existing NCS 2000 devices to limit the machine (EMS) account with single session.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Select a device and then click the Edit icon. The **Edit Device** window appears.

Step 3 To edit a single session on a new device or on existing device, set the following parameters:

a) Check the **Enable Single Session TL1** check box under **TL1 Parameters**.

b) Enter the required parameters.

c) Do one of the following:

- Click **Update** to update the single session settings only on the database.
- Click **Update & Sync** to update both the database and device with the single session settings.

Step 4 (Optional) You can also edit the single session through Bulk Import and Bulk Edit operations.

Note By default, the single session is disabled for the bulk edit. You must check the **Enable Single Session TL1** check box to enable it for all the devices to be imported. Selecting the Bulk Import option might affect the single session flag.

What to do next

To verify the enabled single session

1. Launch the Cisco Transport Controller and select the device for which the single session is enabled.
2. Choose **Provisioning** > **Security** > **Active Logins** to view all the active devices with single sessions. The devices for which the single session is disabled will not be displayed.

Note The credentials check is the only exception while performing the single session task

Establish Strong SSH for Device Communication

Follow this procedure to connect to devices with more secure SSH connection.

Step 1 Connect to the server using SSH and log in as the admin user. See Establish an SSH Session With the Cisco EPN Manager Server for more information.

Step 2 Navigate to `/opt/CSCOlumos/xmp_inventory/xde-home/conf/` directory.

Step 3 Rename the `sampleTransportProperties.xml` file to `transportProperties.xml` in the same directory. This enables Cisco EPN Manager to use stronger ciphers when connecting to the device.

What to do next

Restart Cisco EPN Manager. See Stop and Restart Cisco EPN Manager.

Note To revert to the previous connection, rename the `transportProperties.xml` file to `sampleTransportProperties.xml` and restart Cisco EPN Manager.

Add SVO Devices

SVO is a solution to support multi chassis behavior. SVO device can support one NCS2k ROADM and 50 NCS2k OLA instances. With SVO devices, Cisco EPN Manager will move to managed plane provisioning. From 12.0.1, the Cisco EPN Manager will uses the Netconf to communicate with SVO instances.

Before you begin

Check Configure Devices So They Can Be Modeled and Monitored, on page 19 to make sure the Cisco NCS devices are configured correctly.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 In the **Add Device** dialog box, complete the required fields.

a) Enter the **IP Address** in the **General** section.
b) Select **Netconf Over SSH2** from the **Protocol** drop down list in the **Telnet/SSH** section.
c) Enter the **Username**, **Password**, and **Confirm Password**.
d) Click **Verify Credentials** to validate that Cisco EPN Manager can reach the device.

Step 4 Click **Add** to add the device to Cisco EPN Manager.

If you click on the **Device Name** hyperlink of this device the SVO Nodal craft web UI opens to display and manage the details of this device if SSO is configured. If SSO is not configured, you need to enter the login credentials in the SVO Nodal craft web UI. To enable SSO from Cisco EPN Manager to SVO Nodal craft web UI, see Enable Single Sign-on (SSO) from Cisco EPN Manager to SVO UI , on page 17.

You can also do a bulk import of the devices.

What to do next

- To create and provision OCHCC and OCH-Trail circuits, see Create and Provision an OCH Circuit.

- Performance collection must be enabled on the SVO devices to poll and collect the PM data from underlying NCS2K node. It can be enabled or disabled using the CLI Template for one or more devices.

Device 360 View - SVO

The Device 360 view for SVO devices provides the following information.

Information Provided in Device 360 View	Description
General information and tools	Device type, its OS type and version, its last configuration change, and its last inventory collection. Icons convey the status of the device. Using the menus in the pop up window, you can perform these tasks: • Auto-Refresh—For real-time updates of device status and troubleshooting, enable an on-demand refresh by clicking on the Refresh icon. Alternatively, you can also set the auto-refresh interval to 30 seconds, 1 minute, 2 minutes, or 5 minutes from the drop-down list. Auto-Refresh is OFF by default. **Note** The Auto-Refresh setting is applicable only for the currently open 360 view pop up window. If the view is closed and reopened or another view is opened, by default Auto-Refresh is Off. • Open the Device Details page to view details about software image and configuration file management (**View** > **Details**) • Open the Device Configuration page in the SVO Nodal craft UI to perform any configuration changes on the device by choosing **View** > **Chassis View**. • Select a device for a side-by-side comparison with another device on the basis of information such as raised alarms and the current status of circuits, interfaces, and modules (**Actions** menu)—see Compare Device Information and Status • Troubleshoot—Perform a ping or traceroute, launch the Alarm browser, open a Cisco support case, or get information from the Cisco Support Community (**Actions** menu) • Topology—View the network topology and the device's local topology, up to 3 hops (**Actions** menu) • Collect the device's inventory and save it to the database using **Sync Now**, **Sync and Rebuild** (**Actions** menu)
Alarms tab	Current alarms for the device, including their severity, status, and the time they were generated.
Modules tab	Modules that are configured on the device, including their name, type, state, ports, and location.

Interfaces tab	Interfaces that are configured on the device, including status information. You can also launch an Interface 360 view for a specific interface.
Neighbors tab	NEs that are connected to this device through Cisco Discovery Protocol (CDP). If the selected device does not support CDP, this tab is empty. Displayed information includes device type and name, and the local port and device port. To view the neighbors in a pop up topology map, choose **Actions > N Hop Topology** from the top right of the Device 360 view (see View a Device's Local Topology from the Device 360 View.
Circuit/VCs tab	Circuit/VC name, type, customer, status, and creation date for each circuit provisioned on the device. You can also launch a Circuit/VC 360 view for specific circuits/VCs.
Civic Location	Geographical information about device's location.
Recent Changes	The last five changes made on the device, classified as: Inventory, Config (Configuration Archive), or SWIM (Software Images). (These are the same types of changes that are displayed when you choose **Inventory** > **Network Audit**.) **Note** If you have logged in as a root user, then you can view all the activities under the Recent Changes tab. If you have logged in as a non-root user, then you can only view the activities performed by you.

You can also view a specific device in the topology map by choosing **Actions** > **Network Topology** (at the top right of the Device 360 view).

SVO UI Overview

Here are the details of the different sections and their respective tabs in SVO:

Table 3: SVO UI Details

Section	Details
SVO Topology	This section shows the topological view of the devices.
Fault Monitoring	This section shows the Alarms, Conditions, History, and Profiles.You can export details of alarms, conditions, and history. You can also load alarm profiles, associate alarms, and manage alarm resources.
Device Configuration	This section allows you to manage the Authorization Groups, Devices, and Diagnostics. You can also configure the IPv4 settings and apply the device settings.

Section	Details
Node Configuration	Here are the details of the action that can be performed in the respective tabs in this section: • Optical Configuration: You can manage the Internal Patch Cords, Connection Verification, Optical Degrees, Fiber Attributes, OSC Terminations, GCC Terminations, Optical Degree Power Monitoring, APC, and measure and export the Span Loss data. • ANS Parameters: You can view export the details for the Amplifier, Interface, Raman Amplifier, and Raman Interface. • Optical Cross Connections: You can view and export the optical cross connection data. • OTDR: You can manage OTDR Provisioning and traces. • XML Configuration: You can select an XML configuration file and load the configuration from it.
SVO Configuration	This section allows you to set up date and time for SVO. You can also retrieve and download SVO and System Logs.
Database	This section shows the database details.
Software Manager	This section allows you to download and manage the SVO and device software packages.
Inventory	This section allows you the view and export the inventory data.
Users Configuration	This section helps you to manage users, manage the SSO configuration and users, and manage the RADIUS configuration.

If required, you can click on the **Device Name** hyperlink of an SVO device, to display the device details in the SVO window. On the Chassis view you can select a card and perform a **Open Card**, **Delete, Soft Reset**, **Hard Reset**, **OBFL**, and **Change Admin State** actions. For the selected card you can select **Open Card** and view the Alarms, Conditions, History, Maintenance, and Performance Details in the respective tabs. You can click on the Provisioning tab to add Pluggable Port Modules, Card Mode, Pluggable Ports, Trail Trace Monitoring, ODU Interfaces, OTU interfaces, Ethernet Interfaces, Optical Channels, Optical Thresholds, G709 Thresholds, FEC Thresholds, UDC, and RMON Thresholds for the selected card. Once done the respective changes will be displayed in the Device 360 and Interface 360 view in EPNM.

Enable Single Sign-on (SSO) from Cisco EPN Manager to SVO UI

To enable Single Sign-on (SSO) from Cisco EPN Manager to SVO UI:

Step 1 Log in to the SVO UI.

Step 2 From the **Menu** navigate to **Access Configuration** and click the **SSO** tab.

Step 3 Under the **SSO Configuration** area, select the **Enable SSO** check box.

Step 4 Enter **IP Address** and **Port** details of the Cisco EPN Manager server from which you wish to cross-launch the SVO UI and click **Apply**.

Step 5 Under **SSO**, click **+** to add the username. Assign appropriate role to the user and click **Apply**.

Migrating Existing NCS2K-Based Networks

You can migrate the existing NCS2K based networks using the **Optical Circuits/VCs Migrator** window.

Note
- OCH-Trail migration is supported for OTU3, OTU2, OTU2E, OTU4, and OTU4C2.
- OCH-CC migration is support for 100G, 10G, and 40G.

To migrate the existing NCS2K-based networks, carry out these steps:

Before you begin

- NCS2K nodes must be upgraded to 12.3 and equipped with an SVO card.
- Both NCS2K and SVO nodes must be modeled in EPNM and added to different user-defined groups.
- NCS2K and SVO nodes must be in sync.
- Sync both NCS2K and SVO nodes on the EPNM server.
- Move the NCS2K and SVO devices to maintenance state in EPNM.
- Do not modify the circuits set for migration from EPNM.

Step 1 Go to **Inventory > Other** and select **Optical Circuits/VCs Migrator**.

The Optical Circuits/VCs Migrator page appears displaying the list of circuit names that can be migrated.

Step 2 Select the circuit names that you want to migrate.

The migration status of the circuits will be displayed as **Not migrated**.

Step 3 Click **Migrate Circuits**.

Once the migration is done, the migration status of the circuit changes to **Success**. The migrated circuit names will be removed once this page is refreshed.

What to do next

Check the Network Topology page. You will find the migrated circuit's name appearing twice. Check the circuit details in the Circuit/VC 360 view for both the circuits. The migrated circuits will have all the details (alarms, endpoints, history, and related circuit/VCs). The other circuit will indicate the circuit type that is substituted with the word Legacy and will not have the related details. These devices can be deleted from the

Network Devices page. The migrated circuits can be modified and deleted if required. If we model it in two user define groups, you can filter and check the circuits. You will not see duplicate circuits.

How Is Inventory Collected?

After devices are added and discovered, Cisco EPN Manager will collect physical and logical inventory information and save it to the database. The following table describes how inventory collection is triggered.

Inventory Collection Trigger	Description
In response to incoming events	Cisco EPN Manager receives an incoming NE SNMP trap, syslog, or TL1 message that signals a change on the NE. These incoming events include: • Configuration change events that signal a change in the device configuration. These events are normally syslogs or traps. • Other inventory events, such as tunnel up/down, link up/down, module in/out, and so forth. Cisco EPN Manager reacts to these incoming events by collecting NE inventory and state information to make sure that information in its database conforms to that of the NE. Most events trigger granular inventory collection, where Cisco EPN Manager only collects data relevant to the change event; other events will trigger a complete collection (sync) of the NE physical and logical inventory. The data that Cisco EPN Manager collects is determined by information in the incoming event, along with metadata that is defined in Cisco EPN Manager. The metadata in Cisco EPN Manager uses a combination of mechanisms—expedited events, reactive inventory, and granular polling—to fine-tune what is collected. For example, if Cisco EPN Manager receives a GMPLS Tunnel State Change event, it will collect ODU tunnel inventory information to discover midpoints and the Z endpoint of the tunnel.
On demand	Users can perform an immediate inventory collection (called *Sync*) from: • Network Devices page—Select one or more devices (by checking check boxes) and click **Sync**. • Device 360 view—Choose **Actions** > **Sync Now**. See Collect a Device's Inventory Now (Sync).
Scheduled (daily)	Normal inventory collection is usually performed overnight. Users with sufficient privileges can check when inventory is collected and the status of collection jobs by choosing **Administration** > **Dashboards** > **Job Dashboard** and choosing **System Jobs > Inventory and Discovery Jobs.**

Configure Devices So They Can Be Modeled and Monitored

• Configure Devices to Forward Events to Cisco EPN Manager, on page 20

Note For information on the supported configuration of different device families, see, Cisco Evolved Programmable Network Manager Supported Devices.

Ensure that the device is managed in Cisco EPN Manager with full user privilege (Privileged EXEC mode).

Configure Devices to Forward Events to Cisco EPN Manager

To ensure that Cisco EPN Manager can query devices and receive events and notifications from them, you must configure devices to forward events to the Cisco EPN Manager server. For most devices, this means you must configure the devices to forward SNMP traps and syslogs.

For other devices (such as some optical devices), it means you must configure the devices to forward TL1 messages.

If you have a high availability deployment, you must configure devices to forward events to both the primary and secondary servers (unless you are using a virtual IP address; see Using Virtual IP Addressing With HA).

In most cases, you should configure this using the **snmp-server host** command. Refer to the topics in this document that list the pre-requisites for the different device operating systems.

Note For information on the required configuration for enabling granular inventory on devices, see Cisco Evolved Programmable Network Manager Supported Syslogs.

Required Settings—Cisco IOS and IOS-XE Device Operating System

Disable domain lookups to avoid delay in Telnet/SSH command response:

```
no ip domain-lookup
```

Enable SSH

```
crypto key generate rsa
ip ssh rsa keypair-name keypair-name
crypto key generate rsa usage-keys label key-label modulus modulus-size
ip ssh version [1 | 2]
```

Setup VTY options:

```
line vty <number of vty>
exec-timeout
session-timeout
transport input ssh (requird only if ssh is used)
transport output ssh (required only if ssh isused)
```

Enable CFM modeling:

```
snmp-server view all 1.3.111.2.802.1.1.8 included
```

For SNMPv2 only, configure the community string:

```
snmp-server community ReadonlyCommunityName RO
```

For SNMPv3 only, configure the following settings:

```
snmp-server user User Group v3 auth sha Password priv des Password
snmp-server view Group 1.3.6 included
snmp-server view Group 1.0.8802.1.1.2 included
snmp-server group Group v3 priv notify Group read Group

snmp-server group Group v3 priv read v1default write v1default notify v1default
snmp-server group Group v3 priv
snmp-server group Group v3 priv notify epnm read epnm
```

Note

- For the device to work seamlessly in Cisco EPN Manager, the SNMP EngineID generated/configured in the device should be unique in the network.
- For the credentials to work, SNMP users should be re-created if the SNMP EngineID is re-configured in the device.

Configure the cache settings at a global level to improve the SNMP interface response time using the configuration:

```
snmp-server cache
```

Syslogs are used by Cisco EPN Manager for alarm and event management. NTP settings ensure that Cisco EPN Manager receives the correct timestamps for events. To configure syslogs on the device, add the following settings:

Required Settings—Cisco IOS XR Device Operating System

Set up VTY options:

```
line default
exec-timeout 10 0
session-limit 10
session-timeout 100
transport input ssh
transport output ssh
vty-pool default 0 99 line-template default
```

Telnet and SSH Settings:

```
telnet ipv4 server max-servers no-limit
telnet vrf default ipv4 server max-servers 100
ssh server v2
```

```
ssh server rate-limit 60
cinetd rate-limit 60
```

Configure the Netconf and XML agents:

```
xml agent tty
netconf agent tty
```

Monitor device with Virtual IP address :

```
ipv4 virtual address use-as-src-addr
ipv4 virtual address Virtual_IP_Address/Subnet_Mask
```

Enable CFM modeling:

```
snmp-server view all 1.3.111.2.802.1.1.8 included
```

For SNMPv2 only, configure the community string:

```
snmp-server community ReadonlyCommunityName RO SystemOwner
```

For SNMPv3 only, configure the following settings:

```
snmp-server user User Group v3 auth sha encrypted Password priv des56 encrypted
Password SystemOwner
snmp-server view Group 1.3.6 included
snmp-server view Group 1.0.8802.1.1.2 included
snmp-server group Group v3 priv notify Group read Group
snmp-server group Group v3 priv read v1default write v1default notify v1default
```

Note Alternatively, you can navigate to **Configuration** > **Templates** > **Features & Technologies**. From the Templates tab on the left side, select **CLI Templates** > **System Templates - CLI** and deploy the *Default_Manageability_Config-IOS-XR* template to configure the IOS-XR device settings required for Cisco EPN Manager discovery.

Note

- For the device to work seamlessly in Cisco EPN Manager, the SNMP EngineID generated/configured in the device should be unique in the network.
- For the credentials to work, SNMP users should be re-created if the SNMP EngineID is re-configured in the device.

Configure the following to improve the SNMP interface stats response time:

```
snmp-server ifmib stats cache
```

Configure SNMP traps for virtual interfaces to ensure that link-down scenarios are captured:

```
snmp-server interface subset 2 regular-expression Forty*
notification linkupdown
!
snmp-server interface subset 3 regular-expression Ten*
notification linkupdown
!
snmp-server interface subset 1 regular-expression Hun*
notification linkupdown
!
snmp-server interface subset 1 regular-expression TwoHun*
notification linkupdown
!
```

```
snmp-server interface subset 1 regular-expression FourHun*
notification linkupdown
```

Enable SNMP entity field replaceable unit (FRU) control traps:

```
snmp-server traps fru-ctrl
```

Syslogs are used by Cisco EPN Manager for alarm and event management. NTP settings ensure that Cisco EPN Manager receives the correct timestamps for events. To configure syslogs on the device, add the following settings:

Enable performance management on all optical data unit (ODU) controllers:

```
controller oduX R/S/I/P
per-mon enable
```

Enable performance management for Tandem Connection Monitoring (TCM):

```
tcm id {1-6}
perf-mon enable
```

To open Cisco Transport Controller (CTC) from Cisco EPN Manager, enable the HTTP/HTTPS server:

```
http server ssl
```

If you plan to use the Configuration Archive, devices must be configured as secured. To configure devices from CTC:

1. Choose **Provisioning** > **Security** > **Access**.
2. Set **EMS Access** to secure.

Note

- Ensure that both the MPLS and K9 packages are installed on the device.
- Install the Cisco IOS XR Manageability Package (MGBL).
- Alternatively, all the above prerequisite can also be applied through CLI Templates. Navigate to **Configuration** > **Templates** > **Features&Technologies**. From the **Templates t**ab on the left pane, select **CLI Templates** > **System Templates-CLI** and deploy the **Default_Manageability_Config template**.
- For more information see, Supported Traps and Supported Syslogs..

Required Settings—Cisco NCS Series Devices

For SR policies, apply the following configuration settings on the selected device:

- Configurations to enable events for policy status logging:

```
segment-routing
traffic-eng
logging policy status
```

- Required Settings—Cisco NCS 4000 Series Devices, on page 24
- Required Settings—Cisco NCS 4200 Series Devices, on page 26

Required Settings—Cisco NCS 4000 Series Devices

Attention Ensure that both the MPLS and K9 packages are installed on the device before completing the following steps.

- Cisco EPN Manager uses SSH to secure communication with Cisco NCS 4000 series devices. To enable SSH, apply the following configuration settings on the device:

```
ssh server v2
ssh server rate-limit 600
```

- In MPLS traffic engineering configuration mode, enable event logging:

```
mpls traffic-eng logging events all
```

- Set the VTY options:

```
line default
exec-timeout 10 0
session-limit 10
session-timeout 100
transport input ssh
transport output ssh
vty-pool default 0 99 line-template default
```

- Configure the LMP link:

```
router-id ipv4 unicast local IP address
```

  where *local IP address* is the IP address of the device.

- Configure the Netconf and XML agents:

```
xml agent tty
netconf agent tty
```

- Configure SNMP on the device:

```
snmp-server host
snmp-server community public RO SystemOwner
snmp-server community private RW SystemOwner
snmp-server ifindex persist
```

  You can use either SNMPv2 or SNMPv3:

  - For SNMPv2 only, configure the community string:

```
snmp-server community ReadonlyCommunityName RO SystemOwner
```

  - For SNMPv3 only, configure the following settings:

```
snmp-server user User Group v3 auth sha encrypted Password priv des56 encrypted
Password SystemOwner
snmp-server view Group 1.3.6 included
snmp-server group Group v3 priv notify Group read Group
```

    For configuring the polling and configuration view, choose one of the following configuration options:

    - SNMPv3 default configuration (used for SNMPv3 polling and viewing of the default configuration):

```
snmp-server group Group v3 priv read v1default write v1default notify v1default
```

- SNMPv3 specific configuration:
  - For SNMPv3 polling only:

    ```
    snmp-server group Group v3 priv
    ```

  - For viewing configuration for SNMPv3 set, polling, and for traps/informs notifications:

    ```
    snmp-server group Group v3 priv notify epnm read epnm write epnm
    ```

  - For viewing SNMPv3 - LLDP MIB OID configuration:

    ```
    snmp-server view Group 1.0.8802.1.1.2 included
    ```

  For viewing the LAG link, add the following configuration on device:

  ```
  snmp-server view all 1.0.8802 included
  ```

Note In the first line, *User* and *Group* are two distinct variables that you must enter values for.

- Configure the stats command to improve the SNMP interface stats response time using the configuration

  ```
  Snmp-server ifmib stats cache
  ```

- Configure SNMP traps for virtual interfaces to ensure that link-down scenarios are captured:

  ```
  snmp-server interface subset 1 regular-expression Hun*
  notification linkupdown
  !
  snmp-server interface subset 2 regular-expression Forty*
  notification linkupdown
  !
  snmp-server interface subset 3 regular-expression Ten*
  notification linkupdown
  !
  ```

- Syslogs are used by Cisco EPN Manager for alarm and event management. NTP settings ensure that Cisco EPN Manager receives the correct timestamps for events. To configure syslogs on the device, add the following settings:

  ```
  clock timezone TimeZone
  service timestamps log datetime show-timezone msec year
  ntp server NTP_Server
  logging facility local7
  logging  vrf name
  ```

  Note the following:

  - When specifying the time zone, enter the time zone's acronym and its difference (in hours) from Coordinated Universal Time (UTC). For example, to specify the time zone for a device located in Los Angeles, you would enter `clock timezone PDT -7`.
  - Replace with the IP address of the host Cisco EPN Manager is installed on.

- Configure the Virtual IP address:

  ```
  ipv4 virtual address NCS4K_Virtual_IP_Address/Subnet_Mask
  ipv4 virtual address use-as-src-addr
  ```

Note *NCS4K_Virtual_IP_Address* and *Subnet_Mask* are two distinct variables that are separated by a slash. Be sure to enter a value for both of these variables.

- Enable performance management on all optical data unit (ODU) controllers:

```
controller oduX R/S/I/P
per-mon enable
```

- Enable event logging of link status messages for optics controllers of Cisco NCS4000 devices running Cisco IOS release 6.1.42 or later:

```
controller Optics <x/y/z/w>
logging events link-status
```

- Enable performance management for Tandem Connection Monitoring (TCM):

```
tcm id {1-6}
perf-mon enable
```

- Configure the Telnet or SSH rate limit for accepting service requests:
  - For Telnet, set the number of requests that are accepted per *second* (between1-100; the default is 1):

    ```
    cinetd rate-limit 100
    ```

  - For SSH, set the number of requests that are accepted per *minute* (between 1-600; the default is 60):

    ```
    ssh server rate-limit 600
    ```

- To open Cisco Transport Controller (CTC) from Cisco EPN Manager (from a Device 360 view), enable the HTTP/HTTPS server:

```
http server ssl
```

- If you plan to use the Configuration Archive feature, devices must be configured as *secured*. To do this from CTC:
  1. Choose **Provisioning** > **Security** > **Access**
  2. Set EMS Access to **secure**.

- If you notice any performance issues because multiple Cisco NCS 4000 Series devices are sending information simultaneously, increase the number of Telnet sessions per *second*:

```
cinetd rate-limit 100
```

Required Settings—Cisco NCS 4200 Series Devices

- Cisco EPN Manager uses SSH to secure communication with Cisco NCS 4200 series devices. To enable SSH, apply one the following configuration settings on the device:
  -
```
enable
configure terminal
hostname name
ip domain-name name
crypto key generate rsa
```

- enable
  configure terminal
  ip ssh rsa keypair-name keypair-name
  crypto key generate rsa usage-keys label key-label modulus modulus-size
  ip ssh version [1 | 2]

- Set the VTY options:

```
line vty <#>
exec-timeout
session-timeout
transport input ssh
transport output ssh
```

- Configure SNMP on the device:

```
snmp-server host
snmp-server community public RO
snmp-server community private RW
```

You can use either SNMPv2 or SNMPv3:

- For SNMPv2 only, configure the community string:

```
snmp-server community ReadonlyCommunityName RO
```

- For SNMPv3 only, configure the following settings:

```
snmp-server user User Group v3 auth sha Password priv des  Password
snmp-server view Group 1.3.6 included
snmp-server group Group v3 priv notify Group
```

For configuring the polling and configuration view, choose one of the following configuration options:

- SNMPv3 default configuration (used for SNMPv3 polling and viewing of the default configuration):

```
snmp-server group Group v3 priv read v1default write v1default notify v1default
```

- SNMPv3 specific configuration:
  - For SNMPv3 polling only:

```
snmp-server group Group v3 priv
```

  - For viewing configuration for SNMPv3 set, polling, and for traps/informs notifications:

```
snmp-server group Group v3 priv notify epnm read epnm
```

  - For viewing SNMPv3 - LLDP MIB OID configuration:

```
snmp-server view Group 1.0.8802.1.1.2 included
```

Note In the first line, *User* and *Group* are two distinct variables that you must enter values for.

- Configure the cache settings at a global level to improve the SNMP interface response time using the configuration `Snmp-server cache`

- Syslogs are used by Cisco EPN Manager for alarm and event management. NTP settings ensure that Cisco EPN Manager receives the correct timestamps for events. To configure syslogs on the device, add the following settings:

```
clock timezone TimeZone
service timestamps log datetime show-timezone msec year
ntp server NTP_Server
update-calendar
logging facility local7
logging  vrf default severity info [port default]
mpls traffic-eng logging lsp setups
mpls traffic-eng logging lsp teardowns
```

  Note the following:

  - When specifying the time zone, enter the time zone's acronym and its difference (in hours) from Coordinated Universal Time (UTC). For example, to specify the time zone for a device located in Los Angeles, you would enter `clock timezone PDT -7`.
  - Replace with the IP address of the host Cisco EPN Manager is installed on.

Required Settings—Cisco ASR Series Devices

For SR policies, apply the following configuration settings on the selected device:

- Configurations to enable events for policy status logging:

```
segment-routing
traffic-eng
logging policy status
```

Required Settings—Cisco ONS Device Operating System

If you plan to use the Configuration Archive feature, devices must be configured as *secured*. You can do this from CTC:

1. From CTC, choose **Provisioning** > **Security** > **Access**.
2. Set EMS Access to secure.

Required Settings—Cisco NCS2K Device

If you plan to use the Configuration Archive feature on NCS2K devices, enable the HTTP/HTTPS server.

Note For the devices where single session is not enabled or applicable, do the following to restrict the number of connections to be used in EPNM:

1. Open **`$XMP_HOME/xmp_inventory/xde-home/inventoryDefaults/onsTL1.def`**
2. Add a new attribute tag as below after the **</test>** tag where **ConnectionCount** must be replaced with actual number (for example: 5).

   *<default attribute="DEVICE_THROTTLING">**ConnectionCount**</default>*

Required Configuration for IPv6 Devices

If you want to access a device that uses IPv6 addresses, configure the IPv6 address and static route on the Cisco EPN Manager server (virtual machine) by performing these steps:

1. Remove the ipv6 address autoconfig from the interface.
2. Configure the IPv6 address on the Cisco EPN Manager server.
3. Add a static route to the Cisco EPN Manager server.

Enable Archive Logging on Devices

Follow these steps to enable archive logging on devices so that granular inventory can be enabled for those devices on Cisco EPN Manager:

For Cisco IOS-XR devices:

```
logging  <epnm server ip>  vrf default severity alerts
logging  <epnm server ip>  vrf default severity critical
logging  <epnm server ip>  vrf default severity error
logging  <epnm server ip>  vrf default severity warning
logging  <epnm server ip>  vrf default severity notifications
logging  <epnm server ip>  vrf default severity info
snmp-server host <epnm server ip>  traps version 2c public
```

For Cisco IOS and IOS-XE devices:

```
logging host <epnm server ip>  transport udp port 514
logging host <epnm server ip>  vrf Mgmt-intf transport udp port 514
snmp-server host <epnm server ip>  traps version 2c public
```

Apply Device Credentials Consistently Using Credential Profiles

Credential profiles are collections of device credentials for SNMP, Telnet/SSH, HTTP, and TL1. When you add devices, you can specify the credential profile the devices should use. This lets you apply credential settings consistently across devices.

If you need to make a credential change, such as changing a device password, you can edit the profile so that the settings are updated across all devices that use that profile.

To view the existing profiles, choose **Inventory > Device Management > Credential Profiles**.

Create a New Credential Profile

Use this procedure to create a new credential profile. You can then use the profile to apply credentials consistently across products, or when you add new devices.

Step 1 Select **Inventory** > **Device Management** > **Credential Profiles**.

Step 2 If an existing credential profile has most of the settings you need, select it and click **Copy**. Otherwise, click **Add**.

Step 3 Enter a profile name and description. If you have many credential profiles, make the name and description as informative as possible because that information will be displayed on the Credential Profiles page.

Step 4 Enter the credentials for the profile. When a device is added or updated using this profile, the content you specify here is applied to the device.

The SNMP read community string is required.

Step 5 Click **Save Changes**.

Apply a New or Changed Profile to Existing Devices

Use this procedure to perform a bulk edit of devices and change the credential profile the devices are associated with. This operation overwrites any existing association between a device and a credential profile. You can also use this operation to synchronize device configurations with the new settings.

Note Make sure the profile's credential settings are correct before following this procedure and selecting **Update and Sync**. That operation will synchronize the devices with the new profile.

Step 1 Configure the credential profile using one of these methods:

- Create a new credential profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, and clicking **Add**.
- Edit an existing profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, selecting the profile, and clicking **Edit**.

Step 2 When you are satisfied with the profile, choose **Inventory** > **Device Management** > **Network Devices**.

Step 3 Filter and select all of the devices you want to change (bulk edit).

Step 4 Click **Edit**, and select the new credential profile from the Credential Profile drop-down list.

Step 5 Save your changes:

- **Update** saves your changes to the Cisco EPN Manager database.
- **Update and Sync** saves your changes to the Cisco EPN Manager database, collects the device's physical and logical inventory, and saves all inventory changes to the Cisco EPN Manager database.

Delete a Credential Profile

This procedure deletes a credential profile from Cisco EPN Manager. If the profile is currently associated with any devices, you must disassociate them from the profile.

Step 1 Check whether any devices are using the profile.

a) Go to **Inventory** > **Device Management** > **Credential Profiles**.
b) Select the credential profile to be deleted.
c) Click **Edit**, and check if any devices are listed on the Device List page. If any devices are listed, make note of them.

Step 2 If required, disassociate devices from the profile.

a) Go to **Inventory** > **Device Management** > **Network Devices**.
b) Filter and select all of the devices you want to change (bulk edit).
c) Click **Edit**, and choose **--Select--** from the Credential Profile drop-down list.
d) Disassociate the devices from the old profile by clicking **OK** in the warning dialog box.

Step 3 Delete the credential profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, selecting the profile, and clicking **Delete**.

Check a Device's Reachability State and Admin Status

Use this procedure to determine whether Cisco EPN Manager can communicate with a device (reachability state) and whether it is managing that device (admin status). The admin status also provides information on whether the device is being successfully managed by Cisco EPN Manager.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Locate your device in the Network Devices table.

a) From the **Show** drop-down list (at the top right of the table), choose **Quick Filter**.
b) Enter the device name (or part of it) in the text box under the **Device Name** column.

Step 3 Check the information in the **Reachability** and **Admin Status** columns. See Device Reachability and Admin States, on page 31 for descriptions of these states.

Device Reachability and Admin States

Device Reachability State—Indicates whether Cisco EPN Manager can communicate with the device using all configured protocols.

Table 4: Device Reachability State

Icon	Device Reachability State	Description	Troubleshooting

	Reachable	Cisco EPN Manager can reach the device using SNMP, or the NCS 2K device using ICMP.	—
	Ping reachable	Cisco EPN Manager can reach the device using Ping, but not via SNMP.	Although ICMP ping is successful, check for all possible reasons why SNMP communication is failing. Check that device SNMP credentials are the same in both the device and in Cisco EPN Manager, whether SNMP is enabled on the device, or whether the transport network is dropping SNMP packets due to reasons such as mis-configuration, etc. See Change Basic Device Properties.
	Unreachable	Cisco EPN Manager cannot reach the device using Ping.	Verify that the physical device is operational and connected to the network.
	Unknown	Cisco EPN Manager cannot connect to the device.	Check the device.

Device Admin State—Indicates the configured state of the device (for example, if an administrator has manually shut down a device, as opposed to a device being down because it is not reachable by Ping).

Table 5: Device Admin State

Device Admin State	Description	Troubleshooting
Managed	Cisco EPN Manager is actively monitoring the device.	Not Applicable.
Maintenance	Cisco EPN Manager is checking the device for reachability but is not processing traps, syslogs, or TL1 messages.	To move a device back to Managed state, see Move a Device To and From Maintenance State, on page 33.

Unmanaged	Cisco EPN Manager is not monitoring the device.	In the Network Devices table, locate the device and click the "i" icon next to the data in the **Last Inventory Collection Status** column. The popup window will provide details and troubleshooting tips. Typical reasons for collection problems are: • Device SNMP credentials are incorrect. • The Cisco EPN Manager deployment has exceeded the number of devices allowed by its license. • A device is enabled for switch path tracing only. If a device type is not supported, its Device Type will be **Unknown**. You can check if support for that device type is available from Cisco.com by choosing **Administration** > **Licenses and Software Updates** > **Software Update** and then clicking **Check for Updates**.
Unknown	Cisco EPN Manager cannot connect to the device.	Check the device.

Move a Device To and From Maintenance State

When a device's admin status is changed to Maintenance, Cisco EPN Manager will neither poll the device for inventory changes, nor will it process any traps or syslogs that are generated by the device. However, Cisco EPN Manager will continue to maintain existing links and check the device for reachability.

See Device Reachability and Admin States, on page 31 for a list of all admin states and their icons.

Step 1 From the Network Devices table, choose **Admin State** > **Set to Maintenance State**.

Step 2 To return the device to the fully managed state, choose **Admin State** > **Set to Managed State**.

Note You can also schedule devices to maintenance on specific date and time and return them back to Managed state on specific date and time using **Schedule Maintenance State** and **Schedule Managed State** options.

Validate Added Devices and Troubleshoot Problems

To monitor the discovery process, follow these steps:

Step 1 To check the discovery process, choose **Inventory** > **Device Management** > **Discovery**.

Step 2 Expand the job instance to view its details, then click each of the following tabs to view details about that device's discovery:

- Reachable—Devices that were reached using ICMP. Devices may be reachable, but not modeled, this may happen due to various reasons as discussed in Add Devices Using Discovery, on page 5. Check the information in this tab for any failures.
- Filtered—Devices that were filtered out according to the customized discovery settings.
- Ping Reachable—Devices that were reachable by ICMP ping but could not be communicated using SNMP. This might be due to multiple reasons: invalid SNMP credentials, SNMP not enabled in device, network dropping SNMP packets, etc.
- Unreachable—Devices that did not respond to ICMP ping, with the failure reason.
- Unknown—Cisco EPN Manager cannot connect to the device by ICMP or SNMP.

Note For devices that use the TL1 protocol, make sure that node names do not contain spaces. Otherwise, you will see a connectivity failure.

Step 3 To verify that devices were successfully added to Cisco EPN Manager, choose **Inventory** > **Device Management** > **Network Devices**. Then:

- Verify that the devices you have added appear in the list. Click a device name to view the device configurations and the software images that Cisco EPN Manager collected from the devices.
- View details about the information that was collected from the device by hovering your mouse cursor over the Inventory Collection Status field and clicking the icon that appears.
- Check the device's Reachability and Admin Status columns. See Device Reachability and Admin States, on page 31.

If you need to edit the device information, see Change Basic Device Properties.

To verify that Cisco EPN Manager supports a device, refer to Cisco Evolved Programmable Network Manager Supported Devices.

To verify that Cisco EPN Manager supports a device, click the Settings icon (⚙), then choose **Supported Devices**.

Find Devices With Inventory Collection or Discovery Problems

Use the quick filter to locate devices that have discovery or collection problems.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices** to open the Network Devices page.

Step 2 Make sure **Quick Filter** is listed in the **Show** drop-down at the top left of the table.

Step 3 Place your cursor in the quick filter field below the **Last Inventory Collection Status** and select a status from the drop-down list that is displayed. The devices are filtered according to that status. For troubleshooting steps, see Validate Added Devices and Troubleshoot Problems, on page 33.

Retry Job for Device Modeling

During device discovery, certain transient conditions can cause a device to have the **Last Inventory Collection Status** value as *Completed with Warning*. In such cases, the failed features of these devices will be automatically recovered using the **Failed Feature Sync**.

Note *Completed with Warning* state is indicated when a device moves to *Completed* state and usable from Cisco EPN Manager, but has certain features that have failed and are unusable. These failed features are listed and can be recovered by the user by performing the recommended action.

Note

- The **Failed Feature Sync** job will be used only for devices with *Completed with Warning* status, for certain recoverable failures (for example, a timeout error). Permanent or system-based errors (for example, user authentication error or unknown error) cannot be auto-recovered. For more information on the error scenarios, please contact the administration team.

The **Failed Feature Sync** job (Go to **Administration** > **Dashboard** > **Job Dashboard**. In the left sidebar, choose **System Jobs** > **Inventory And Discovery Jobs**) is enabled by default. The default job interval (1 hour) can be edited using the **Edit Schedule** option, though it is not recommended to run the job at a reduced interval, unless in case of emergency.

Note If you have more number of devices with *Completed with Warning* status, it is recommended to run the **Failed Feature Sync** job as least often as possible.

Alternately, Cisco EPN Manager provides additional instructions for devices in *Completed with Warning* state that can be followed by the user to resolve failures and move the device to the *Completed* state. In the Network Devices table, locate the device and click the *i* icon next to the data in the **Last Inventory Collection Status** column. The pop-up window provides details and troubleshooting tips (Failures, Impact, Possible Causes, and Recommended Actions). After user performs the recommended actions, the device can be moved to *Completed* state through a manual sync (applicable for errors such as Wrong CLI credentials), or automatically recovered in the next iteration of the **Failed Feature Sync** job.

Here are some of the *Completed with Warning* scenarios and the corresponding recommended actions:

Table 6: Completed with Warning state scenarios

Possible Cause	Recommended Action
Connection to the device failed	Verify that the device accepts incoming CLI/ SNMP connections and retry.
Connection to the device is closed	Verify that the device accepts incoming CLI/ SNMP connections and retry.
Data cap exceeded	Collection Error: Please contact the administrator with inventory logs.

Possible Cause	Recommended Action
Unexpected condition in the TL1 protocol	Verify that the device accepts incoming TL1 connections and retry.
General unexpected condition in the HTTP protocol	Verify that the device accepts incoming HTTP connections and retry.
Error retrieving from NETCONF/XML	Verify that NETCONF/XML is configured and retry.
NETCONF reported an RPC error	Collection Error: Please contact the administrator with inventory logs.
Error in the CLI_SESSION_SCRIPT document	Verify that the device can accept a new CLI session and retry.
A pattern was matched indicating an error during session setup or tear down	Verify that the device can accept a new CLI session and retry.
Device not reachable	Please contact the administrator with inventory logs.
Failsafe timeout occurred when trying to communicate with the device	Verify device responsiveness and load.
A timeout occurred when trying to communicate with the device	Verify that the timeouts that are configured on the device do not stop CLI connections and retry. Also, check the maximum number of active SSH connections that are configured on the device.
No response for SNMP get request	Verify that the device can accept incoming SNMP requests and retry.
Failed to perform SNMP get request	Verify that the device can accept incoming SNMP requests and retry.
Response error for SNMP get request	Verify that the device can accept incoming SNMP requests and retry.

Export Device Information to a CSV File

When you export the device list to a file, all device information is exported into a CSV file. The file is then compressed and encrypted using a password you select. The exported file contains information about the device's SNMP credentials, CLI settings, device groups, and geographical coordinates. The exported file includes device credentials but does not include credential profiles.

Caution Exercise caution while using the CSV file as it lists all credentials for the exported devices. You should ensure that only users with special privileges can perform a device export.

Cisco EPN Manager supports ZipCrypto encryption method to open the exported file using operating system default zip utility. To enable ZipCrypto encryption method, choose **Administration** > **Settings** > **System**

Settings > **Inventory** > **Inventory**, and then check the **Enable ZipCrypto encryption for 'Export Device'** check box. By default, this option is disabled.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Select the devices that you want to export, then click **Export Device** (or click  and choose **Export Device**).

Step 3 In the **Export Device** dialog box, add and confirm a password that will be used to encrypt the exported CSV file. Users will need to supply this password to open the exported file. Optionally, enter the Export File Name. Depending on your browser configuration, you can open or save the compressed file.

Step 4 Click **Export**.

Note You can open the file only if ZipCrypto encryption is enabled.

Create Groups of Devices for Easier Management and Configuration

Organizing your devices into logical groupings simplifies device management, monitoring, and configuration. As you can apply operations to groups, grouping saves time and ensures that configuration settings are applied consistently across your network. In smaller deployments where all devices can be configured with the same settings, you may only need to create one general device group. The grouping mechanism also supports subgroups. You will see these groups in many of the Cisco EPN Manager GUI windows.

When a device is added to Cisco EPN Manager, it is assigned to a location group named **Unassigned**. If you are managing a large number of devices, be sure to move devices into other groups so that the Unassigned Group membership does not become too large.

How Groups Work

Groups are logical containers for network elements, such as devices and ports. You can create groups that are specific to your deployment—for example, by device type or location. You can set up a group so that new devices are automatically added if they match your criteria, or you may want to add devices manually.

For information on the specific types of groups, see the related topics Network Device Groups, on page 38 and Port Groups, on page 39.

For information on how elements are added to groups, see How Elements Are Added to Groups: Dynamic, Manual, and Mixed Groups, on page 40.

Network Device Groups

The following table lists the supported types of network device groups. The device groups can be accessed from the Inventory.

Network Device Group Type	Membership Criteria	Can Be Created or Edited By Users?
Device Type	Devices are grouped by family (for example, Optical Networking, Routers, Switches and Hubs, and so forth). Under each device family, devices are further grouped by series. New devices are automatically assigned to the appropriate family and series groups. For example, a Cisco ASR 9006 would belong to Routers (family) and Cisco ASR 9000 Series Aggregation Services Routers (series). Note the following: • You cannot create a device type group; these are dynamic groups that are system-defined. Instead, use device criteria to create a user-defined group and give it an appropriate device name. • Device type groups are not displayed in Network Topology maps. • Unsupported devices discovered by Cisco EPN Manager are automatically assigned the **Unsupported Cisco Device** device type and are listed under **Device Type** > **Unsupported Cisco Device Family**.	No
Location	Location groups allow you to group devices by location. You can create a hierarchy of location groups(such as theater, country, region, campus, building, and floor) by adding devices manually or by adding devices dynamically. A device should appear in one location group only, though a higher level "parent" group will also contain that device. For example, a device that belongs to a *building* location group might also indirectly belong to the parent campus group. By default, the top location of the hierarchy is the **All Locations** group. All devices that have not been assigned to a location appear under the Unassigned group under All Locations.	Yes
User Defined	Devices are grouped by a customizable combination of device and location criteria. You can customize group names and use whatever device and location criteria you need.	Yes

Import Location Groups

From the Network Device Groups page, you can import location groups using CSV file. To import a location group using a CSV file that lists all attributes of the group that you want to add into Cisco EPN Manager:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Click the **Import Groups** button. The **Import Groups** dialog opens.

Step 3 Download the sample template by clicking **here** at the bottom of the displayed dialog. Create a CSV file and enter group name/parent hierarchy/location preference/physical address/latitude/longitude details using the format and information in the template as a guide. Save the CSV file.

Step 4 Click **Browse** in the **Import Groups** dialog, and select the CSV file that contains the group that you want to import.

Step 5 Choose **Administration** > **Dashboards** > **Job Dashboard** and click **Import Groups** to view the status of the job.

Export Location Groups

To export the location group information as a CSV file:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Click the **Export Groups** button. The **Export Groups** dialog opens.

Step 3 Save the CSV file at the desired location. The CSV file provides details such as group name, parent hierarchy, location preference, physical address, latitude, and longitude.

Port Groups

The following table lists the supported types of port groups.

Port Group Type	Membership Criteria	Can be created or edited by users?
Port Type	Grouped by port type, speed, name, or description. Ports on new devices are automatically assigned to the appropriate port group. You cannot create Port Type groups. Instead, use device criteria to create a user-defined group, and create subgroups under the user-defined group.	No; instead create a User Defined Group

System Defined	Grouped by port usage or state. Ports on new devices are automatically assigned to the appropriate port group. Link Ports—Ports that are connected to another Cisco device or other network devices and are operating on "VLAN" mode and are assigned to a VLAN. Trunk Ports—Ports that are connected to a Cisco device or other network devices (Switch/Router/Firewall/Third party devices) and operating on "Trunk" mode in which they carry traffic for all VLANs. If the status of a port goes down, it is automatically added to Unconnected Port group. You cannot delete the ports in this group, and you cannot re-create this group as a sub group of any other group. Wireless and Data Center devices use the other System Defined port groups: AVC Configured Interfaces, UCS Interfaces, UCS Uplink Interfaces, WAN Interfaces, and so forth. You cannot create System Defined Port groups. Instead, use device criteria to create a user-defined group, and create subgroups under the user-defined group. **Note** As the WAN Interfaces is a static group, automatic port addition is not applicable. Hence, you must add the ports manually to the group.	No; instead create a User Defined Group
User Defined	Grouped by a customizable combination of port criteria, and you can name the group. If the group is dynamic and a port matches the criteria, it is added to the group.	Yes

How Elements Are Added to Groups: Dynamic, Manual, and Mixed Groups

How elements are added to a group depends on whether the group is dynamic, manual, or mixed.

Method for Adding Devices	Description
Dynamic	Cisco EPN Manager automatically adds a new element to the group if the element meets the group criteria. While there is no limit to the number of rules that you can specify, the performance for updates may be negatively impacted as you add more rules.
Manual	Users add the elements manually when creating the group or by editing the group.
Mixed	Elements are added through a combination of dynamic rules and manual additions.

The device inheritance in parent-child user defined and location groups are as follows:

- User Defined Group—When you create a child group:
  - If the parent and child groups are both dynamic, the child group can only access devices that are in the parent group.

- If the parent group is static and the child group is dynamic, the child group can access devices that are outside of the parent group.
- If the parent and child groups are dynamic and static, the child group "inherits" devices from the parent device group.

- Location Group—The parent group inherits the child group devices.

Groups and Virtual Domains

While groups are logical containers for elements, access to the elements is controlled by virtual domains. This example shows the relationship between groups and virtual domains.

- A group named **SanJoseDevices** contains 100 devices.
- A virtual domain named **NorthernCalifornia** contains 400 devices. Those devices are from various groups and include 20 devices from the **SanJoseDevices** group.

Users with access to the **NorthernCalifornia** virtual domain will be able to access the 20 devices from the **SanJoseDevices** group, but not the other 80 devices in the group. For more details, see Create Virtual Domains to Control User Access to Devices.

Create User-Defined Device Groups

To create a new device type group, use the user-defined group mechanism. You must use this mechanism because device type groups are a special category that is used throughout Cisco EPN Manager. The groups that you create appear in the **User Defined** category.

Note Cisco ASR satellites can only belong to location groups. For more information, see Satellite Considerations in Cisco EPN Manager.

To create a new group, complete the following procedure:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 In the **Device Groups** pane, click the + (**Add**) icon and then choose **Create User Defined Group**.

Step 3 Enter the group's name and description. If other user-defined device type groups exist, you can set one as the parent group by choosing it from the **Parent Group** drop-down list. If you do not select a parent group, the new group resides in the **User-Defined** folder (by default).

Step 4 Add devices to the new group:

If you want to add devices that meet your criteria automatically, enter the criteria in the **Add Devices Dynamically** area. To group devices that fall within a specific range of IP addresses, enter that range in square brackets. For example, you can specify the following:

- IPv4-10.[101-155].[1-255].[1-255] and 10.126.170.[1-180]
- IPv6-2014::5217:[0000-ffff]:fe22:[1e40-1f41]

Note While there is no limit on the number of rules you can specify for a dynamic group, group update performance could become slower as the number of rules increases.

If you want to add devices manually, do the following:

a. Expand the **Add Devices Manually** area and then click **Add**.

b. In the **Add Devices** dialog box, check the check boxes for the devices you want to add, then click **Add**.

Step 5 Click the **Preview** tab to see the members of your group.

Step 6 Click **Save**.

The new device group appears in the folder that you selected in Step 3.

Note The dynamically added device group cannot be deleted after its creation. If you want to add and define devices manually, then you have to delete the dynamically created device group and create a new device group.

Note You can also create device groups by navigating to **Inventory** > **Device Management** > **Configuration Archive** > **Archives** > **Create Group**.

Create Location Groups

Note Cisco ASR satellites can only belong to Location Groups. For more information, see Satellite Considerations in Cisco EPN Manager.

To create a location group, follow these steps:

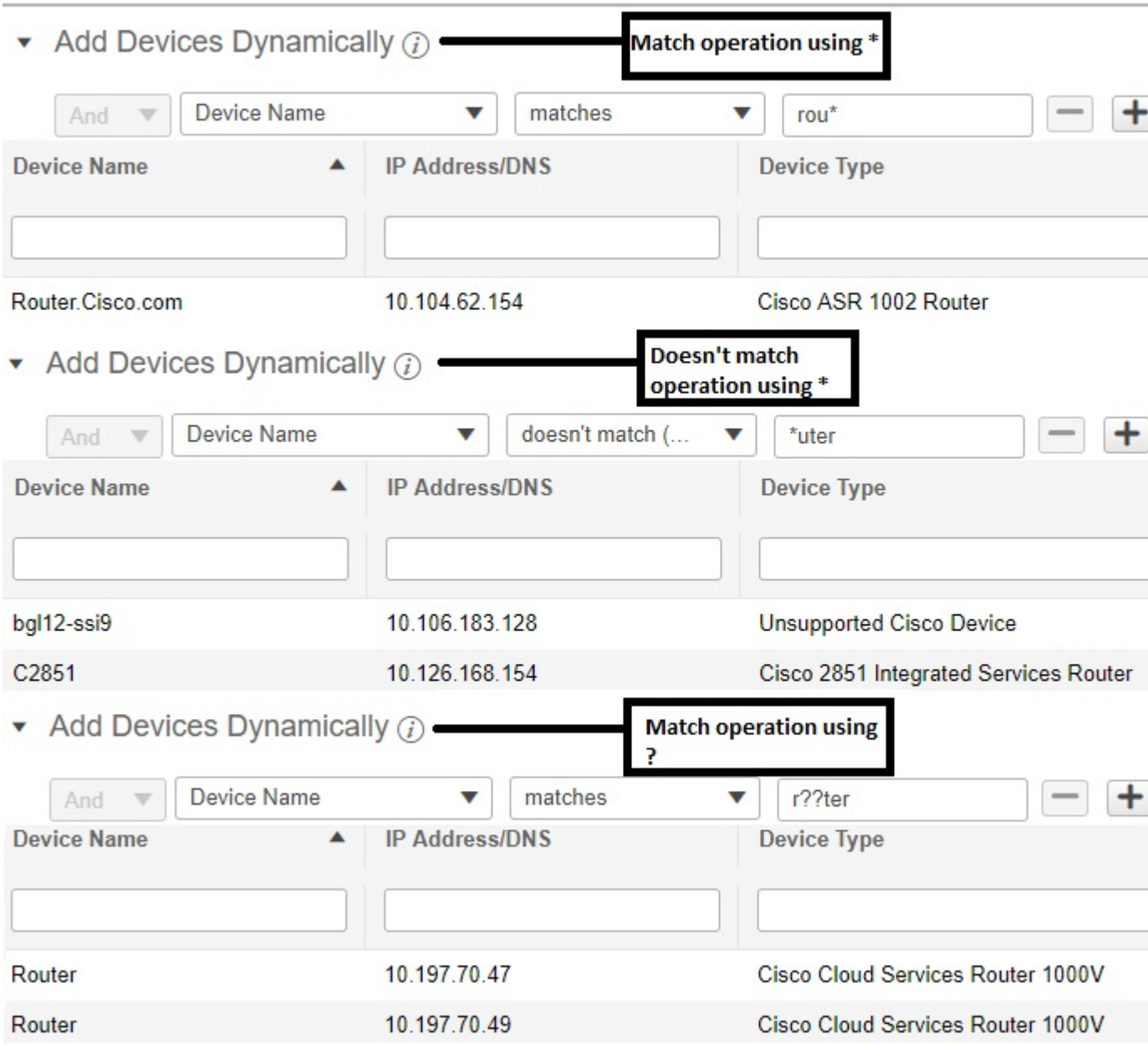
Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 In the **Device Groups** pane on the left, click the **Add** icon, then choose **Create Location Group**.

Step 3 Enter the name and description, and choose a group from the **Parent Group** drop-down list. By default, the group will be an All Locations subgroup (that is, displayed under the **All Locations** folder).

Step 4 If you are creating a device group based on geographical location, for example, all devices located in a building at a specific address, select the Geographical Location check box and specify the GPS coordinates of the group or click the **View Map** link and click on the required location in the map. The GPS coordinates will be populated automatically in this case. Note that location groups defined with a geographic location are represented by a group icon in the geo map. The devices you add to the group will inherit the GPS coordinates of the group. See Device Groups in the Geo Map for more information. Note that if geographical location is the primary reason for grouping a set of devices, it is recommended that the devices you add to the group do not have their own GPS coordinates that are different from the group's.

Step 5 If you want devices to be added automatically if they meet certain criteria, enter the criteria in the **Add Device Dynamically** area. Otherwise, leave this area blank.



While there is no limit on the number of rules that you can specify for a dynamic group, as the number of rules increases, the group update performance could become slower.

Step 6 If you want to add devices manually:

a) Under **Add Devices Manually**, click **Add**.

b) In the **Add Devices** dialog box, locate devices you want to add, then click **Add**.

Step 7 Click the **Preview** tab to see the group members.

Step 8 Click **Save**, and the new location group appears under the folder you selected in Step 3 (**All Locations**, by default).

launch the Maps GUI. click building.

When you edit a location group, you may change the group type if the following conditions are met:

- The group type is Default.
- The group does not have any subgroups.

Create Port Groups

To create a port group, follow these steps:

Step 1 Choose **Inventory** > **Group Management** > **Port Groups**.

Step 2 From **Port Groups** > **User Defined**, hover your cursor over the "i" icon next to **User Defined** and click **Add SubGroup** from the popup window.

Step 3 Enter the name and description, and choose a group from the **Parent Group** drop-down list. By default, the port group will be under the **User Defined** folder.

Step 4 Choose the devices a port must belong to in order to be added to the group. From the **Device Selection** drop-down list, you can select:

- **Device**—To choose devices from a flat list of all devices.
- **Device Group**—To choose device groups (Device Type, Location, and User Defined groups are listed).

Step 5 If you want ports to be added automatically if they meet your criteria, enter the criteria in the **Add Ports Dynamically** area. Otherwise, leave this area blank.

While there is no limit on the number of rules that you can specify for a dynamic group, the group update performance could become slower as the number of rules increases.

Step 6 If you want to add devices manually:

a) Under **Add Ports Manually**, click **Add**.

b) In the **Add Ports dialog** box, locate devices you want to add, then click **Add**.

Step 7 Click the **Preview** tab to see the group members.

Step 8 Click **Save**, and the new port group appears under the folder you selected in Step 3 (**User Defined**, by default).

Make Copies of Groups

When you create a duplicate of a group, Cisco EPN Manager names the group **CopyOf***group-name* by default. You can change the name, if required.

To duplicate a group follow these steps:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Choose the group from the Device Groups pane on the left.

Step 3 Locate the device group you want to copy, then click the "i" icon next to it to open the pop-up window.

Step 4 Click **Duplicate Group** (do not make any changes yet) and click **Save**. Cisco EPN Manager creates a new group called **CopyOf***group-name*.

Step 5 Configure your group as described in Create User-Defined Device Groups, on page 41 and Create Location Groups, on page 42.

Step 6 Verify your group settings by clicking the **Preview** tab and examining the group members.

Step 7 Click **Save** to save the group.

Hide Groups That Do Not Have Any Members

By default, Cisco EPN Manager will display a group in the web GUI even if the group has no members. Users with Administrator privileges can change this setting so that empty groups are hidden—that is, they are not displayed in the web GUI. (Hidden groups are not deleted from Cisco EPN Manager.)

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Grouping**.

Step 2 Uncheck **Display groups with no members**, and click **Save**.

We recommend that you leave the **Display groups with no members** check box selected if you have a large number of groups and devices. Unselecting it can slow system performance.

Delete Groups

Make sure the group you want to delete has no members, otherwise Cisco EPN Manager will not allow the operation to proceed.

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Locate the device group you want to delete in the Device Groups pane on the left, then click the "i" icon next to it to open the pop-up window.

Step 3 Click **Delete Group** and click **OK**.

Delete Devices

When you delete a device, Cisco EPN Manager will no longer model or monitor it.

Before you begin

If a device has services on it that were provisioned using Cisco EPN Manager, you must delete those services before deleting the device. However, you will be permitted to delete devices that have discovered or provisioned services on it (that is, services that were not created by Cisco EPN Manager). To find out which services are on a device, use the Device 360 view; see View a Specific Device's Circuits/VCs.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices** to open the Network Devices page.

Step 2 Locate the device you want to delete. For example, navigate through the Device Groups list, or enter the text in the Quick Filter boxes.

Step 3 Select the device and click the **Delete Device** icon.

Replace an Existing Network Element

To replace an existing network element with a new network element which is exactly the old device:

Step 1 Choose **Inventory** > **Device Management** > **Configuration Archive** and take the configuration backup for the device that needs to be replaced when it is in the completed state.

Step 2 Choose **Inventory** > **Device Management** > **Network Devices** and change the device state to **Maintenance** for the device that needs to be replaced.

Step 3 Replace the network element with the same hardware, including the RP and line cards which were installed in the same slots as of the old hardware.

Step 4 Reconnect the new hardware to the management port in the same way as the old hardware was connected.

Step 5 Configure the basic management configurations on the new device same as of old device. For example, mangement IP, subnet, hostname, and so on.

Step 6 Choose **Inventory** > **Device Management** > **Configuration Archive** and **Roll Back** the configuration backup taken from the old device on the new device.

Step 7 On the **Network Devices** page, change the device state to **Managed** and wait till the status changes to **Completed**.

What to do next

Make sure that all the basic device settings, services , performance and fault data are intact and the new configuration is successful.