Using the Topology Map

About Topology

The **Topology** window displays a graphical view of your network. Using the discovery settings that you have configured, the Cisco APIC-EM discovers and maps devices to a physical topology with detailed device-level data.

Note The entire network topology is displayed. However, you will only have access to device information and functions if the device is listed in the device scope in your user profile. If the device is not in your device scope, then you will not be able to view additional information about the device, or, in the case of a user profile with ROLE_ADMIN or ROLE_POLICY_ADMIN, tag devices or change device roles.

To access the **Topology** window, from the **Navigation** pane, click **Topology**. The **Topology** window appears and displays a topology map of your network.

Figure 1: Topology Window
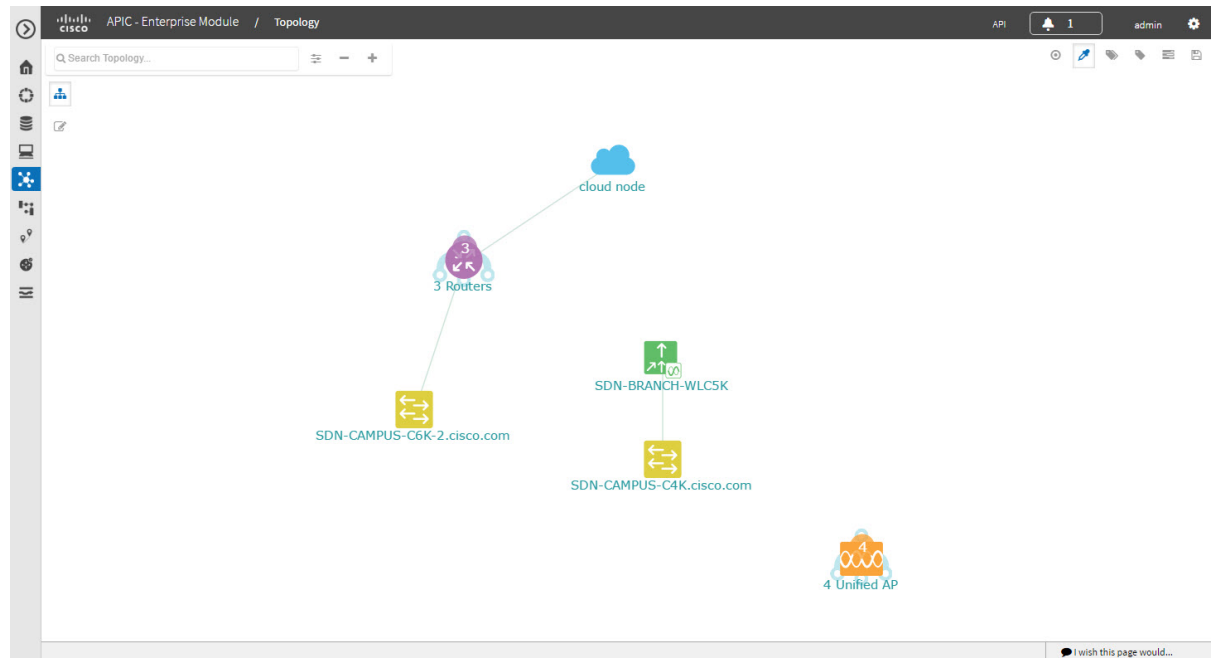
The topology map includes the following key features:

- Auto-visualization of Layer 2 and 3 topologies on top of the physical topology for a granular view for design planning and simplified troubleshooting.

- For a Layer 2 topology, display of configured VLANs within your network. For a Layer 3 topology, display of OSPF, IS-IS, and so on, depending on what is currently configured and in use in your network.

- Device information.

- Display of a path trace in the topology map. For additional information about performing a path trace, see the *Cisco Path Trace Application for APIC-EM User Guide*.
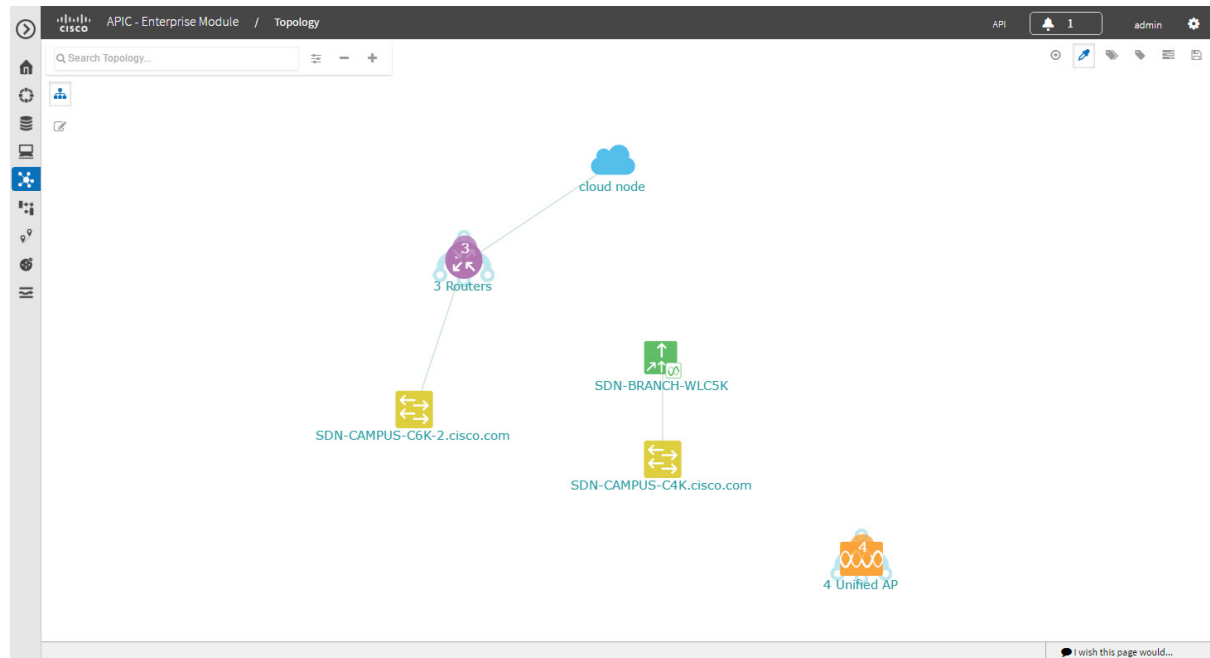
Note   Individual device configurations are retrieved and stored in a network information database (NIDB).

Topology Toolbar

The Topology toolbar is located at the top of the **Topology** window.

Figure 2: Topology Window

Icon	Name	Description
	Toggle Aggregation	Enables or disables device aggregation. Aggregating devices means grouping devices together. You can group devices in any way that makes sense to you. You can save the layout for future reference by clicking the **Save** icon. This grouping does not effect the physical configuration on the devices. Aggregation is enabled by default.
	Toggle Multiselect	Allows you to select multiple devices by dragging the mouse over the desired devices or shift-clicking on devices. You can also select multiple groups of devices by clicking shift and dragging the mouse over a group of devices. After selecting the group of devices, you can aggregate or tag them. If you aggregate devices of different product families, the Cisco APIC-EM shows them as generic devices (without a device type) and the number of devices. Multiselect is off by default.
	Search Topology	Searches for a host or device by host name, device name, device type, or IP address. As you enter information into this field, the Cisco APIC-EM displays matches. Select the host or device from the results that appear. The selected host or device appears in the **Topology** window.

Icon	Name	Description
	Filters	Allows you to choose a filter that you can apply to the topology map. For each filter, you can make additional adjustments using the **Advanced** options. For information, see Configuring the Topology Structure, on page 12.
		• **Enterprise** (Default)—Displays your network topology, separating your devices on connection branches. For example, if a group of devices are connected to Router A, and another group of devices are connected to Router B, the topology would show this division and would separate the devices.
		• **Connections**—Displays the devices according to their number of connections. Starting from the left, the devices with no connections are displayed, then devices with one connection, then devices with two connections, and so on.
		• **Type and Role**—Displays the devices according to their role in the network: access router, distribution switch, core switch and hub, and boarder router.
		• **Advanced**—Provides options for you to refine the topology display.
	Zoom out	**Note** Adjusts the **Topology** window's view. Click the **-** (minus) icon to minimize the view of the network hosts and devices.
	Zoom in	Adjusts the **Topology** window's view. Click the **+** (plus) icon on the menu bar to maximize the view of the network hosts and devices.
	Toggle Color Code	Toggles between displaying the device icons in different colors or in a single color. Color coding is enabled by default.
	Device Tags	Displays the available device tags. Clicking on an individual tag highlights the device or devices in the **Topology** window that have this tag.
		You can also apply tags to devices by selecting the device, clicking **Device Tagging** in the **Device Information** dialog box, and then creating and applying the tags.
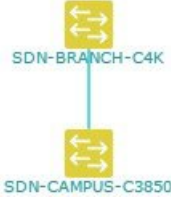
Icon	Name	Description
	Policy Tags	Displays the available policy tags. Clicking on an individual tag adds the device to the policy scope. You can also applypolicy tags to devices in the **EasyQoS > Policy Scopes**.

	Layers	Displays devices with the following attributes on the topology map:
		
		• **Layer 2**—Displays devices based on the selected VLAN or Layer 2 protocol. Select either a VLAN from the drop-down menu or one of the Layer 2 protocols.
		
		  Note You can also access a management network view by choosing a management selection from the drop-down menu.
		
		• **Layer 3**—Displays devices based on the selected Layer 3 protocol. The following Layer 3 protocols are available:
		
		  • **Intermediate System-to-Intermediate System (IS-IS)**
		
		  • **Open Shortest Path First (OSPF)**
		
		  • **Enhanced Interior Gateway Routing Protocol (EIGRP)**
		
		  • **Static-Route**
		
		  Note The default Layer 3 topology has all Layer 3 protocols.
		
		• **VRF**—Displays devices that have Virtual Routing and Forwarding (VRF) tables.

	Save and Load Options	Displays the following options: • **Save Current Layout**—Saves the current layout, device aggregations, and labels. • **Load Saved Layout**—Loads the previously saved layout, device aggregations, and labels) options.

Icon	Name	Description
	Map view	Displays the **Topology** map view. Click this icon to view the network topology in a graphical representation of your network's physical location.
		Note This icon is displayed only if you have added location markers for your devices from the **Device Inventory** window.

Topology Icons

The following icons appear in the **Topology** window:

Icon	Network Element	Description
cloud	**Cloud**	Representation of the external network.
DEVICE-NAME	**Router**	Displays the device name.
DEVICE-NAME	**Switch**	Displays the device name.
DEVICE-NAME	**Access Point**	Displays the device name.
DEVICE-NAME	**Wireless LAN Controller**	Displays the device name.
3 accesspoint	**Aggregated Devices**	Displays the number of aggregated devices and the device type. **Note** If different devices types are aggregated, only the number of aggregated devices is displayed.

Icon	Network Element	Description
DEVICE-NAME	**Location Marker**	Displays the device name. The device icon is displayed with a location marker as a background. If you add location markers to your devices (from the **Device Inventory** window) and then click **Topology** in the navigation pane or click the **Map** button on the Topology toolbar, the Topology map view appears. The map view shows where you have placed your location markers (for example, San Jose and London). Click a location marker on the map to display the topology for that location (for example, San Jose). Devices that use a different location marker (for example, London) are shown with a location marker as a background.
SDN-BRANCH-C4K SDN-CAMPUS-C3850	**Links**	Lines between devices. Click on a link to display information about the connected devices. **Note** Some of the links may be hidden due to device aggregations.

Displaying Device Data

You can display data for a specific device in the **Topology** window. Displaying device data is helpful when troubleshooting network connectivity issues between devices.

Note The device data that is accessible in the **Topology** window is also accessible in the **Device Inventory** window.

The following device data is available:

- Location (Location information is displayed if the selected device icon has a location marker background. Click the **Location** link to display the topology for devices that share that location marker.)
- Type
- Device role (For information about changing the device role, see Changing the Device Role.
- IP address
- MAC address
- OS (operating system)
- Software version
- Ports

- Gigabit Ethernet ports

- 10-Gigabit Ethernet ports

- Management ports

- VLAN (if exists)

- Number of connections

- List of connected devices (Each connected device shows its device type (icon) and the number of connections. Clicking on a connected device displays the details for that device.)

- Tags

Step 1   From the **Navigation** pane, click **Topology**.

The **Topology** window appears.

Note   If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker to display the **Topology** for that location.

Step 2   To display data for a specific device, click that device in the **Topology** window.

Step 3   To display a list of aggregated devices, do the following:

a) In the **Topology** window, click an **aggregated devices** icon.
b) In the **Device Details** pane, click the **Details** link for each device to view the device data.
c) Click the **Aggregated Results** link to return to the list of aggregated devices.

What to do next

Select and review data from other devices within your network, or perform other tasks including the following:

- Aggregate or disaggregate selected groups

- Search for device using device names and IP addresses

- Apply tags to devices within your network

- Change the device role

Aggregating Devices

You use the Cisco APIC-EM device aggregation feature to adjust how devices are displayed in the **Topology** window. This feature enhances network navigation and manageability.

Aggregating Devices in the Topology Window

You can aggregate and disaggregate devices into and out of groups in the **Topology** window.
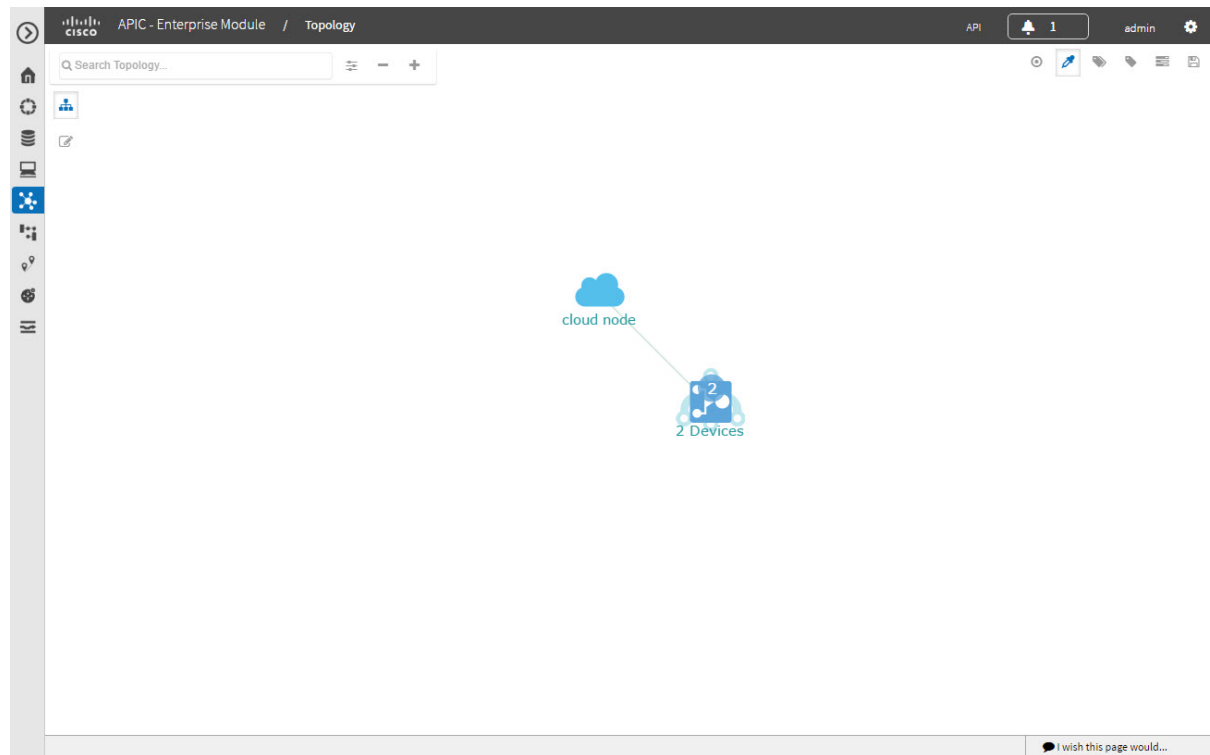
Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device and host inventory for the database.

Determine how the devices within your network configuration are to be visually grouped and organized.

Step 1	Click **Topology** in the navigation pane.
	The **Topology** window appears.
	Note If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker to display the **Topology** for that location.
Step 2	Click the **Toggle Aggregation** icon to enable device aggregation.
	Note Device aggregation is enabled by default.
Step 3	Drag and drop a device icon onto another device icon.
	The device icon changes to an aggregated devices icon. For more information about the aggregated devices icon, see Topology Icons, on page 6.
	Note You can also select multiple devices by clicking the **Multiselect** icon, dragging the mouse over the desired devices, and clicking the **Aggregate Selected** link.

Disaggregating Devices in the Topology Window

You can ungroup devices by disaggregating them in the **Topology** window.

Figure 3: Topology Window Showing Disaggregate Option in Devices List
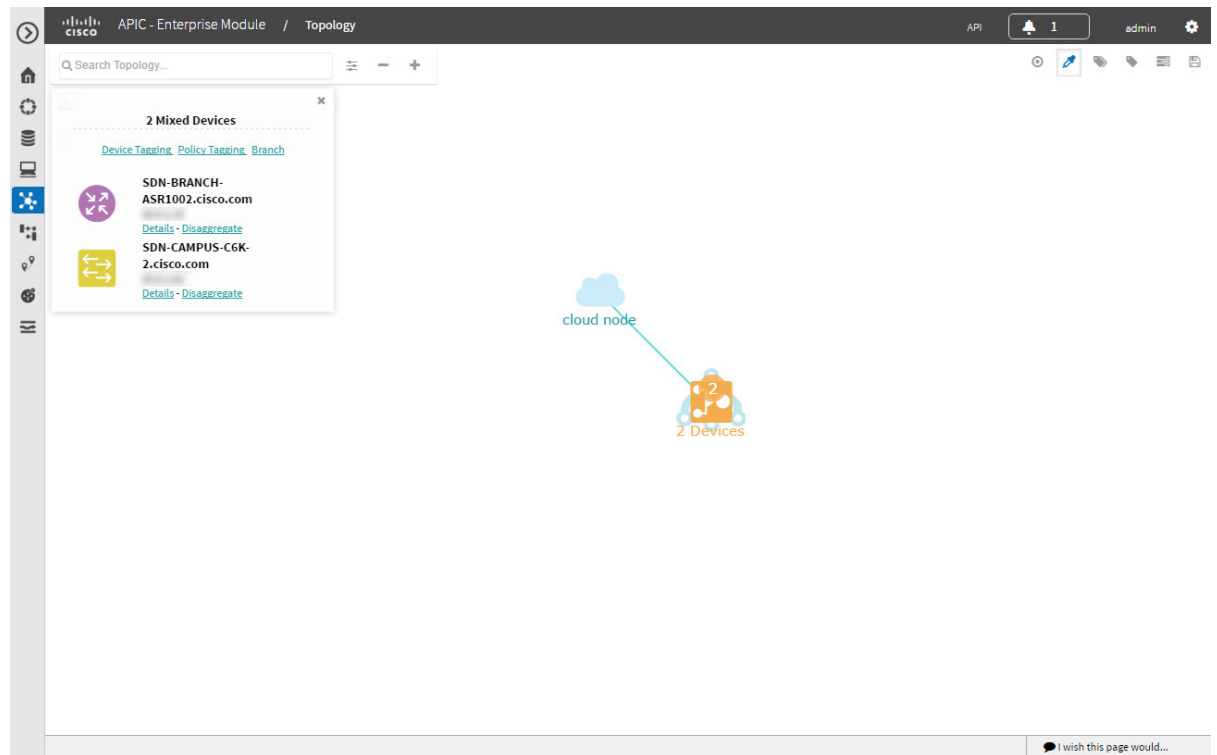
Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device inventory for the database.

Determine how the devices within your network configuration are to be visually grouped and organized.

Step 1 From the Navigation pane, click **Topology**.

The **Topology** window appears.

Note If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker to display the **Topology** for that location.

Step 2 Click on an **aggregated devices** icon.

A list of the aggregated devices appears.

Step 3 From the list, click the **Disaggregate** link for each device that you want to remove from the aggregated devices.

The device is removed from the list and from the aggregated devices icon. The aggregated device label and the aggregated devices icon are updated to reflect the number of devices.

Changing the Aggregated Devices Label

The default label for aggregated devices is the number of devices and the device type (*# devicetype* Devices). However, you can change the default label to one that is meaningful in the context of your network topology.
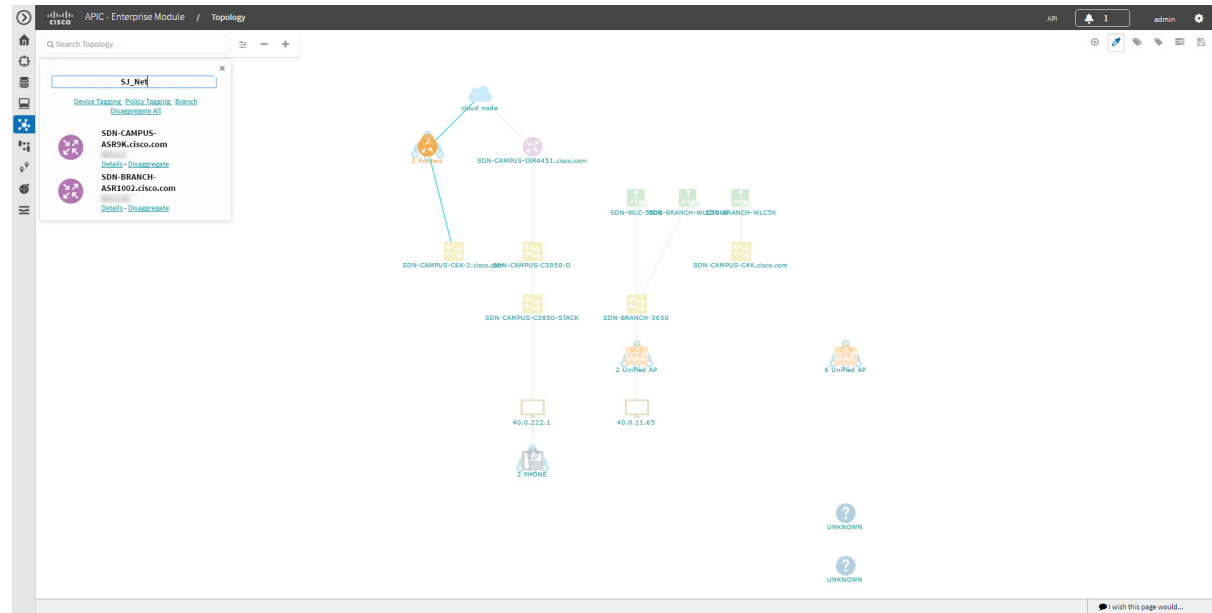
Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device inventory for the database.

Determine how the devices within your network configuration are to be visually grouped and organized.

Step 1   From the Navigation pane, click **Topology**.

The **Topology** window appears.

Note   If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker to display the **Topology** for that location.

Step 2   Click an **aggregated devices** icon.

A list of the aggregated devices appears. At the top of the list is the aggregated devices label.

Step 3   Click the aggregated devices label to open an edit field where you can change the label.

Step 4   Change the label, then click outside of the edit field to save your changes.

Configuring the Topology Structure

You can choose from three default topology layouts. You can also use advanced settings to modify these layouts, such as the overall size of the topology graph, the spacing that separates individual elements, and more.

Figure 4: Topology Window Showing Filters Drop-Down List
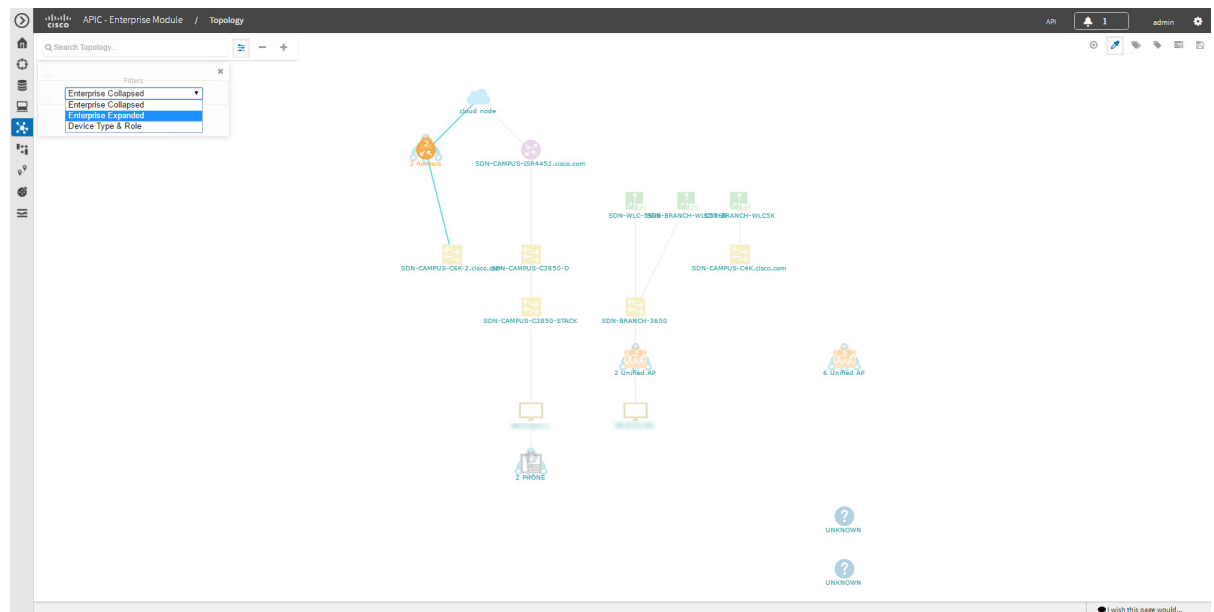
Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device inventory for the database.

Step 1   From the **Navigation** pane, click **Topology**.

The **Topology** window appears.

Note   If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker to display the **Topology** for that location.

Step 2   From the **Topology** toolbar, click the **Filters** icon.

Step 3   Select a filter from the drop down list. Available options are **Enterprise Collapsed**, **Enterprise Expanded**, or **Device Type & Role**.

Step 4   Click the **Advanced View** button to configure how each filter is displayed. Click the **Basic View** button to return to the basic view.

| Filter	Basic View	Advanced View
Enterprise	Arranges the device icons into a structured connection hierarchical view, from top to bottom.	**Device type**—Use the slider to adjust the amount of space between device icons based on their device types. **cloud-centralizeX**— When checked (default), the device icons are centered along the X axis. When unchecked, the device icons are aligned to the X axis. **Device role**—Use the slider to adjust the amount of space between device icons based on their device roles. **Branch**— Use the slider to adjust the amount of space between branches. **Node overlap**—Use the slider to adjust the amount of space between nodes. **Note** Select **x** or **y** from the drop down next to each slider to change how the device icons are displayed, horizontally or vertically.
Connections	Arranges the device icons from left to right based on the number of connections, from least to most. **Note** Aggregated devices are disaggregated in this view.	**Connections**—Use the slider to adjust the amount of space between connections. **Node overlap**—Use the slider to adjust the amount of space between nodes. **centralizeY**—When checked, the device icons are centered along the Y axis. When unchecked, the device icons are aligned to the Y axis. **Note** Select **x** or **y** from the drop down next to each slider to change how the device icons are displayed, horizontally or vertically.
Type and Role	Arranges the device icons from top to bottom based on device type (cloud, router, WLC, switch, access point, wired, wireless) and role (border router, core, distribution, and access) **Note** Aggregated devices are disaggregated in this view.	**Device type**—Use the slider to adjust the amount of space between device icons based on their device types. **Device role**—Use the slider to adjust the amount of space between device icons based on their device roles. **Node overlap**—Use the slider to adjust the amount of space between nodes. **centralizeX**—When checked, the device icons are centered along the X axis. When unchecked, the device icons are aligned to the X axis. **Note** Select **x** or **y** from the drop down next to each slider to change how the device icons are displayed, horizontally or vertically.

What to do next

Save the current layout or load a previously saved layout. For information, see Saving a Topology Layout, on page 14 and Opening a Saved Topology Layout, on page 15.

Saving a Topology Layout

You can save a topology layout so that you can open and view it later.

Figure 5: Topology Window Showing Save Dialog Box
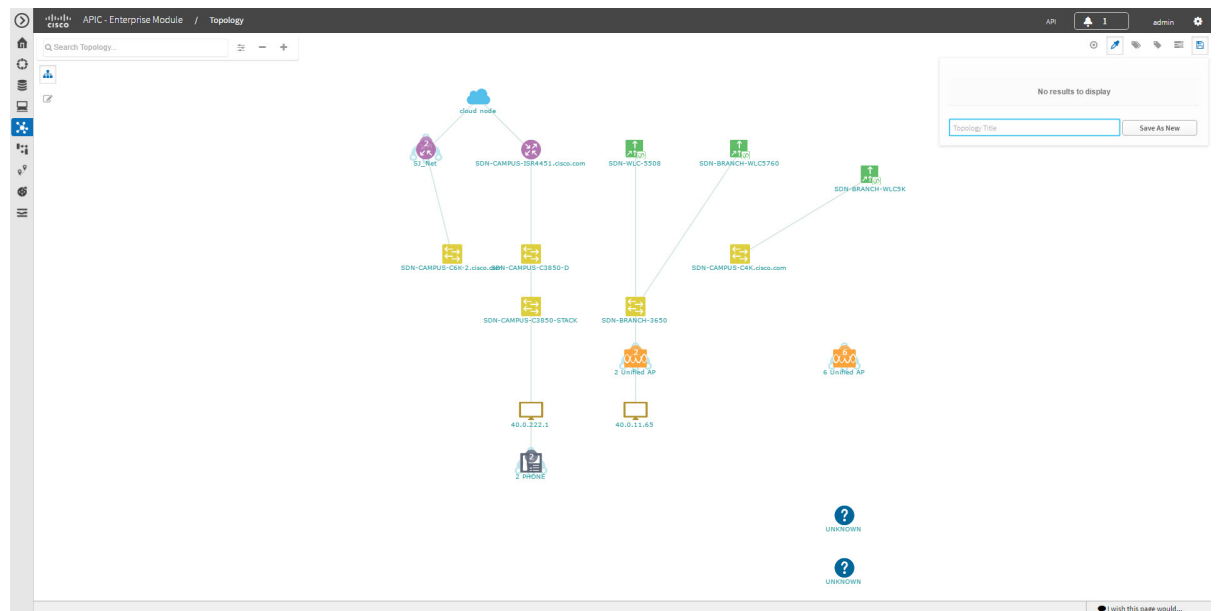
Before you begin

You must have administrator role permissions.

You must have administrator (ROLE_ADMIN) permissions and access to all devices (RBAC Scope set to ALL) to perform this procedure.

Make sure that you have devices in your inventory. If not, discover devices using the Discovery function.

Step 1 From the **Navigation** pane, click **Topology**.

The **Topology** window appears.

Step 2 From the **Topology** toolbar, click the **Save** icon.

Step 3 In the **Topology Title** field, enter a name for the topology and click **Save as New**.

Step 4 Click **OK** to confirm the save.

The topology is saved and the name appears at the top of the dialog box.

Opening a Saved Topology Layout

You can open a topology layout that you have previously saved.

Figure 6: Topology Window Showing Previously Saved Topology Layouts in Save Dialog Box

Before you begin

You must have administrator (ROLE_ADMIN) permissions and access to all devices (RBAC Scope set to ALL) to perform this procedure.
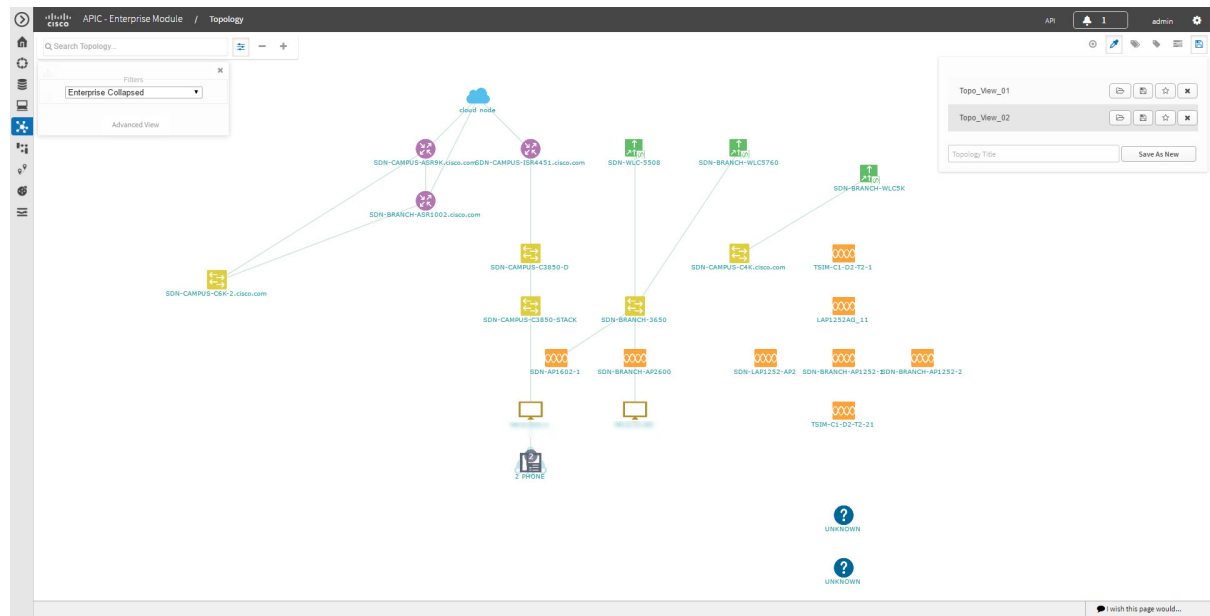
Make sure that you have devices in your inventory. If not, discover devices using the Discovery function.

Step 1   From the **Navigation** pane, click **Topology**.

The **Topology** window appears.

Step 2   From the **Topology** toolbar, click the **Save** icon.

A dialog box appears listing the saved topology layouts.

Step 3   For the topology layout that you want to open, click the **Folder** icon..

Step 4   Click **OK** to confirm.

The topology layout opens in the **Topology** window.

Changing a Device's Role From the Topology Window

During the scan process, a device role is automatically assigned to each discovered device. The device role is used for identifying and grouping devices according to their responsibilities and placement within the network.

A device can have one of the following roles within the Cisco APIC-EM:

- Unknown—Device role is unknown.

- Access—Device is located within and performs tasks required for the access layer or first tier/edge.

- Border Router—Device performs the tasks required for a border router.

- Distribution—Device is located within and performs tasks required for the distribution layer.

- Core—Device is located within and performs tasks required for the core.

You can change the device role when you select a device and display the device data.

Note   You can also change the device role from the **Device Inventory** window.

Figure 7: Topology Window Showing Role Drop-Down List
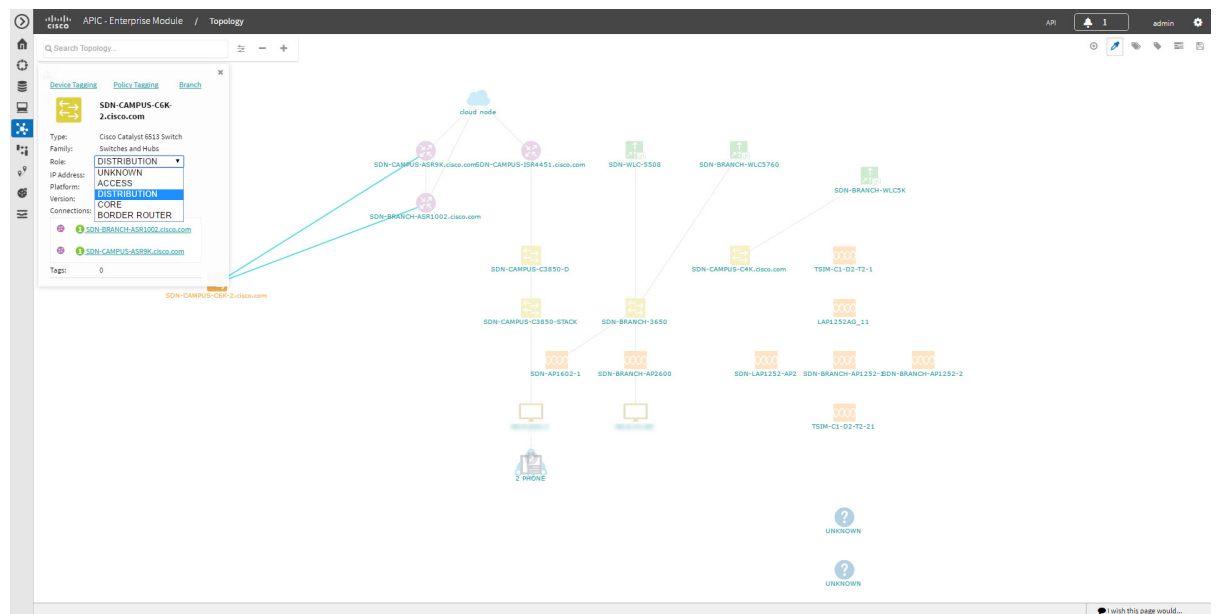
Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device inventory for the database.

Step 1   From the **Navigation** pane, click **Topology**.

The **Topology** window appears.

Note   If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker on the map to display the Topology for that location.

Step 2   Click a specific device in the **Topology** window to select it.

Step 3   Choose a role from the **Role** drop-down list: **Access**, **Core**, **Distribution**, or **Border Router**.

Step 4   (Optional) Select additional devices and change device roles.

Step 5   Click the **Filters** icon on the **Topology** toolbar.

Step 6   (Optional) Select a filter from the drop down list. Available options are **Branch**, **Connections**, or **Device and Role**.

Step 7   Click the refresh button to the right of the filter type to update all of the device roles.
The **Topology** structure refreshes showing the changed device roles.

Searching for Devices and Hosts

You use the Cisco APIC-EM search function to locate specific devices or hosts within your network. This function allows you to search the network using any string value. To locate a specific device or host quickly, use any of the following values in the search field:

- Device or host name

- Aggregation label

- IP address

- Device role

- Device type
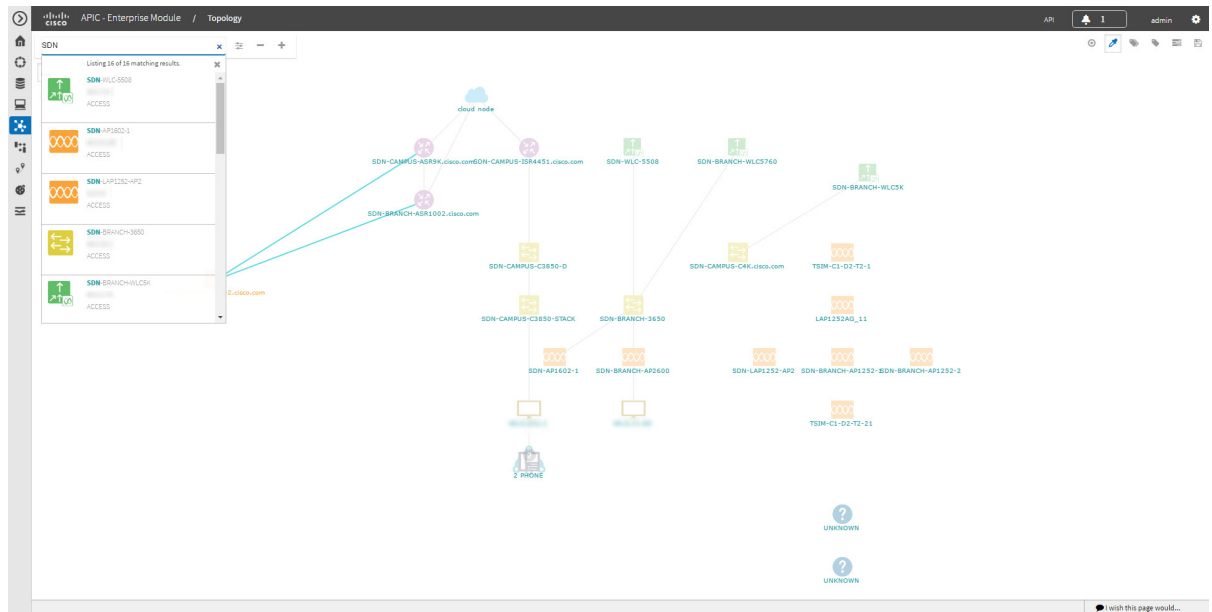
Note   The search function supports fragmented results. For example, if you enter **12** in the search field, you will get results for devices with IP addresses or device names that contain 1 and 2 (.12, .120, .102, 10.20, 1-switch2, etc).

Figure 8: Topology Window Showing Device Search List

Before you begin

Scan your network using the discovery functionality of the Cisco APIC-EM to populate device and host inventory for the database.

Determine the string value to be used within your network for your search.

Step 1   Click **Topology** in the navigation pane.

The **Topology** window appears.

Note   If you have added location markers for your devices from the **Device Inventory** window, the Topology map view appears. Click a location marker on the map to display the Topology for that location.

Step 2   From the Topology toolbar, enter a keyword in the **Search Topology** field.

As you begin typing, the controller displays a list of possible matches to your entry.

Note   You can click the **x** in the search field to clear the search keyword field and the results.

Step 3   Click on a device from the search results to highlight that device and its links in the **Topology** window. Click on the device again to display detailed data for that device.

Step 4   Proceed with any provisioning or troubleshooting tasks on the located devices or hosts.

What to do next

Search using other string values for other devices or hosts within your network, or perform other tasks including the following:

- Viewing the data for specific devices

- Applying tags to devices within your network

- Host a meeting using the topology co-editor to collaborate with other users in real-time on the network

# Adding or Removing a Device Tag in Topology

In the **Topology** window, you can add device tags to associate devices that share a common attribute. For example, you can create a tag and use it to group devices based upon a platform ID, Cisco IOS releases, or location. Similarly, you can remove tags from devices.

You can also add or remove device tags from the **Device Inventory** window or from the **EasyQoS** window. For information, see Adding or Removing a Device Tag in Device Inventory or the *Cisco EasyQoS Application for APIC-EM User Guide*.

Note Applying a tag to a host is not supported.

Figure 9: Device Tag Dialog Box
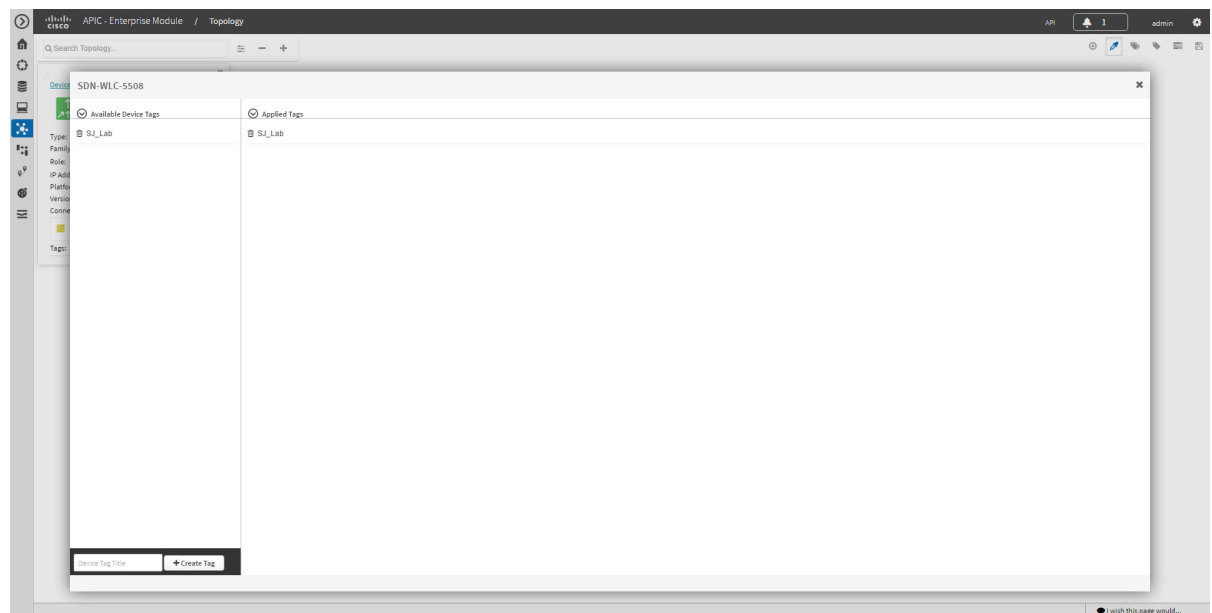
Before you begin

- Make sure that you have devices in your inventory. If not, discover devices using the Discovery function.

Step 1 From the Navigation pane, click **Topology**.

Step 2 Click the device or devices you want to tag. To select more than one device, click the **Multiselect** icon. For information about how to use the multiselect function, see Topology Icons, on page 6.

Note	To deselect devices in your selection, click outside of the selected device.

The **Device Information** dialog box appears.

Step 3   Click **Device Tagging**.

The **Device Tagging** dialog box appears.

Step 4   From the **Available Tags** column, click a tag to apply it to the selected device or devices. If the tag you want does not exist, you can create it by entering the name of the tag in the **Device Tag Title** field and clicking **+Create Tag**.

Step 5   When you are done, click **x** to close the dialog box.

Adding or Removing a Policy Tag in Topology

Before you can create a QoS policy, you need to identify the policy scope, that is, the devices that will be configured with QoS policies. You identify the devices by tagging them with a policy tag.

You can also add or remove policy tags from the **Device Inventory** window or the **EasyQoS** window. For information, see Adding or Removing a Device Tag in Device Inventory or the *Cisco EasyQoS Application for APIC-EM User Guide*.

Figure 10: Policy Tag Dialog Box
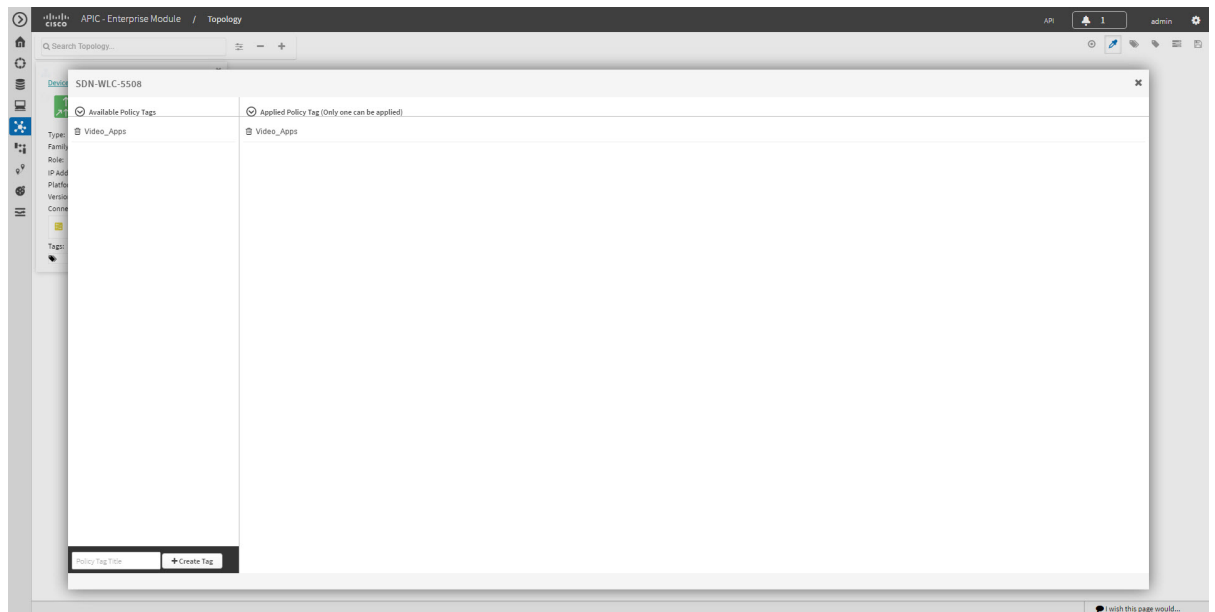
Before you begin

• Make sure that you have devices in your inventory. If not, discover devices using the Discovery function.

From the **Topology** or **Device Inventory** window, verify that the device roles assigned to devices during discovery are appropriate for your network design. If necessary, change any of the device roles that are not appropriate.

Step 1 From the Navigation pane, click **Topology**.

Step 2 Click the device or devices you want to tag. To select more than one device, click the **Multiselect** icon. For information about how to use the multiselect function, see Topology Icons, on page 6.

> **Note** To deselect devices in your selection, click outside of the selected device.

The **Device Information** dialog box appears.

Step 3 Click **Policy Tagging**.

The **Multiple Policy Tagging** dialog box appears.

Step 4 From the **Available Policy Tags** column, click a tag to apply it to the selected device or devices. If the tag you want does not exist, you can create it by entering the name of the tag in the **Policy Tag Title** field and clicking **+Create Tag**.

Step 5 When you are done, click **x** to close the dialog box.

Displaying Devices with Tags

To display tagged devices from the **Topology** window, perform the following steps.

Figure 11: Topology Window Showing Devices with Tags
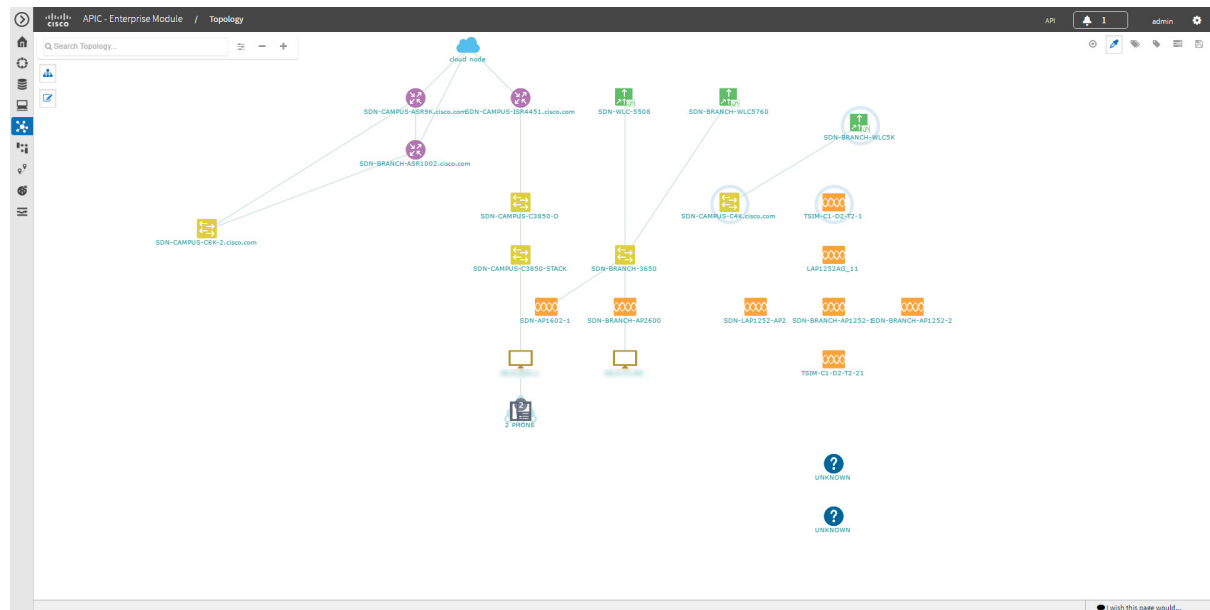
Before you begin

You should have performed the following tasks:

- Discovered the devices on your network to populate the device inventory database.

- Created tags and applied them either through the **Device Inventory** or **Topology** window.

Step 1   From the Navigation pane, click **Topology**.

The **Topology** window appears.

Step 2   From the Topology toolbar, click the **Tags**.

A tag selection box appears.

Step 3   To identify the devices associated with a tag, click the tag. To return the devices to their normal display, click the tag again.

Tags are color-coded, so when you click a tag, a circle of the same color is drawn around its associated devices.

Note   You can click more than one tag at a time. The tag that you chose to display first is the innermost circle around the device, followed by the next tag as the next circle, and so on.