Topology

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Topology

The Topology window displays color-encoded nodes and links that correspond to various network elements, including switches, links, fabric extenders, port-channel configurations, virtual port-channels, and more. For information about each of these elements, hover your cursor over the corresponding element. Also, click a node or the line for a link. A slide-in pane appears from the right side of the window. This pane displays detailed information about either the switch or the link.

Note You can open multiple tabs simultaneously and can function side by side to facilitate comparison and troubleshooting.

Status

The color coding of each node and link corresponds to its state. The colors and what they indicate are described in the following list:

- Green: Indicates that the element is in good health and functioning as intended.

- Yellow: Indicates that the element is in warning state and requires attention to prevent any further problems.

- Red: Indicates that the element is in critical state and requires immediate attention.

- Gray: Indicates lack of information to identify the element or the element has been discovered.

  Note • In the **Topology** window, FEX appears in gray (**Unknown** or **n/a**) because health is not calculated for FEX.

- Black: Indicates that the element is down.

Scope

You can search the topology based on the scope. The default scopes available from the **SCOPE** drop-down list is: **DEFAULT_LAN**

The following search options are available for **DEFAULT_LAN**:

- Quick Search

- Host name (vCenter)

- Host IP

- Host MAC

- Multicast Group

- VXLAN ID (VNI)

- VLAN

- FabricPath

- VXLAN OAM

Searching

When the number of nodes is large, it quickly becomes difficult to locate the intended switches and links. You can quickly find switches and links by performing a search. You are also able to search for VM tracker and generic setups. Searching feature enables you to see which leaf the host is connected to.

The following searches are available:

Note By default, Quick Search is selected.

Quick Search

Quick Search enables you to search for devices by name, IP address, model, serial number, and switch role. As you enter a search parameter in the **Search** field, the corresponding switches are highlighted in the topology. To perform a search for multiple nodes and links, separate multiple keywords using a comma, for example, ABCD12345, N7K, sw-dc4-12345, core, 172.23.45.67. Cisco DCNM supports wildcard searches too. If you know a serial number or switch name partially, you can build a search based on these partial terms that are preceded by an asterisk, for example, ABCD*, sw*12345, core, and so on.

To limit the scope of your search to a parameter, enter the parameter name followed by a space and the parameter in the Search field, for example, name=sw*12345, serialNumber=ABCD12345, and so on.

Host name (vCenter)

The host name search enables you to search for hosts by using vCenter.

Host IP

You can search the topology using host IP addresses. The **Host IP** searches the switches in the scope to locate the hosts that match the IP address that you enter in the **Search** field. The **Host IP** search supports IPv4 and IPv6 addresses. From the Search drop-down list, choose **Host IP** to search the topology using the IP Address of the host device. Enter a host IP address in the **Search** field and press **Enter**. Click **Details** to view the corresponding host details.

Host MAC

You can search a topology using host MAC addresses. The **Host MAC** searches the switches in the scope to locate the hosts that match the MAC address that you enter in the **Search** field. From the Search drop-down list, choose **Host MAC** to search the topology using a host MAC address. Enter a host MAC address in the Search field and press **Enter**. Click **Details** to view the corresponding host details.

Multicast Group

The **Multicast Group** search is limited to the VXLAN context, VXLAN tunnel endpoint or VTEP switches, to get VXLAN IDs (VNIs) associated with this multicast address.

Select the **Multicast Group** search from the drop-down list, enter a multicast address in the search field, and press **Enter**. Click the **Details** link next to the search field to get the detailed multicast address table. The table displays switches, which have the searched multicast address configured on them, along with associated VNI, VNI status, and mapped VLAN.

You can also hover over switches that are highlighted to view details about the search you have performed.

VXLAN ID (VNI)

The VXLAN ID or the VNI search lets you search the topology by VNI. Select the **VXLAN ID (VNI)** search from the drop-down list. Enter a VNI in the search field and press **Enter**. Click the **Details** link next to the search field to view the detailed VNI table. The table displays the switches that have VNI configured on them along with associated multicast address, VNI status, and mapped VLAN.

VLAN

Search by a given VLAN ID. VLAN search provides the search for the VLAN configured on the switch or the links. If STP is enabled, then it provides information that is related to the STP protocol and the STP information for links.

VSAN ID/Name

Search by a given VSAN ID. VSAN search provides the search for VSAN configured on the switch or the links. In order to view the STP details associated with the VSAN, click **STP Details** link.

This shows the STP details, if STP is enabled. If the link is blocked, it is marked as red, green in case of a forwarding link, and orange if the link is blocked for one VSAN range and forwarding for the other VSAN range.

This search is applicable to both the default LAN and SAN scopes.

FabricPath

Search on the FabricPath topology ID, typically 0 or 1. After search, FabricPath topology links are displayed with purple colored links. You can use the **FabricPath Panel** below the search box to fetch various FabricPath graphs.

Click the drop-down arrow next to **FabricPath Panel**, select a below type of graph:

- **Multi destination**—Select the switch from the **Anchor** drop-down list, and select the graph ID from the **Graph ID** drop-down list to get multi destination or broadcast graph.

- **Reachability**—Select the switch in the **From** drop-down list to get the reachable devices in FabricPath topology from the selected switch.

- **Unicast**—Select the switch from the **Source** and **Destination** drop-down list to get equal cost multi paths from a source to destination switch in FabricPath topology.

- **Multicast**—Select from the **Anchor**,**Ftag ID**, and **IGMP Addr** drop-down list to get the FabricPath multicast tree. The selected anchor switch is the root of the tree.

VXLAN OAM

You can track details such as reachability and actual path of the flows in a VXLAN EVPN based-fabric topology by choosing the **VXLAN OAM** option from the **Search** drop-down list or by entering **VXLAN OAM** in the **Search** field. This displays the **Switch to switch** and **Host to host tabs**. DCNM highlights the route on the topology between the source and destination switch for these two options.

The **Switch to switch** option provides the VXLAN OAM ping and traceroute test results for the VTEP-to-VTEP use-case. Provide the following values to enable search by using the **Switch to switch** option:

- From the **Source Switch** drop-down list, choose the source switch.

- From the **Destination Switch** drop-down list, choose the destination switch.

- From the **VRF** drop-down list, choose or enter the VRF details.

- Check the **All Path Included** check box to include all the paths in the search results.

The **Host to host** option provides the VXLAN OAM pathtrace results for the exact path that is taken by a given flow from the VTEP or switch that is connected to the source host to VTEP or switch that is connected to the destination host. For the **Host to host** use-case, there are two suboptions:

- VRF or SVI for a network is instantiated on the switches in the VXLAN EVPN fabric. In such a scenario, the IP address information of the end hosts is required.

- Layer 2 configuration for a given network is instantiated on the switches in the VXLAN EVPN fabric. In such a scenario, both the MAC and IP address information of the end hosts are required.

Provide the following values to enable search using the **Host to host** option:

- In the **Source IP** field, enter the IP address of the source host.

- In the **Destination IP** field, enter the IP address of the destination host.

- In the **VRF** field, choose VRF from the drop-down list or enter the VRF name that is associated with the hosts.

- (Optional) In the **Source Port** field, choose Layer 4 source port number from the drop-down list or enter its value.

- (Optional) In the **Destination Port** field, choose destination port number or enter its value.

- (Optional) In the **Protocol** field, choose the protocol value from the drop-down list or enter its value. This is the Layer 4 protocol, usually TCP or UDP.

- Click the **Interchange/Swap Source and Destination IPs (and MACs if applicable)** icon to interchange the source and destination IP addresses. This interchange allows a quick trace of the reverse path without reentering the host IP addresses or MAC addresses.

- Check the **Layer-2 only** check box to search the VXLAN-EVPN fabric that is deployed in Layer 2 only mode for some networks, that is, Layer 2 VNIs. Note that no SVIs or VRFs should be instantiated in the fabric for these networks when you use this search option.

  Enter values for the following additional fields:

Show Panel

You can choose to view your topology based on the following options:

- **Auto Refresh**: Check this check box to automatically refresh the topology.

- **Switch Health**: Check this check box to view the switch's health status.

- **FEX**: Check this check box to view the Fabric Extender.

  > **Note** The FEX feature is available only on LAN devices. Therefore, checking this check box displays only the Cisco Nexus switches that support FEX.

  > **Note** FEX is also not supported on Cisco Nexus 1000V devices. Therefore, such devices will not be displayed in the topology when you check the **FEX** check box.

- **Links**: Check this check box to view links in the topology. The following options are available:

  - **Errors Only**: Click this radio button to view only links with errors.

  - **All**: Click this radio button to view all the links in the topology.

  - **VPC Only**: Check this check box to view only vPC peer-links and vPCs.

  - **Bandwidth**: Check this check box to view the color coding based on the bandwidth that is consumed by the links.

- **OTV**: Check this check box to show the Overlay Transport Virtualization (OTV) topology with the cloud icon and the dotted links from the OTV edge devices. Hovering the cursor over the cloud and the links shows the relevant information for OTV topology, such as control group, extended VLANs, and so on. The OTV search field appears below the filter field. Use the OTV search field to search the shown OTV topology that is based on **Overlay ID** and **Extended VLAN ID**. The searched virtual links based on the **Overlay ID** and **Extended VLAN ID** are marked green.

A **Details** link appears after you check the **OTV** check box. Clicking the link shows the OTV topology data. The **Overlay Network** column shows whether the particular topology is multicast based or unicast based. The **Edge Device** column displays the edge switches in the particular OTV topology. The other columns display the corresponding overlay interface, extended VLANs, join interface, and data group information.

- **UI controls**: Check the check box to show or hide the various controls on the **Topology** window.

- **Compute**: Check the check box to enable the compute visibility on the **Topology** window.

- **Refresh**: You can also perform a topology refresh by clicking the **Refresh** icon in the upper-right corner of this panel.

Layouts

The topology supports different layouts along with a **Save Layout** option that remembers how you positioned your topology.

- **Hierarchical** and **Hierarchical Left-Right**: Provide an architectural view of your topology. Various switch roles can be defined that will draw the nodes on how you configure your CLOS topology.

  Note When running a large-scale setup, being able to easily view all your switches on a leaf-tier can become difficult. To mitigate this, DCNM splits your leaf-tier every 16 switches.

- **Random**: Nodes are placed randomly on the window. DCNM tries to make a guess and intelligently place nodes that belong together in close proximity.

- **Circular** and **Tiered-Circular**: Draw nodes in a circular or concentric circular pattern.

- **Custom saved layout**: Nodes can be dragged around according to your preference. After you position as required, click **Save** to retain the positions. The next time you come to the topology, DCNM will draw the nodes based on your last saved layout positions.

Before a layout is chosen, DCNM checks if a custom layout is applied. If a custom layout is applied, DCNM uses it. If a custom layout is not applied, DCNM checks if switches exist at different tiers, and chooses the Hierarchical layout or the Hierarchical Left-Right layout. Force-directed layout is chosen if all the other layouts fail.

Zooming, Panning, and Dragging

You can zoom in and zoom out using the controls that are provided at the bottom left of the windows or by using your mouse's wheel.

To pan, click and hold anywhere in the whitespace and drag the cursor up, down, left, or right.

To drag switches, click, hold, and move the cursor around the whitespace region of the topology.

Switch Slide-Out Panel

You can click on the switch to display the configured switch name, IP address, switch model, and other summary information such as status, serial number, health, last-polled CPU utilization, and last-polled memory utilization.

Beacon

This button will be shown for switches that support the **beacon** command. After beaconing starts, the button will show a countdown. By default, the beaconing will stop after 60 seconds, but you can stop it immediately by clicking **Stop Beacon**.

Note   The default time can be configured in `server.properties` file. Search for **beacon.turnOff.time**. The time value is in milliseconds. Note that this requires a server restart to take effect.

Tagging

Tagging is a powerful yet easy way to organize your switches. Tags can be virtually any string, for example, *building 6*, *floor 2*, *rack 7*, *problem switch*, and *Justin debugging*.

Use the search functionality to perform searches based on tags.

More Details

Click **Show more details**; detailed information appears in the switch's dashboard.

Link Slide-Out Panel

You can click a link to view the status and the port or switches that describe the link.

24-Hour Traffic

This feature requires **Performance Monitoring** to be turned **ON**. When **Performance Monitoring** is **ON**, traffic information is collected and the aggregate information is displayed along with a graph showing traffic utilization.

vCenter Compute Visualization

In virtualized environments, any kind of troubleshooting starts with identifying the network attachment point for the virtual machines. This means that a quick determination of the server, virtual switch, port group, VLAN, associated network switch, and physical port is critical. This requires multiple touch points and interactions between the server and the network administrator as well as reference to multiple tools (compute orchestrator, compute manager, network manager, network controller, and so on).

This allows you to visualize the vCenter-managed hosts and their leaf switch connections on the **Topology** window. The visualization options include viewing only the attached physical hosts, only the VMs, or both. When you select both, the topology all the way from the leaf switches to the VMs, including the virtual switches are displayed. The VM Search option highlights the path of the VM. Hover the cursor over a host or a connected uplink to view key information relevant to that entity. Up to four vCenters are supported.

> ✎
>
> **Note**
> - The vCenter Compute Visualization feature is supported on both the LAN Classic and Easy Fabrics installations for the vCenter-managed computes.
>
> - It is not recommended to use special characters in a VM name as vCenter does not escape special characters used in display names. For more information, see https://vss-wiki.eis.utoronto.ca/display/VSSPublic/Virtual+Machine+Naming.

Figure 1: vCenter Compute Visualization
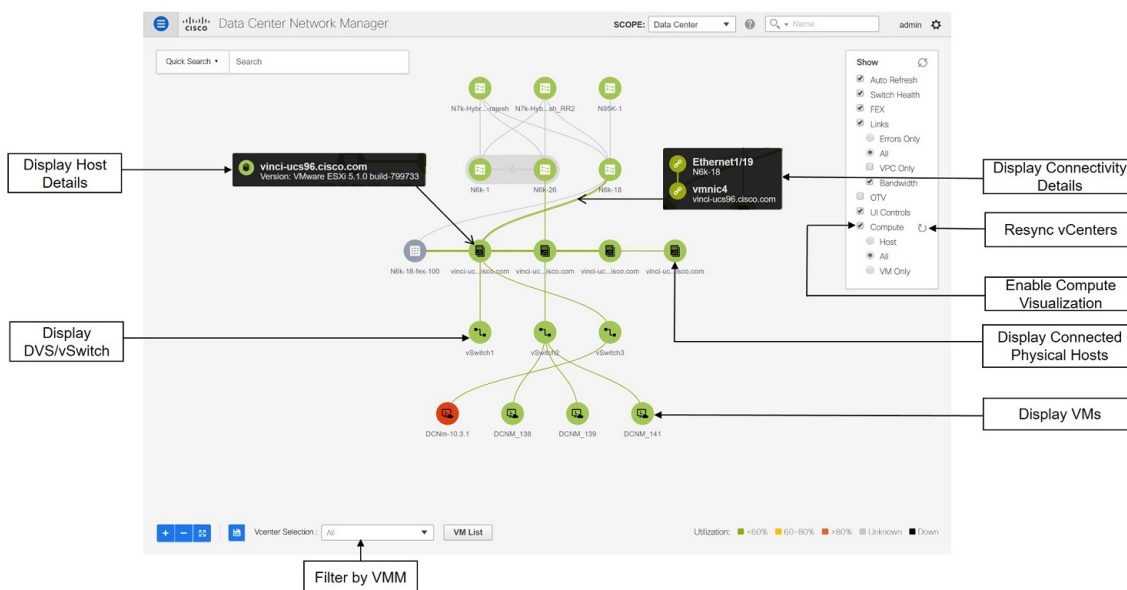
Enabling vCenter Compute Visualization

To enable the vCenter Compute Visualization feature from the Cisco DCNM Web UI, perform the following steps.

Procedure

Step 1 Choose **Configure > Inventory > Virtual Machine Manager**.

The **Inventory > Discovery > Virtual Machine Manger** window appears.
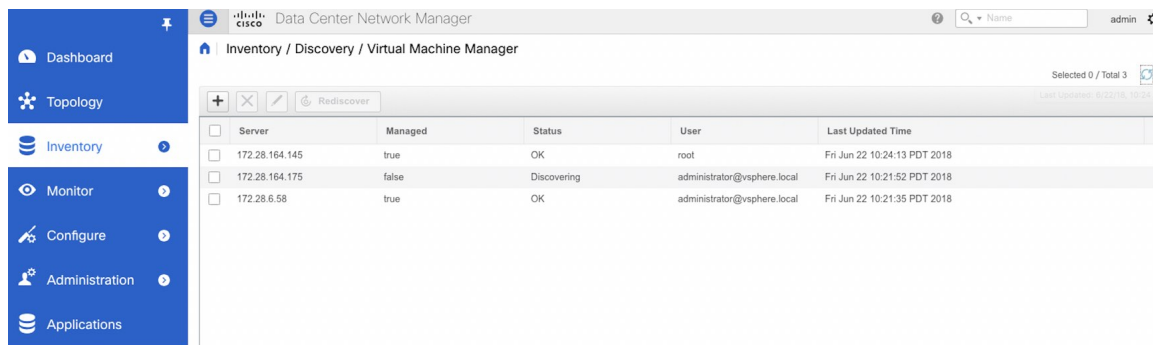
Step 2   Click the + icon to add a new VMware vSphere vCenter.
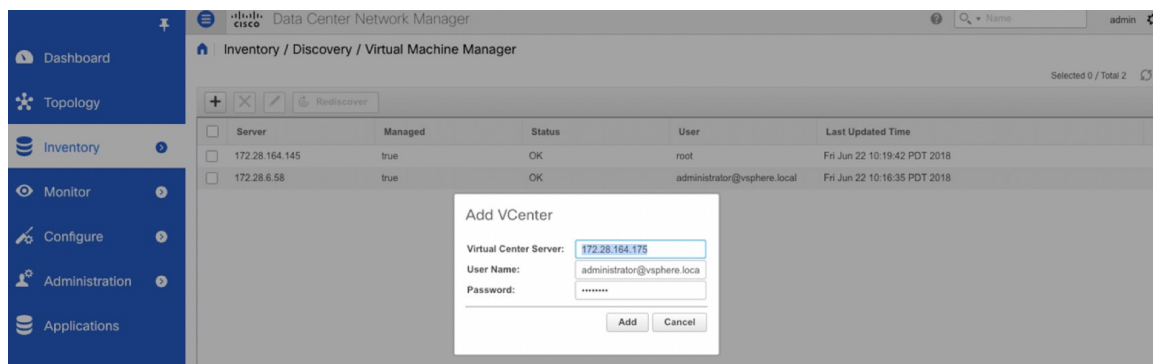
Step 3   Enter the server IP address, username, and password to the vCenter. vCenter version 5.5 or later is required.

After the initial discovery, the information that is received from the vCenter is appropriately organized and displayed on the main **Topology** window. An extra menu item labeled **Compute** appears on the **Show** pane.
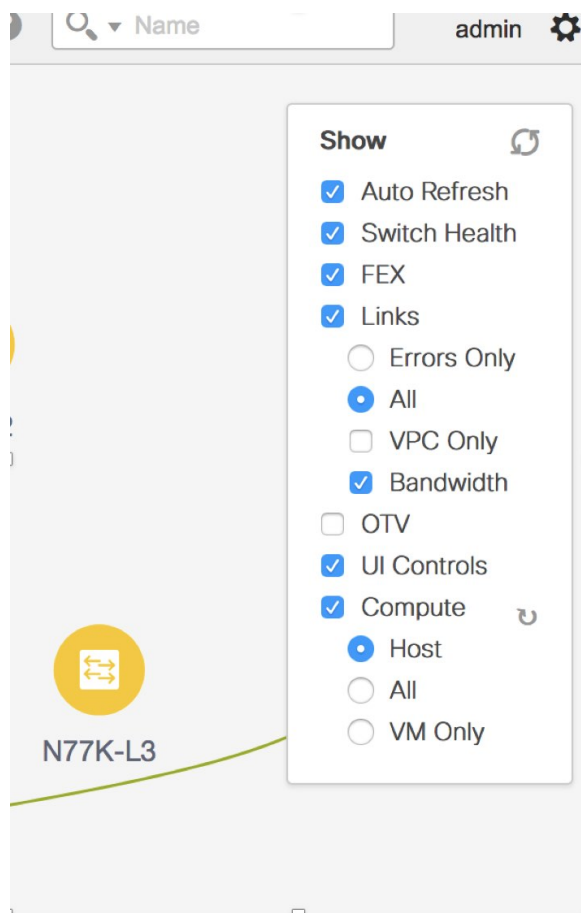
Using vCenter Compute Visualization

To use the vCenter Compute Visualization feature from the Cisco DCNM Web UI, perform the following steps.

Procedure

Step 1   Choose **Topology**.

Step 2   In the **Show** list, select **Compute** to enable the compute visibility.

By default, the **Host** check box is selected. This implies that the topology shows the VMWare vSphere ESXi hosts (servers), that are attached to the network switches.

The following options are available in the Compute Visualization feature.

- **Host**

- **All**

- **VM Only**
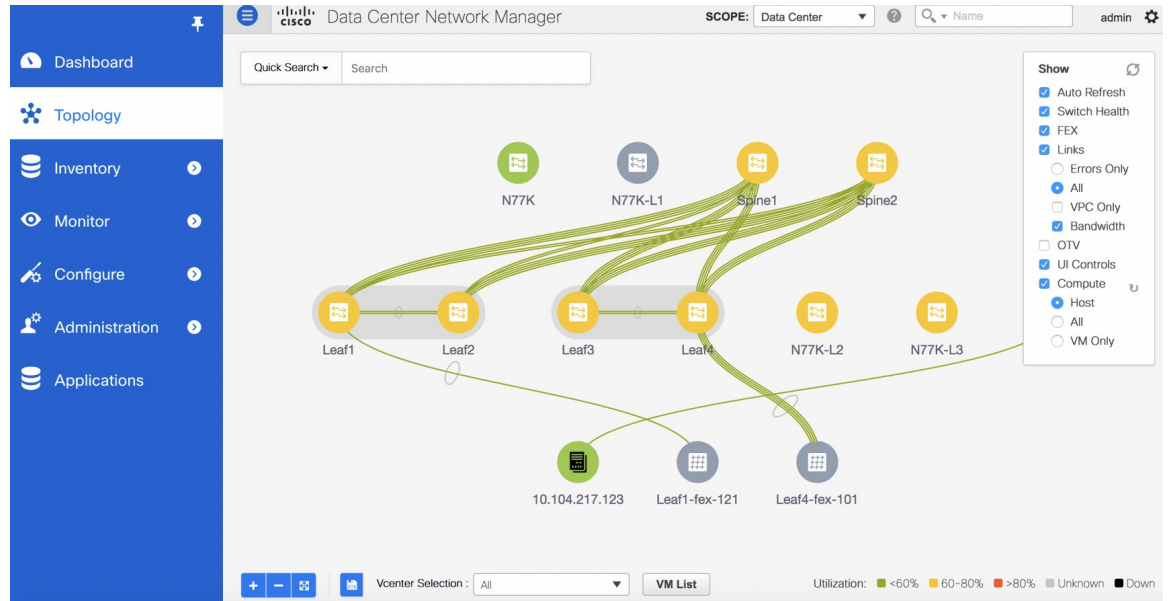
In the **All** mode, you can see double-arrows that help you to extend a node. If you double-click this node, you can see all the hidden child nodes.

Step 3   Click a specific ESXi host to view additional information.

The expanded topology displayed in the following figure, shows the virtual switches (both vSwitch and Distributed Virtual Switch) that are configured on the specific ESXi host.
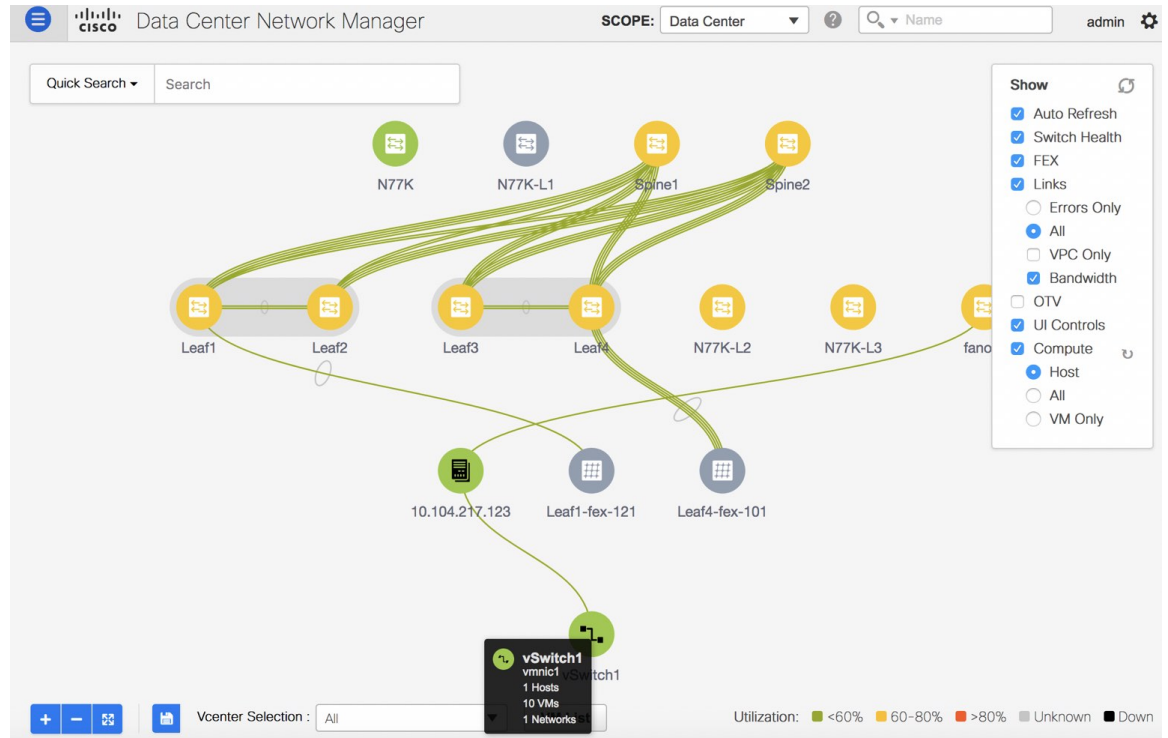
Step 4   When changing from the **Host** suboption to the **All** suboption, all the compute resources are expanded.

When **All** is selected, an expanded view of all the hosts, virtual switches, and virtual machines that are part of the topology are displayed. If a VM is powered off, it is shown in red color; otherwise, it is shown in green color.

Note   The vCenter search is unavailable when compute visualization is not enabled. Also, this search is available only when you select the **All** option.

Step 5   Instead of browsing through the large set of available information, to focus on a specific VM.

Enter a host name (vCenter) in the **Search** field at the top-left. When you start entering the characters, the topology is instantaneously updated with matching objects.

Using the Virtual Machine List

The **Virtual Machine List** allows you to view the complete list of virtual machines.

Procedure

Step 1   Choose **Topology**.

Step 2   Click **VM List**.

Click **Export** to export the list of virtual machines into a .csv file.

Click on the name of a VM to view additional information about that virtual machine.
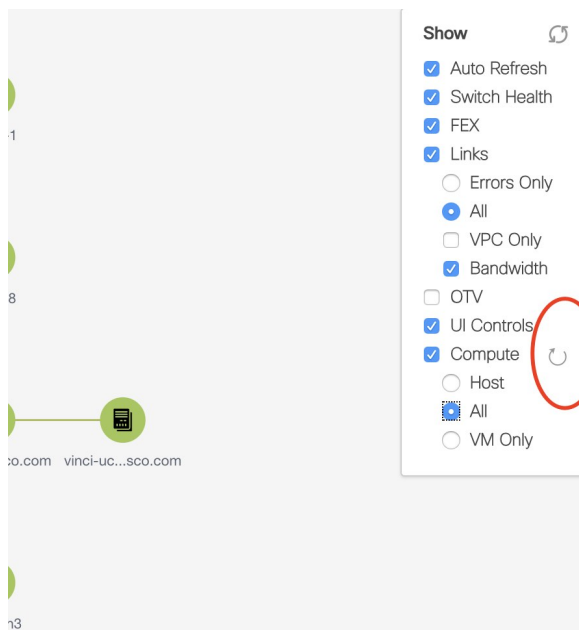
Note   When you export the VM List to a .CSV file, the .CSV file may appear correct. However, when the .CSV file is imported into Microsoft Excel, it might get reformatted, for example, the VLAN column 1-1024 could be reformatted to a date 1/1/2019. Therefore ensure that columns are formatted correctly in Microsoft Excel while importing the .CSV file.

Resynchronizing Virtual Machines

Procedure

Step 1   Choose **Topology**.

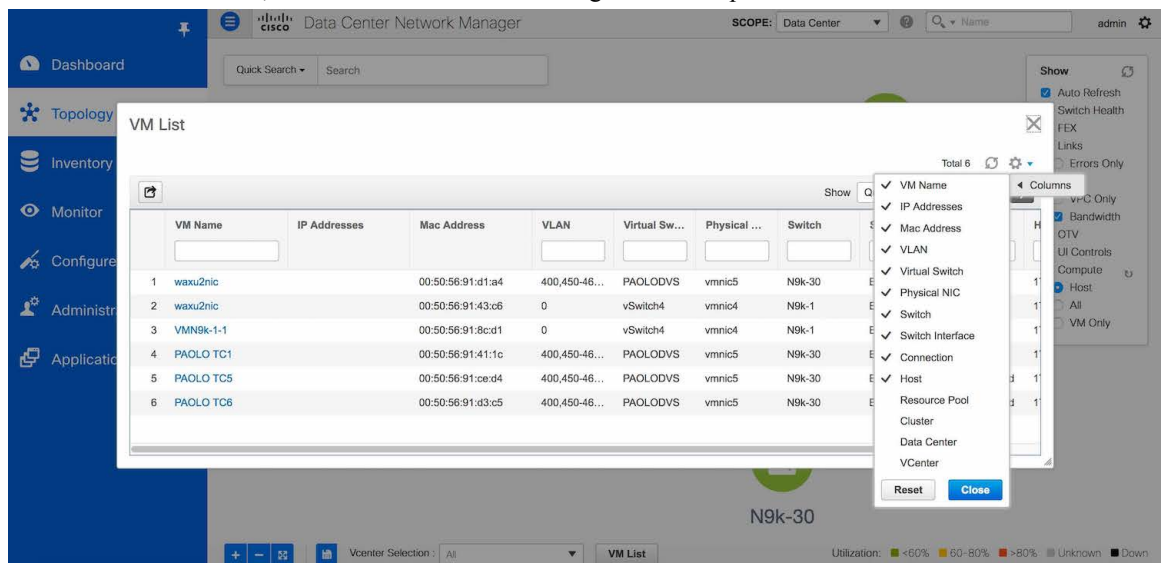**Step 2**   Click **Resync vCenters** icon next to **Compute**.

Selecting a Column in the Virtual Machine List

Procedure

Step 1   In the **VM List** window, click the **Columns** under the gear icon drop-down list.


Step 2   Select the columns that you want to display in the VM list table. If you select additional columns, click **Resync vCenters** icon to refresh and view the new columns.

Periodic resynchronization with the vCenter happens in the back-end.To configure the resync timer value, choose **Administration > DCNM Server > Server Properties**. In the **#GENERAL > DATA SOURCES VMWARE** section, specify the timer value in the **vmm.resync.timer** field. The default value is 60 (for 60minutes), and this value can be increased or decreased. If you enter a value that is less than 60 minutes, the feature is disabled.

Troubleshooting vCenter Compute Visualization

The following error window appears when the vCenter times out. This error might occur when the discovery of the vCenter is in progress.
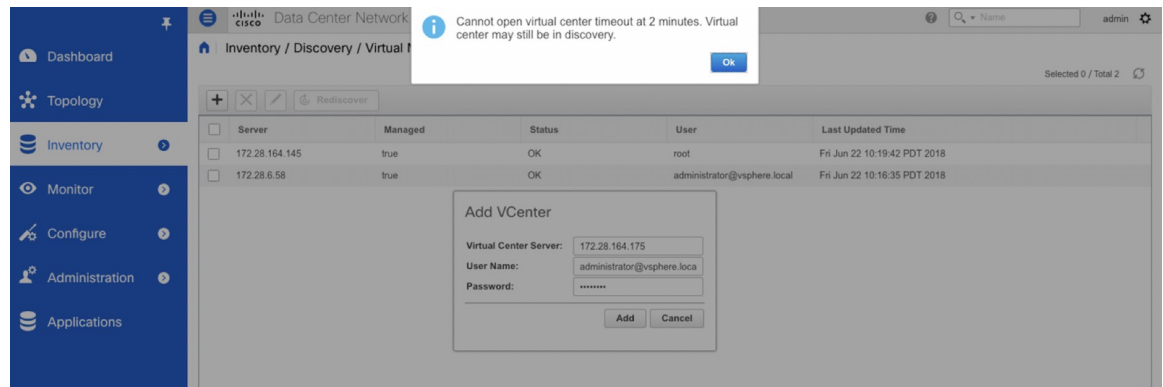
Viewing Topology in Scale Mode

The following window shows how the **Topology** window appears after about 200 devices are available in the topology. Note that the topology graph is trimmed down at scale.