



# 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.



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

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## 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.
- After moving a cable from one port to another port, the old fabric link is retained in the **Topology** window, and it is shown in the red color indicating that the link is down. The port movements are not updated in the **Topology** window. You need to rediscover the switch for the updated ports to be displayed in DCNM.

- 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** and **DEFAULT\_SAN**. The search options differ based on the chosen scope.

The following search options are available for **DEFAULT\_LAN**:

- Quick Search
- Host name (vCenter)
- Host IP
- Host MAC
- Multicast Group
- VXLAN ID (VNI)
- VLAN
- VSAN ID/Name
- FabricPath
- VXLAN OAM

The following search options are available for **DEFAULT\_SAN**:

- Quick Search
- VLAN
- VSAN ID/Name

## 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:



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**Note** By default, Quick Search is selected.

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## 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.

## Pod Name (Container)

You can also click on the Pod List to view the information regarding all the pods running on the selected Cluster. If Cluster Selection is All, all the pods running on all the clusters in your topology is displayed. You can also export the Pod List data for further analysis.

## Host IP

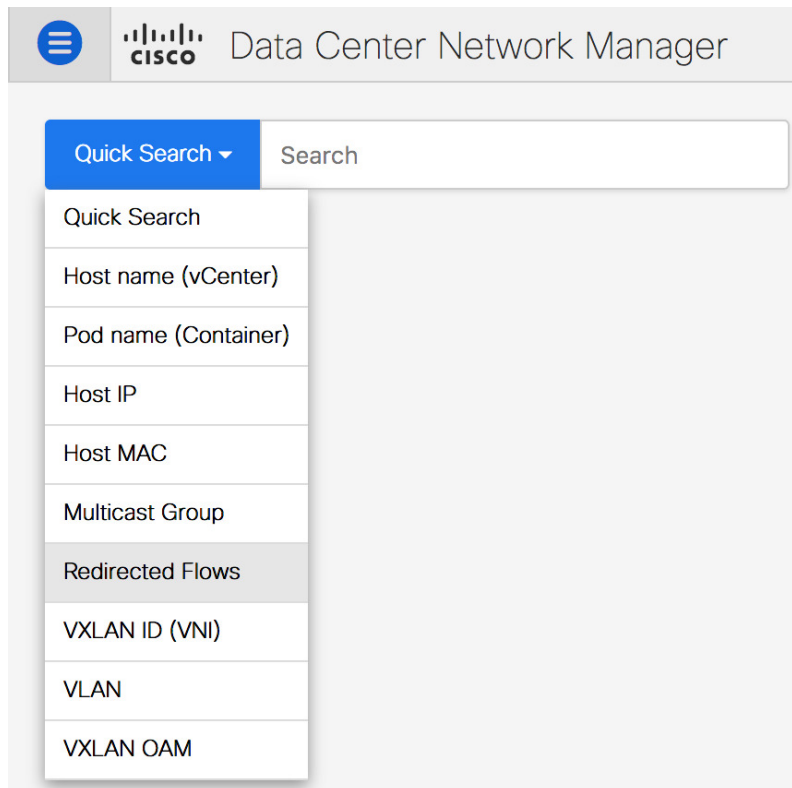
You can search the topology using host IP addresses. The **Host IP** searches the switches in the scope to locate the hosts that match the IP address that you enter in the **Search** field. The **Host IP** search supports IPv4 address. From the Search drop-down list, choose **Host IP** to search the 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

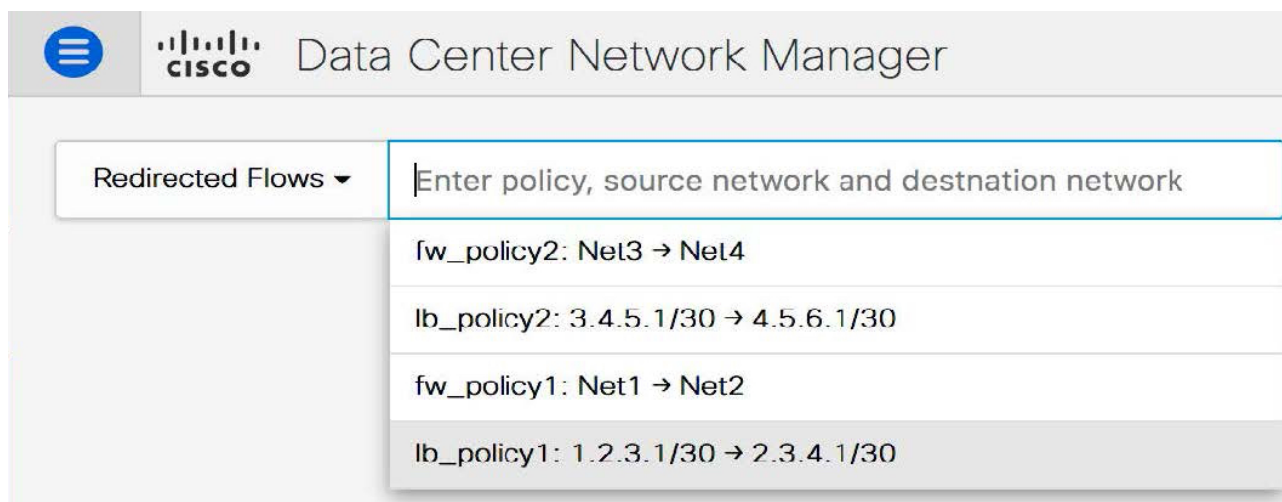
You can search a topology using host MAC addresses. The **Host MAC** searches the switches in the scope to locate the hosts that match the MAC address that you enter in the **Search** field. From the Search drop-down list, choose **Host MAC** to search the topology using a host MAC address. Enter a host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

## Redirected Flows

After the physical attachment of a service node to the fabric is defined, select **Redirected Flow** from the **Quick Search** drop-down list in the **Topology** window.



You can select a policy from the drop-down list or initiate a search by entering a policy name, source network and destination network in the search field. The search field is auto-populated based on your input.



Based on the input in the search field, the switches are highlighted on the topology window. The switches, on which the source and destination network have been attached and the flow has been redirected, are highlighted on the topology window. The service node is shown as connected by a dotted line to the leaf switch on the topology window. Hover over the dotted line to get more information about the interface. Click a switch to display the redirected flows which are initiated, redirected to, or terminated on that switch. Click **Show more flows** to display the **Service Flows** window that has information about all the redirected flows.

The screenshot shows the Cisco Data Center Network Manager interface. The main topology view displays three leaf switches (es-leaf1, es-leaf2, es-leaf3) connected to a central spine switch, which is in turn connected to an external cloud (Ext). A 'Redirected Flows' window is open, showing details for the 'es-leaf2' device. The window includes a search bar with the text 'lb\_policy1: 1.2.3.1/30 → 2.3.4.1/30'. The right-hand panel provides a summary of the device's status, health, and redirected flows.

**Redirected Flows**

fw_policy2:	Net3 →	Net4
lb_policy2:	3.4.5.1/30 →	4.5.6.1/30
fw_policy1:	Net1 →	Net2

**Health**

Modules	91.67%	w=0.2
Switch ports	100.00%	w=0.2
Alarms	50.00%	w=0.6

**Summary**

Status: ✔ ok  
 Serial number: FDO22461KGU  
 Version: 9.3(2)  
 CPU: 17%  
 Memory: 22%

Click **Details** in the **Service Flows** window to display attachment details.

es-leaf2  
172.28.10.38  
N9K-C93180YC-EX

Service Flows

Total 4

Node	Policy	Details	Peering	VRF	Src Network	Dest Network	Next Hop	Rev Next Hop
1	ASA1	fw_policy2	fw_peering1	Sales	Net3	Net4	22.1.1.22	21.1.1.21
2	LB1	lb_policy2	p1	Sales	3.4.5.1/30	4.5.6.1/30	22.1.1.22	31.1.1.31
3	ASA1	fw_policy1	fw_peering1	Sales	Net1	Net2	22.1.1.22	21.1.1.21
4	LB1	lb_policy1	p1	Sales	1.2.3.1/30	2.3.4.1/30	22.1.1.22	31.1.1.31

### Service Node 'ASA1' Attachment Details

```

resourceType: Network
resourceName: service_net_inside
fabricName: Acorn
switchAttaches:
  switchName: es-leaf2
  switchSerialNumber: FDO22461KGU
  switchIp: 172.28.10.38
  switchRole: leaf
  attachState: OUT-OF-SYNC
  portNames: Ethernet1/26
  vlanId: 3000
  lanAttached: true
    
```

resourceType: Network

Cancel

## 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.

## 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.



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

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**Note** If a Cisco Nexus Switch is discovered as part of SAN fabric, FEX feature is not available. 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.

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- **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.
- **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.




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**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.

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- **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-pollled CPU utilization, and last-pollled 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**.





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**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.

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## 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.

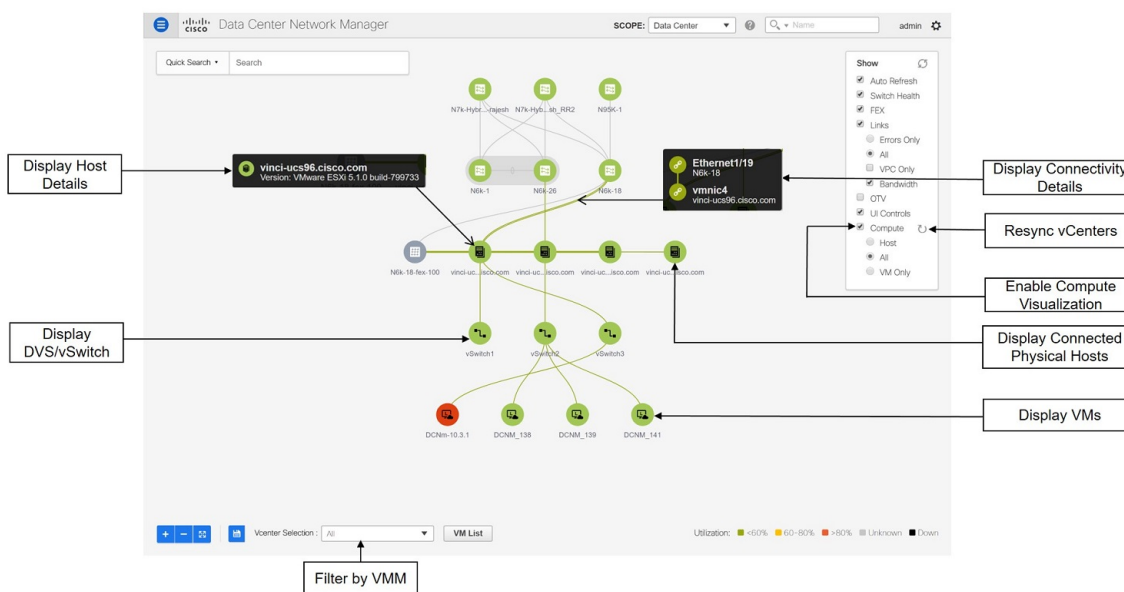
VMM supports computes connecting to a border spine. Border Spine is a new switch role managed by easy fabric in Cisco DCNM 11.1(1).



**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>.
- Cisco DCNM doesnot support non-Cisco blade servers.

**Figure 1: vCenter Compute Visualization**

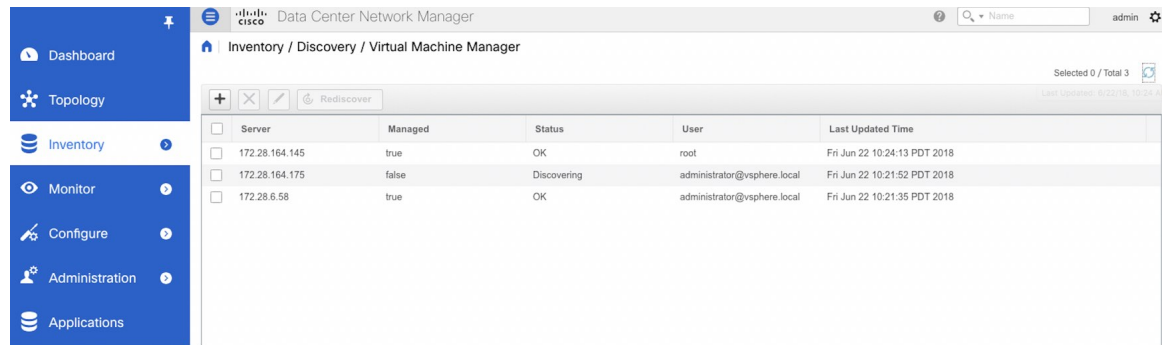


## Enabling vCenter Compute Visualization

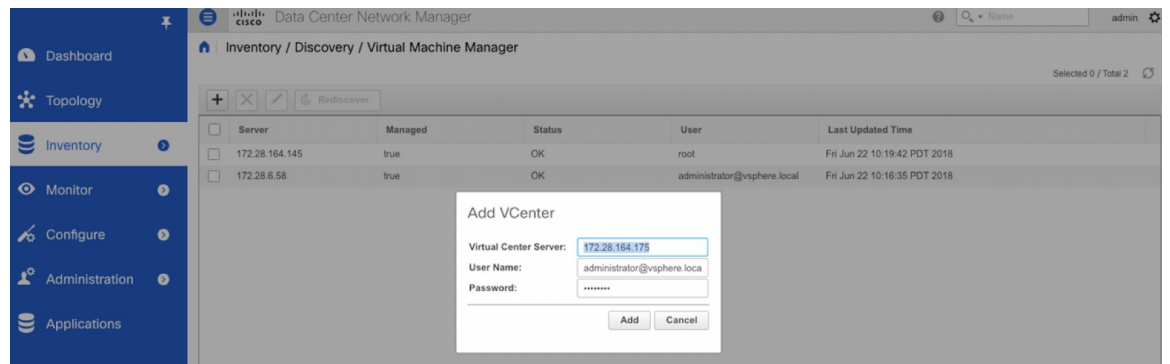
To enable the vCenter Compute Visualization feature from the Cisco DCNM Web UI, perform the following steps.

### Procedure

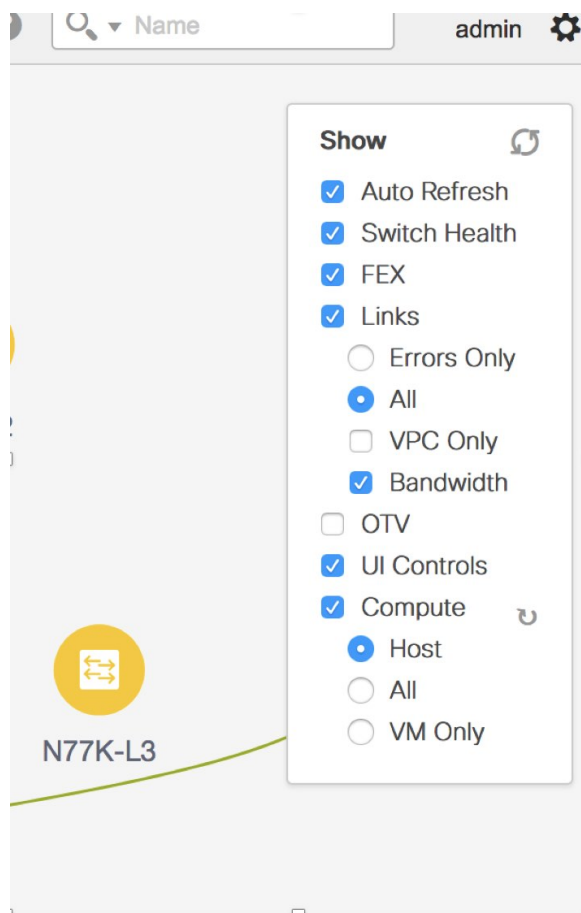
- Step 1** Choose .  
The window appears.



**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

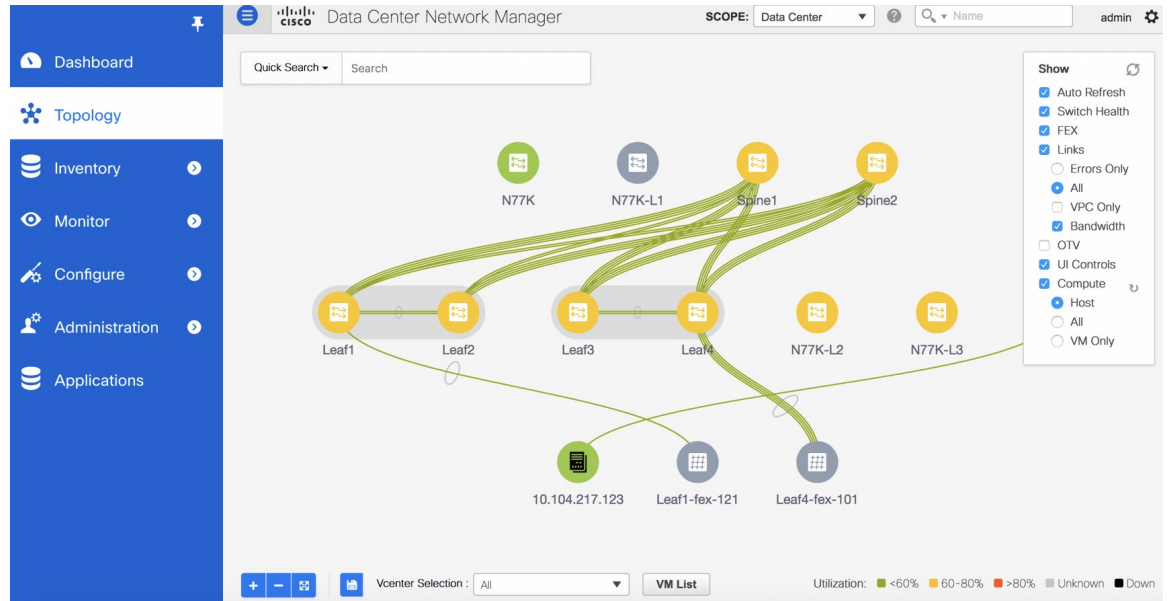
**Step 1** Choose **Topology**.

**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.

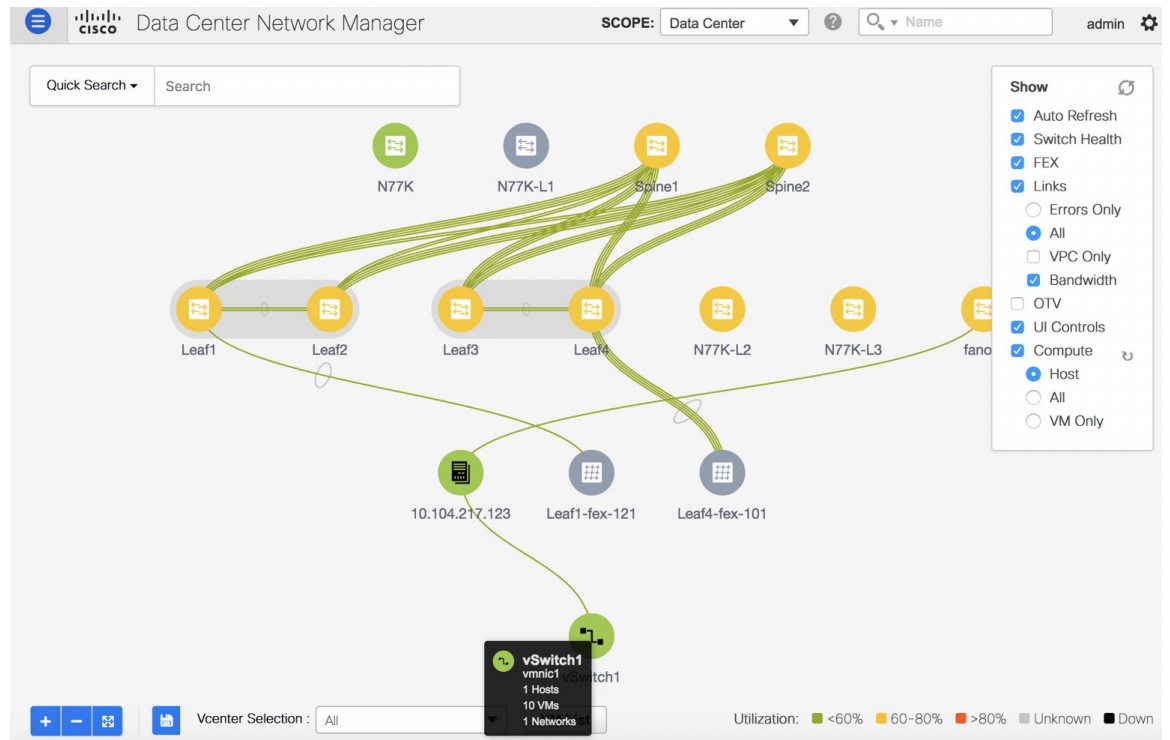
- **Host**
- **All**
- **VM Only**



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.

**Note** Ensure that you select the **FEX** checkbox when you are viewing Compute nodes. The Hosts or VMs behind the FEX will be dangling, otherwise.

## 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**.

	VM Name	VLAN	Virtual Sw...	Physical ...	Host	Switch	Switch Int...	Connection
1	DCM_138	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
2	DCM_139	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
3	DCM_141	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
4	DCM-10.3.1	0	vSwitch3	vmnic3	vinci-ucs96...	N6k-18	Ethernet1/18	connected

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.

The screenshot shows the Cisco Data Center Network Manager (DCNM) interface. A 'VM List' window is open, displaying a table with the following data:

VM Name	VLAN	Virtual Sw...	Physical ...	Host	Switch	Switch Int...	Connection
1 DCMN_138	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
	0	vSwitch2	vmnic3	vinci-ucs14...	N6k-26	Ethernet1/35	connected
	0	vSwitch3	vmnic3	vinci-ucs96...	N6k-18	Ethernet1/18	connected

A tooltip for 'DCNM\_138' is displayed, showing details such as network adapters (all disconnected), CPU count (5), memory (24576 MB), guest OS (Linux 3.10.0-693.21.1.el7.x86\_64), and product information (Name: DCMN Virtual Appliance, Vendor: Cisco Systems, Inc, Version: 11.0.0.700).

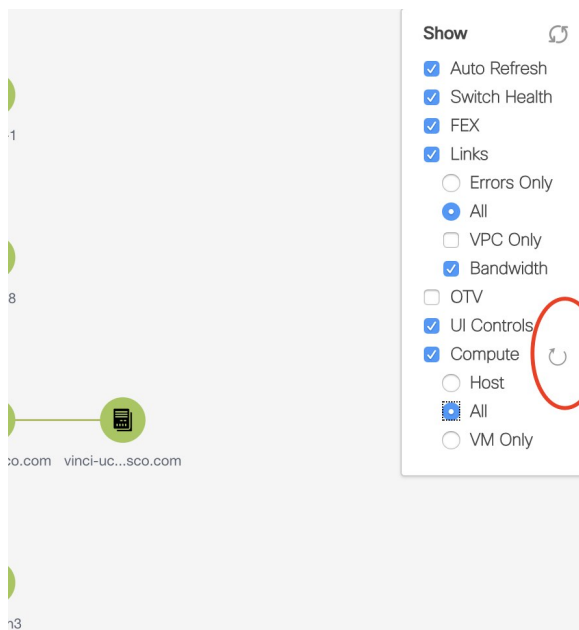
**Note** When you export the VM List to a .CSV file, the .CSV file may appear correct. However, when the .CSV file is imported into Microsoft Excel, it might get reformatted, for example, the VLAN column 1-1024 could be reformatted to a date 1/1/2019. Therefore ensure that columns are formatted correctly 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**.

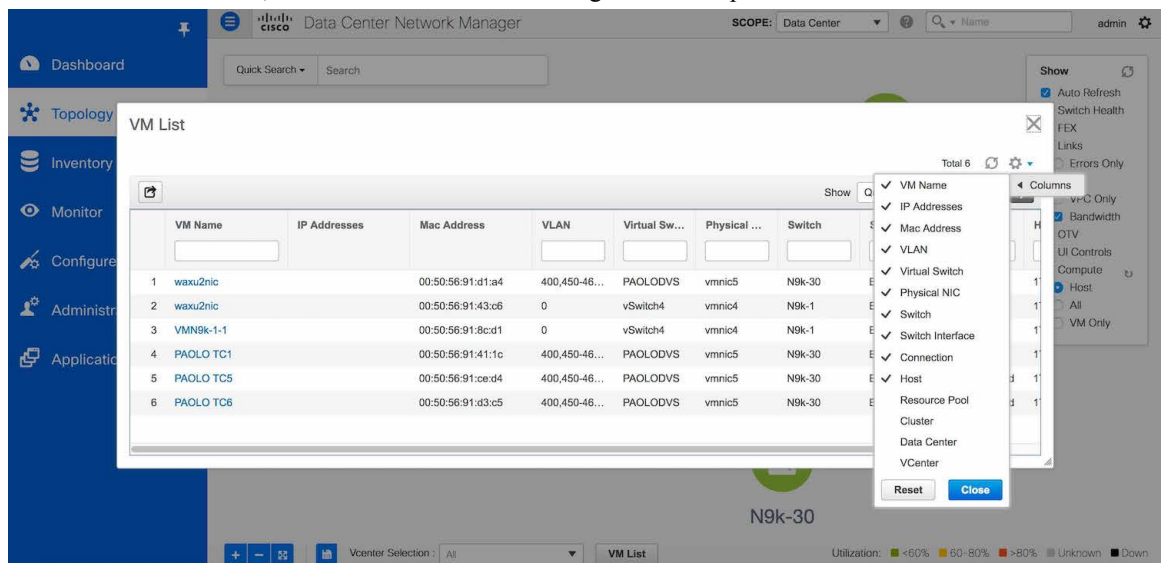
Selecting a Column in the Virtual Machine List



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.



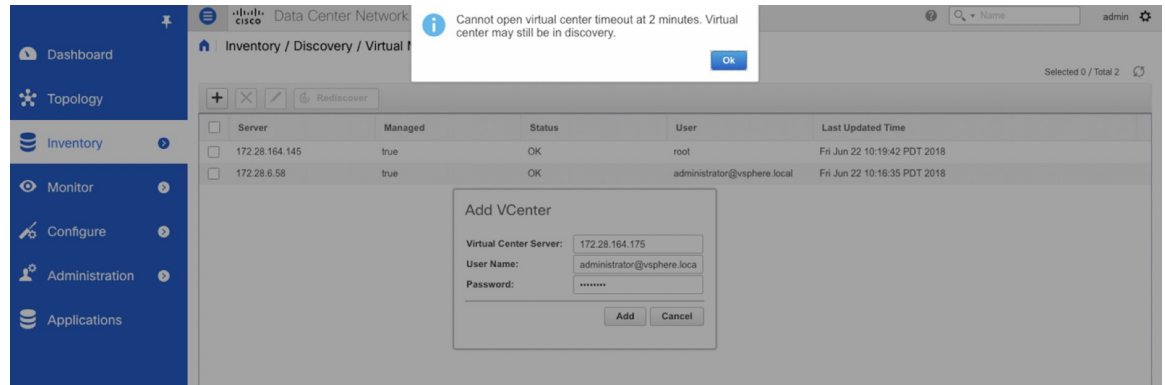
**Step 2** Select the columns that you want to display in the VM list table. If you select additional columns, click **Resync vCenters** icon to refresh and view the new columns.



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.

