Provisioning Overlay Networks

This chapter has the following sections:

- Provisioning Overlay Networks Using Cisco Virtual Topology System, page 1
- Creating Overlays, page 2
- Creating Network using VMware, page 3
- Creating Subnetwork using VMware, page 4
- Creating Routers using VMware, page 4
- Attaching Network to Router, page 4
- Attaching a Virtual Machine to Network, page 5
- Creating a Network using Cisco VTS GUI, page 5
- Creating Router using Cisco VTS GUI, page 6

Provisioning Overlay Networks Using Cisco Virtual Topology System

Virtual Topology System enables overlay connectivity orchestrated through an SDN-based control plane. This ensures instant availability of computing and application workloads in the virtualized data center, and removes network provisioning challenges.

Cisco VTS uses VXLAN to overcome scale limits in the data center and to segment the network better. VXLAN is designed to provide the same Ethernet Layer 2 network services as VLAN does, but with greater extensibility and flexibility. The dependence on a Layer 3 underlay network allows VXLAN to take complete advantage of Layer 3 routing, equal-cost multipath (ECMP) routing, and link aggregation protocols. Virtual Topology System supports hardware and software VTEPs to segment the data center network.

Virtual Topology System supports both VXLAN overlays using the BGP EVPN control plane and VXLAN overlays using IP Multicast-based techniques.

Implementing VXLANs using MP-BGP EVPN based control plane to manage the VXLAN overlay provides a distributed network database, which enables federation and scaling. The BGP EVPN solution is the preferred
option, and it can be flexibly implemented using the infrastructure policy constructs within the Virtual Topology System environment.

Virtual Topology System implements the highly scalable MP-BGP with the standards-based EVPN address family as the overlay control plane to:

- Distribute attached host MAC and IP addresses and avoid the need for unknown unicast, and multicast traffic
- Support multidestination traffic by either using the multicast capabilities of the underlay or using unicast ingress replication over a unicast network core (without multicast) for forwarding Layer 2 multicast and broadcast packets
- Terminate Address Resolution Protocol (ARP) requests early

Control-plane separation is also maintained among the interconnected VXLAN networks. Capabilities such as route filtering and route reflection can be used to provide flexibility and scalability in deployment.

High-level Workflow for Establishing a VXLAN Overlay Network with Hardware and Software VTEPs using BGP EVPN

The following steps provide a high-level workflow for establishing a simple VXLAN overlay network with hardware and software VTEPs using a BGP EVPN control plane:

- Prepare the physical environment to be managed by Cisco VTS to build virtual overlays. See the Prerequisites section in the Cisco VTS 2.1 Installation Guide for details.
- Discover the network topology in the data center. See the Managing Inventory chapter of the Cisco VTS 2.1 User Guide for details.

After you commit the changes to the network group, Virtual Topology System automatically pushes all the relevant configuration information to the respective leafs, Cisco IOS XRv route reflectors, and DCI gateways. At this point, the Admin Domain is ready to build overlay networks based on the intent defined by the service policy or through a Virtual Machine Manager (VMM) or orchestration environment.

For a detailed, illustrated example, see Cisco Virtual Topology System: Data Center Automation for Next-Generation Cloud Architectures White Paper.

Creating Overlays

As part of overlay provisioning, you may need to:

- Create Tenant
- Create Network
- Create Subnet
- Create Router
- Create VM

This can be done using the VMM or Cisco VTS GUI.
Using OpenStack

When you use a VMM such as OpenStack or VMware, the plugin will provide integration between the VMM and Cisco VTS. Once Tenant/ Network/ Subnets are created on the VMM, required overlay network(s) will automatically be created by Cisco VTS.

For information about performing these tasks via OpenStack Horizon dashboard, see OpenStack documentation.

Using VMware

For information about performing these tasks using VMWare, see the following sections:

- Attaching Network to Router, on page 4
- Creating Network using VMware, on page 3
- Creating Subnetwork using VMware, on page 4
- Creating Routers using VMware, on page 4
- Attaching a Virtual Machine to Network, on page 5

Using Cisco VTS GUI

For information about creating Network and Router using Cisco VTS GUI, see the following sections:

- Creating a Network using Cisco VTS GUI, on page 5
- Creating Router using Cisco VTS GUI, on page 6

Creating Network using VMware

To create a network:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Select one of the VDS switches you created, then select Manage tab.</td>
</tr>
<tr>
<td>Step 2</td>
<td>Select the Cisco VTS Network tab and click Add (+) to add the network.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Select create Tenant and enter Network Name field.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Click Create to create the network.</td>
</tr>
<tr>
<td>Step 5</td>
<td>Click the Refresh icon to display the created network.</td>
</tr>
</tbody>
</table>
Creating Subnetwork using VMware

Before you create the subnetwork, you need to create the network in which the subnetwork has to be created.

To create subnetworks:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select one of the VDS switches you had created, then click the Manage tab.</td>
</tr>
<tr>
<td>2</td>
<td>Select Cisco VTS Network tab, and click the network name in which the subnetwork has to be created.</td>
</tr>
<tr>
<td>3</td>
<td>Enter the subnet name, the network range in CIDR format, and the Gateway IP.</td>
</tr>
<tr>
<td>4</td>
<td>Click Create Subnet button to create subnetwork.</td>
</tr>
<tr>
<td>5</td>
<td>Click Refresh button to see the subnetwork.</td>
</tr>
</tbody>
</table>

Creating Routers using VMware

Step 1  Select one of the VDS switches you had created, then click the Manage tab.
Step 2  Select Cisco VTS Router tab, and click Add (+) to add the Router.
Step 3  Select Tenant Name and enter the Router Name.
Step 4  Click Create Router button to create the router.

Attaching Network to Router

To attach a network and subnetwork to a router:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Select one of the VDS switches you had created, then click Manage tab.</td>
</tr>
<tr>
<td>2</td>
<td>Select VTS Router tab and click the Router Name where network has to be added. The Router Details pop up appears.</td>
</tr>
<tr>
<td>3</td>
<td>Select Network and subnet and click Attach Subnet.</td>
</tr>
</tbody>
</table>
Attaching a Virtual Machine to Network

To create VMs:

**Step 1**
Create network and subnet using vCenter Cisco VTC plugin. This will create portgroup for the network.

**Step 2**
Create the VM in vCenter and attach the created portgroup to the VM.
This will attach the VM to the network created via Cisco VTS.

Creating a Network using Cisco VTS GUI

To create a network from the Cisco VTS GUI:

**Step 1**
Go to Overlay > Network. The Overlay / Network window appears.

**Step 2**
Click Add (+) icon.

**Step 3**
Select the Tenant for which you to create the network.

**Step 4**
Select the Zone.

**Step 5**
Enter the network name.

**Step 6**
Select the External Network check box if you need to specify that the network is external.
This implies that the network needs to be configured on the Border Leaf and DCI Gateway.

**Step 7**
Click Save.
You may also add a subnet, and add port.

Creating a Subnetwork

To create a subnetwork:

**Step 1**
Click Add Subnet in the Subnet pane of the Add Network popup.

**Step 2**
Enter the subnet name, the network address, and gateway IP, then click OK.

**Step 3**
Click OK to save the subnet information.
Attach a Port

To add a port:

Step 1  Click Port Attach. The Add Port popup appears.
Step 2  Specify whether it is a Physical Device or a Virtual Device, by selecting the appropriate radio button.
Step 3  Enable Tagging by selecting the Tagging check box.
Step 4  Select the device from the drop-down list.
Step 5  Select the Port, then click OK.

Creating Router using Cisco VTS GUI

To create a router using Cisco VTS GUI:

Step 1  Go to Overlay Provisioning > Router. The Overlay / Router window appears.
Step 2  Click the Add (+) icon. The Add Router window appears.
Step 3  Select the tenant from the Select Tenant drop-down list.
Step 4  Select the Zone from the Select Zone drop-down list.
Step 5  Enter the Router Name.
Step 6  Select the router gateway from the Router Gateway drop-down list.
        You can also add multiple interfaces and select the subnet you need to add an interface to.
Step 7  Click Add (+) icon. The Add Interface popup appears.
Step 8  Select the subnet from the drop down list, and click OK.
Step 9  Click Submit in the Add Router window to save the router and its interface.