

Lab 3-1: Configuring OTV

Complete this lab activity to practice what you learned in the related module.

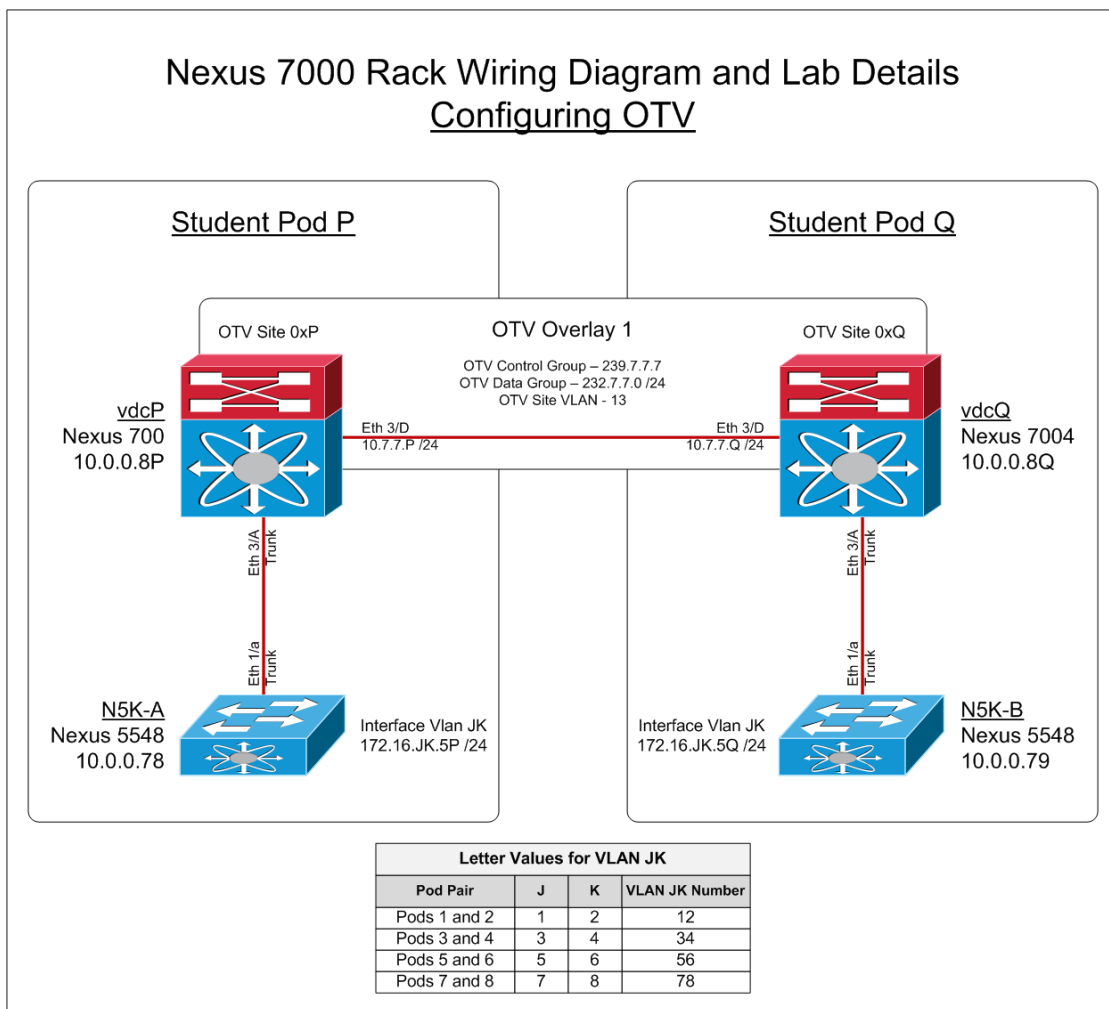
Activity Objective

In this activity, you will configure OTV between your Nexus 7000 VDC and your peer Nexus 7000 VDC. After completing this activity, you will be able to meet these objectives:

- Configure a Cisco Nexus 7000 Series switch to support OTV
- Verify the OTV operation

Visual Objective

The figure illustrates what you will accomplish in this activity.



Command List

The following table describes the Cisco NX-OS commands that are used in this activity.

Command	Description
feature interface-vlan	Enables the interface-vlan feature, which allows SVIs to be created
show license usage	Displays the license usage in a VDC
feature otv	Enables the Overlay Transport Virtualization (OTV) feature
otv site-vlan <vlan>	Defines the OTV site VLAN
ip igmp version <version>	Configures the Internet Group Management Protocol (IGMP) version
interface overlay <nr>	Creates an OTV overlay
otv join-interface <intf>	Defines the OTV join interface for an overlay
otv control-group <multicast-group>	Defines the OTV control multicast group for an overlay
otv data-group <multicastgroup-range>	Defines the range of multicast groups to be used for multicast forwarding on an overlay
otv extend-vlan <vlanrange>	Defines the range of VLANs that are extended across an overlay
show otv overlay <nr>	Displays basic parameters and status information for an OTV overlay
show otv adjacency	Displays the list of OTV adjacencies on a VDC
show otv route	Displays the OTV MAC routing table
show otv arp-nd-cache	Displays the content of the OTV Address Resolution Protocol (ARP) and neighbor discovery (ND) cache
show spanning-tree vlan <vlan>	Displays the spanning-tree state for a VLAN

Task 0: Lab Preparation

In this task, you will perform the steps necessary to get ready for performing the Tasks in this lab.

Activity Procedure

Complete these steps:

- Step 1** Before you can perform this lab you will need a Student Server and a Pod Number assigned to you. Your instructor should provide to you the following information:
- Student Server Name or IP Address
 - Student Server Username
 - Student Server Password
 - Pod Number
 - Peer Pod Number
- Step 2** From your personal/work computer use the Remote Desktop Connection (RDC) application to log in to your assigned Student Server. Refer to *Accessing the NterOne Lab Equipment* for detailed instructions regarding how to use RDC to connect to your Student Server.
- Step 3** From your Student Server desktop use the PuTTY application to open SSH sessions to each of the devices in the following table.

Device Name	Device Description	IP Address	Username	Password
N7K	Nexus 7004 Default VDC	10.0.0.80	admin	Nterone179
vdcP*	Your Pod Nexus 7004 VDC	10.0.0.8P*	admin	Nterone179
vdcQ*	Your Peer Pod Nexus 7004 VDC	10.0.0.8Q*	admin	Nterone179
N5K-X	Nexus 5548UP Switch	10.0.0.78	admin	Nterone179
N5K-B	Nexus 5548UP Switch	10.0.0.79	admin	Nterone179

*Note Replace "P" with your Pod Number for this lab and replace "Q" with your Peer Pod Number.

Step 4 Perform a configuration rollback on your Pod VDC to the checkpoint named "baseline". Use the "best-effort" option.

```
vdcP# rollback running-config checkpoint baseline best-effort
Collecting Running-Config
#Generating Rollback Patch
Executing Rollback Patch

Rollback completed successfully.
```

Step 5 If any VLANs other than VLAN 1 are still on your Pod VDC, delete them.

Step 6 Switch to your PuTTY session to the admin VDC of the Nexus 7000 switch.

Step 7 Enter configuration mode for your Pod VDC.

```
N7K# config
Enter configuration commands, one per line. End with CNTL/Z.
N7K(config)# vdc vdcP
```

Step 8 Change your VDC so that you can use the M1 interfaces in Module 3. Before you can use M1 interfaces you must disable the use of F2 interfaces by using the **no limit-resource module-type f2** command.

```
N7K(config-vdc)# no limit-resource module-type f2
This will cause all ports of unallowed types to be removed from this vdc. Continue
(y/n)? [yes] yes
```

Step 9 Use the following table to allocate interfaces to your VDC using the **allocate interface** command.

VDC	Ethernet Interface 3/A-D
vdcP	Ethernet 3/1-4
vdcQ	Ethernet 3/5-8
vdc3	Ethernet 3/9-12
vdc4	Ethernet 3/13-16
vdc5	Ethernet 3/17-20
vdc6	Ethernet 3/21-24
vdc7	Ethernet 3/25-28
vdc8	Ethernet 3/29-32

```
N7K(config-vdc)# allocate interface ethernet 3/A-D
Moving ports will cause all config associated to them in source vdc to be removed.
Are you sure you want to move the ports (y/n)? [yes] yes
N7K(config-vdc)# end
```

Step 10 Verify that the correct interfaces have been allocated to your Pod VDC by using the **show vdc membership** command.

```
N7K# show vdc membership
<...output omitted...>
vdc_id: 1 vdc_name: N7K interfaces:

vdc_id: X vdc_name: vdcP interfaces:
      Ethernet3/A           Ethernet3/B           Ethernet3/C
      Ethernet3/D
<...output omitted...>
```

Activity Verification

You have completed this activity when you have achieved these goals:

- You have made a successful connection to your Student Server.
- You have successfully used PuTTY to connect to the devices in the table above.
- You rolled back the running configuration to the state at checkpoint “baseline” on your Pod VDC.
- You have reconfigured the interfaces used in your Pod VDC.

Task 1: Configuring Basic OTV

During this task, you will configure OTV on the Nexus 7000 VDC in your pod.

Activity Procedure

Complete these steps:

Step 11 On your Pod VDC make sure that the interface-vlan feature has been disabled.

```
vdcP# config
Enter configuration commands, one per line. End with CNTL/Z.
vdcP(config)# no feature interface-vlan
```

Note Currently, OTV and SVI cannot coexist within the same VDC. You must disable the interface VLAN feature in order for OTV to function properly.

Step 12 On your Pod VDC disable interfaces Ethernet 3/B and 3/C, they will not be used in this lab.

```
vdcP# config
Enter configuration commands, one per line. End with CNTL/Z.
vdcP(config)# interface ethernet 3/B-C
vdcP(config-if)# shutdown
```

Step 13 Enable the interfaces toward your Nexus 5548 switch as well as your Peer Pod VDC, and configure them as trunks.

```
vdcP(config-if)# interface ethernet 3/A, ethernet 3/D
vdcP(config-if-range)# switchport
vdcP(config-if-range)# switchport mode trunk
vdcP(config-if-range)# spanning-tree port type network
vdcP(config-if-range)# end
```

- Step 14** Create a VLAN using the table below and give it the name “OTV-TEST”. The characters “JK” will be used in this lab to represent this value.

Your Pod Number	VLAN Number (JK)
Pod 1	12
Pod 2	12
Pod 3	34
Pod 4	34
Pod 5	56
Pod 6	56
Pod 7	78
Pod 8	78

```
vdcP(config)# vlan JK
vdcP(config-vlan)# name OTV-TEST
```

- Step 15** On your Nexus 5548 switch create and name VLAN JK in the same configuration as on your VDC. Create VLAN 13 as well.

```
N5K-X# config
Enter configuration commands, one per line. End with CNTL/Z.
N5K-X(config)# vlan JK
N5K-X(config-vlan)# name OTV-TEST
N5K-X(config-vlan)# vlan 13
```

- Step 16** Create an SVI for VLAN JK with the address 172.16.JK.5P, where P is your Pod Number.

```
N5K-X(config-vlan)# feature interface-vlan
N5K-X(config)# interface vlan JK
N5K-X(config-if)# ip address 172.16.JK.5P/24
N5K-X(config-if)# no shutdown
```

- Step 17** Configure interface Ethernet 1/a as a trunk port. You must also change the interface speed to 1000 Mbps because this interface is connected to a 1 Gbps interface on the Nexus 7000 switch.

```
N5K-X(config)# interface ethernet 1/a
N5K-X(config-if)# speed 1000
N5K-X(config-if)# switchport
N5K-X(config-if)# switchport mode trunk
N5K-X(config-if)# spanning-tree port type network
N5K-X(config-if)# end
```

- Step 18** Ping the IP address of your peer pod, 172.16.JK.5Q— where Q is your peer pod number, to confirm IP connectivity between the two pods.

```
N5K-X# ping 172.16.JK.5Q
PING 172.16.JK.5Q (172.16.JK.5Q): 56 data bytes
Request 0 timed out
64 bytes from 172.16.JK.5Q: icmp_seq=1 ttl=254 time=1.186 ms
64 bytes from 172.16.JK.5Q: icmp_seq=2 ttl=254 time=0.84 ms
64 bytes from 172.16.JK.5Q: icmp_seq=3 ttl=254 time=0.752 ms
64 bytes from 172.16.JK.5Q: icmp_seq=4 ttl=254 time=0.714 ms
--- 172.16.JK.5Q ping statistics ---
5 packets transmitted, 4 packets received, 20.00% packet loss
round-trip min/avg/max = 0.713/0.872/1.186 ms
```

Note Do not proceed to the next step until you succeed in pinging the peer pod Nexus 5548 switch VLAN JK IP address. Troubleshoot together with your peer pod as necessary.

Step 19 Change the interface on your Nexus 7000 VDC that connects to your peer Nexus 7000 VDC to a routed port.

```
vdcP(config)# interface ethernet 3/D
vdcP(config-if)# no switchport
```

Step 20 Configure IP address 10.7.7.P/24—where P is your pod number—on the routed interface that connects to your peer pod VDC.

```
vdcP(config-if)# ip address 10.7.7.P/24
```

Step 21 Ping the IP address of your peer pod, 10.7.7.Q—where Q is your peer pod number—to confirm IP connectivity between the VDCs.

```
vdcP# ping 10.7.7.Q
PING 10.7.7.Q (10.7.7.Q): 56 data bytes
64 bytes from 10.7.7.Q: icmp_seq=0 ttl=254 time=1.18 ms
64 bytes from 10.7.7.Q: icmp_seq=1 ttl=254 time=0.697 ms
64 bytes from 10.7.7.Q: icmp_seq=2 ttl=254 time=0.846 ms
64 bytes from 10.7.7.Q: icmp_seq=3 ttl=254 time=0.849 ms
64 bytes from 10.7.7.Q: icmp_seq=4 ttl=254 time=0.725 ms
--- 10.7.7.Q ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.697/0.859/1.18 ms
```

Note This interface will be used as the OTV join interface. Do not proceed to the next step until you have verified IP connectivity between the VDCs for this link.

Step 22 Switch to your Nexus 5548 switch. Verify that you can no longer ping from your Nexus 5548 switch to your peer pod Nexus 5548 switch on VLAN JK.

```
N5K-X# ping 172.16.JK.5Q
PING 172.16.JK.5Q (172.16.JK.5Q): 56 data bytes
Request 0 timed out
Request 1 timed out
Request 2 timed out
Request 3 timed out
Request 4 timed out
--- 172.16.JK.5Q ping statistics ---
5 packets transmitted, 0 packets received, 100.00% packet loss
```

Step 23 Determine why you cannot ping between the Nexus 5548 switches any longer.

Step 24 Enable the OTV feature.

```
vdcP(config)# feature otv
```

Step 25 Configure the OTV site identifier as P.P.P, where P is your pod number.

```
vdcP(config)# otv site-identifier P.P.P
% Site Identifier mismatch will prevent overlays from forwarding traffic.
```

Step 26 Configure VLAN 13 as the OTV site VLAN.

```
vdcP(config)# vlan 13
vdcP(config-vlan)# otv site-vlan 13
vdcP(config-site-vlan)# exit
```

Step 27 Configure the OTV join interface (Ethernet 3/D) to use IGMP Version 3.

```
vdcP(config)# interface ethernet 3/D
vdcP(config-if)# ip igmp version 3
```

Step 28 Increase the maximum transmission unit (MTU) on this interface to the maximum of 9216 bytes.

```
vdcP(config-if)# mtu 9216
```

Step 29 Configure your Pod VDC to be the root bridge for VLAN JK. This step is necessary so that traffic flows through the OTV overlay properly.

```
vdcP(config-if)# spanning-tree vlan JK root primary
```

Step 30 Create an OTV overlay interface 1. Configure it to use the interface that connects your Nexus 7000 VDC to your peer pod VDC as the join interface.

```
vdcP(config)# interface overlay 1
vdcP(config-if-overlay)# otv join-interface ethernet 3/D
OTV needs join interfaces to be configured for IGMP version 3
```

Note A warning about using IGMPv3 on the join interface is displayed, regardless of the actual configuration of the join interface.

Step 31 Configure multicast group 239.7.7.7 as the OTV control multicast group.

```
vdcP(config-if-overlay)# otv control-group 239.7.7.7
```

Step 32 Configure the multicast range 232.7.7.0/24 as the Source Specific Multicast (SSM) group range for OTV multicast data.

```
vdcP(config-if-overlay)# otv data-group 232.7.7.0/24
```

Step 33 Extend VLAN JK across the overlay.

```
vdcP(config-if-overlay)# otv extend-vlan JK
```

Step 34 Examine the overlay interface by using the **show otv overlay 1** command.

```
vdcP# show otv overlay 1

OTV Overlay Information
Site Identifier 0001.0001.0001

Overlay interface Overlay1

  VPN name           : Overlay1
  VPN state          : DOWN (admin down)
  Extended vlans     : JK (Total:1)
  Control group      : 239.7.7.7
  Data group range(s) : 232.7.7.0/24
```

```
Join interface(s) : Eth3/4 (10.7.7.P)
Site vlan         : 13 (down)
AED-Capable      : No (Overlay is Down)
Capability        : Multicast-Reachable
```

Step 35 Enable the overlay interface.

```
vdcP(config)# interface overlay 1
vdcP(config-if-overlay)# no shutdown
vdcP(config-if-overlay)# end
```

Note You should wait at least 30 seconds for OTV to form adjacency.

Step 36 Examine the overlay interface again.

```
vdcP# show otv overlay 1

OTV Overlay Information
Site Identifier 0001.0001.0001

Overlay interface Overlay1

VPN name           : Overlay1
VPN state          : UP
Extended vlans    : JK (Total:1)
Control group     : 239.7.7.7
Data group range(s) : 232.7.7.0/24
Join interface(s) : Eth3/4 (10.7.7.P)
Site vlan         : 13 (up)
AED-Capable      : Yes
Capability        : Multicast-Reachable
```

Step 37 Verify that your VDC has established an OTV adjacency with the VDC in your peer pod.

```
vdcP# show otv adjacency
Overlay Adjacency database

Overlay-Interface Overlay1 :
Hostname                   System-ID      Dest Addr      Up Time   State
vdcQ                       8478.ac57.9643 10.7.7.Q       00:07:16  UP
```

Step 38 Examine the OTV MAC routing table to see if any MAC addresses were learned.

```
vdcP# show otv route
```

Note The output of the **show otv route** command will be empty until you generate some traffic that will flow through the overlay.

Step 39 Determine if you see any MAC addresses in the OTV MAC routing table.

```
vdcP# show mac address
Legend:
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False

VLAN      MAC Address      Type      age      Secure NTFY Ports/SWID.SSID.LID
-----+-----+-----+-----+-----+-----+-----
G         -      8478.ac57.9642   static    -        F      F      sup-eth1(R)
```

Step 40 Switch to your Nexus 5548 switch. Ping the IP address of your peer pod, 172.16.JK.5Q—where Q is your peer pod number—from your Nexus 5548 switch.

```
N5K-X# ping 172.16.JK.5Q
PING 172.16.JK.5Q (172.16.JK.5Q): 56 data bytes
Request 0 timed out
Request 1 timed out
64 bytes from 172.16.JK.5Q: icmp_seq=2 ttl=254 time=1.189 ms
64 bytes from 172.16.JK.5Q: icmp_seq=3 ttl=254 time=0.859 ms
64 bytes from 172.16.JK.5Q: icmp_seq=4 ttl=254 time=0.8 ms
--- 172.16.JK.5Q ping statistics ---
5 packets transmitted, 3 packets received, 40.00% packet loss
round-trip min/avg/max = 0.8/0.949/1.189 ms
```

Step 41 Switch back to your Nexus 7000 VDC. Examine the OTV MAC routing table again.

```
vdcP# show otv route
```

```
OTV Unicast MAC Routing Table For Overlay1
```

VLAN	MAC-Address	Metric	Uptime	Owner	Next-hop(s)
JK	002a.6a0f.7181	42	00:00:30	overlay	vdcQ
JK	547f.eef7.6bfc	1	00:00:30	site	Ethernet3/A

Step 42 Examine the OTV ARP cache.

```
vdcP# show otv arp-nd-cache
```

```
OTV ARP/ND L3->L2 Address Mapping Cache
```

```
Overlay Interface Overlay1
```

VLAN	MAC Address	Layer-3 Address	Age	Expires In
JK	002a.6a0f.7181	172.16.JK.5Q	00:00:52	00:07:07

Step 43 Examine the spanning-tree topology for VLAN JK.

```
vdcP# show spanning-tree vlan JK
```

```
VLAN00JK
```

```
Spanning tree enabled protocol rstp
Root ID    Priority    24588
           Address    8478.ac57.9642
           This bridge is the root
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID  Priority    24588 (priority 24576 sys-id-ext JK)
           Address    8478.ac57.9642
           Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
Eth3/A	Desg	FWD	4	128.385	Network P2p

Step 44 Re-examine the MAC address table and verify that there is an entry for the MAC address of the Peer Pod Nexus 5548 SVI.

```
vdcP# show mac address
```

```
Legend:
```

```
* - primary entry, G - Gateway MAC, (R) - Routed MAC, O - Overlay MAC
age - seconds since last seen,+ - primary entry using vPC Peer-Link,
(T) - True, (F) - False
```

	VLAN	MAC Address	Type	age	Secure	NTFY	Ports/SWID.SSID.LID
G	-	8478.ac57.9642	static	-	F	F	sup-eth1 (R)
O	JK	002a.6a0f.7181	dynamic	0	F	F	Overlay1
*	JK	547f.eef7.6bfc	dynamic	120	F	F	Eth3/A

Activity Verification

You have completed this task when you attain these results:

- You have removed the unnecessary configurations from the previous lab.
- You have successfully established an OTV adjacency between your Nexus 7000 VDC and your peer pod VDC.
- You have successfully extended VLAN JK across the OTV overlay.
- You have examined OTV and spanning-tree operation.