

Lab 2-2: Configuring vPC

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

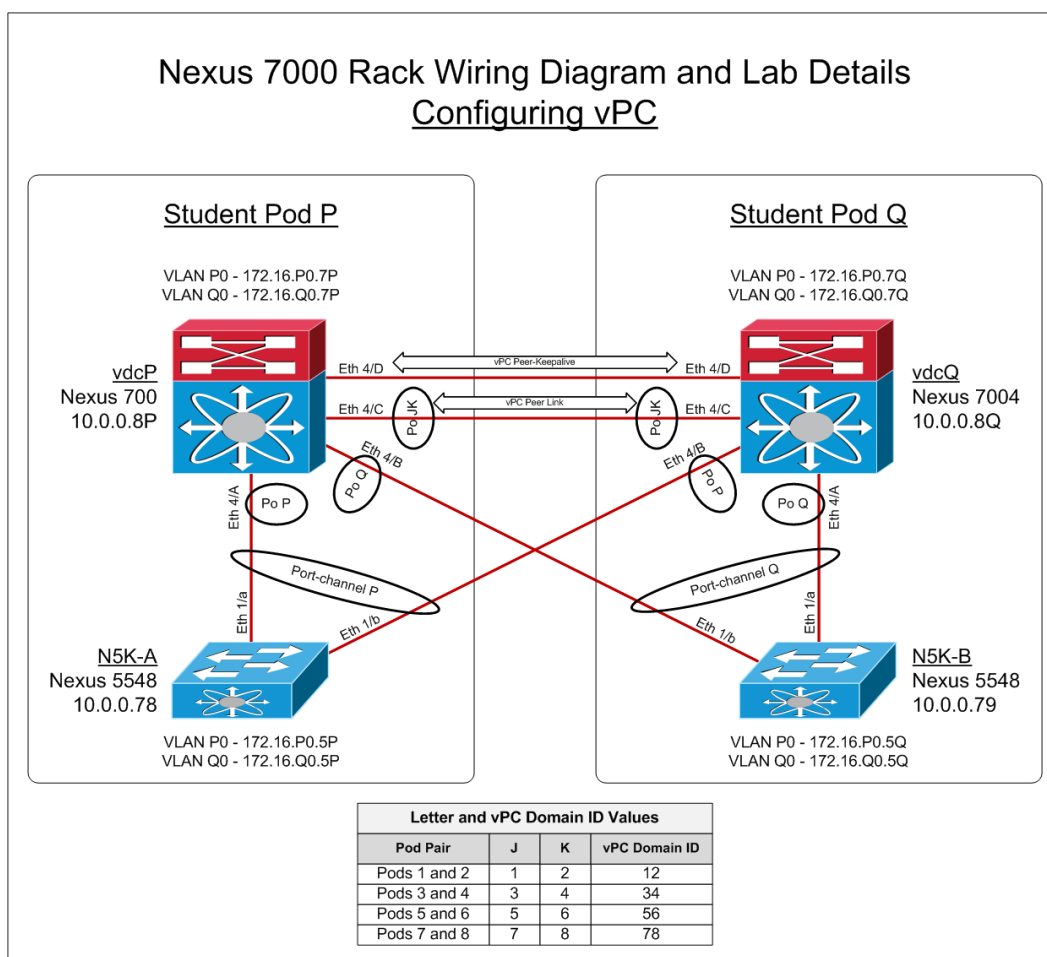
Activity Objective

In this activity, you will log into your VDC and configure a vPC between the Cisco Nexus 7000 and Cisco Nexus 5000 Switches at the access layer of the network. You will connect to your remote lab to complete the task. After completing this activity, you will be able to meet these objectives:

- Configure the vPC domain ID
- Configure the vPC keepalive link between the Nexus 7000 VDCs
- Configure the vPC peer link between the Nexus 7000 VDCs
- Configure and optimize the vPC

Visual Objective

The figure illustrates what you will accomplish in this activity.



Command List

The table describes the commands that are used in this activity.

Command	Description
channel-group nr	This command adds an interface to a port channel.
channel-group nr mode active	This command adds an interface to a port channel that is dynamically negotiated through LACP.
feature lacp	This command enables the use of LACP
feature vpc	This command enables the vPC feature.
peer-keepalive destination vpc-peer-ip-address	This command enables the vPC peer keepalive link to the vPC peer IP address.
ping ip-address vrf vrf	This command verifies IP connectivity to an IP address in a VRF using ICMP echo messages.
show interface intf brief	This command displays summarized status information for an interface.
show lacp neighbor	This command displays a list of LACP neighbors and their operational parameters.
show license usage	This command displays the usage of licensed features.
show port-channel summary	This command displays a summarized view of port-channel operation.
show running-config intf	This command displays the current configuration for an interface.
show spanning-tree	This command displays information that is related to STP.
show vpc	This command displays the vPC operational parameters.
show vpc brief	This command displays a brief overview of vPC status.
show vpc consistency-parameters global	This command displays global vPC consistency status.
show vpc peer-keepalive	This command displays status information for the vPC peer keepalive link.
vpc nr	This command adds a port-channel interface to a vPC.
vpc domain nr	This command creates a vPC domain.
vpc peer-link	This command defines a port-channel interface as the vPC peer link.

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
N5K-A	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

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.

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.

Task 1: vPC Domain

In this task, you will configure the vPC domain ID.

Activity Procedure

Complete these steps:

Step 6 Enable the vPC feature on your VDC.

```
vdcP# config
vdcP(config)# feature vpc
```

Step 7 Determine and configure your vPC domain identifier using the table below. The characters "JK" will be used in this lab to represent this value.

Your Pod Number	vPC Domain ID (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)# vpc domain JK
vdcP(config-vpc-domain)# show vpc
```

Legend:

(*) - local vPC is down, forwarding via vPC peer-link

```
vPC domain id           : JK
Peer status             : peer link not configured
vPC keep-alive status   : Disabled
Configuration consistency status : failed
Per-vlan consistency status : failed
Configuration inconsistency reason: vPC peer-link does not exist
Type-2 consistency status : failed
Type-2 inconsistency reason : vPC peer-link does not exist
vPC role                 : none established
Number of vPCs configured : 0
Peer Gateway            : Disabled
Dual-active excluded VLANs : -
Graceful Consistency Check : Disabled (due to peer configuration)
Auto-recovery status    : Disabled
```

Activity Verification

You have completed this task when you attain these results:

- You have used the show commands on the Nexus 7000 VDC to verify that the vPC domain ID is configured correctly.

Task 2: vPC Keepalive Link

In this task, you will configure the vPC keepalive link between the Nexus 7000 VDCs.

Activity Procedure

Complete these steps:

- Step 8** Configure interface Ethernet 4/D as a Layer 3 port. This will be the peer keepalive-link between the two VDC's in your pod pair.

```
vdcP# config
vdcP(config)# interface Ethernet 4/D
vdcP(config-if)# ip address 192.168.JK.P/24
```

STOP! Wait until your Peer Pod has completed all steps up to this point before proceeding.

- Step 9** Confirm IP connectivity between your pod and your peer pod. You may have to wait for them to catch up to the same step.

```
vdcP(config-if)# ping 192.168.JK.Q
PING 192.168.JK.Q (192.168.JK.Q): 56 data bytes
36 bytes from 192.168.JK.Q: Destination Host Unreachable
Request 0 timed out
64 bytes from 192.168.JK.Q: icmp_seq=1 ttl=254 time=1.119 ms
```

```
64 bytes from 192.168.JK.Q: icmp_seq=2 ttl=254 time=0.648 ms
64 bytes from 192.168.JK.Q: icmp_seq=3 ttl=254 time=0.767 ms
64 bytes from 192.168.JK.Q: icmp_seq=4 ttl=254 time=0.802 ms
```

```
--- 192.168.JK.Q ping statistics ---
5 packets transmitted, 4 packets received, 20.00% packet loss
round-trip min/avg/max = 0.648/0.833/1.119 ms
```

Step 10 Create a VRF context for the peer keepalive link and allocate the interface to it. You will need to reconfigure the IP address after the interface has been allocated to this VRF.

```
vdcP(config-if)# vrf context vpc
vdcP(config-vrf)# interface Ethernet 4/D
vdcP(config-if)# vrf member vpc
% Deleted all L3 config on interface Ethernet4/D
vdcP(config-if)# ip address 192.168.JK.P/24
```

Step 11 Ensure you can still reach peer Pods VDC's IP address.

STOP! Wait until your Peer Pod has completed all steps up to this point before proceeding.

```
vdcP(config-if)# ping 192.168.JK.Q vrf vpc
PING 192.168.JK.Q (192.168.JK.Q): 56 data bytes
36 bytes from 192.168.JK.Q: Destination Host Unreachable
Request 0 timed out
64 bytes from 192.168.JK.Q: icmp_seq=1 ttl=254 time=0.763 ms
64 bytes from 192.168.JK.Q: icmp_seq=2 ttl=254 time=0.732 ms
64 bytes from 192.168.JK.Q: icmp_seq=3 ttl=254 time=0.704 ms
64 bytes from 192.168.JK.Q: icmp_seq=4 ttl=254 time=0.79 ms

--- 192.168.JK.Q ping statistics ---
5 packets transmitted, 4 packets received, 20.00% packet loss
round-trip min/avg/max = 0.704/0.747/0.79 ms
```

Step 12 Configure the vPC keepalive link destination as your peer's VDC IP address.

```
vpcV(config) vpc domain JK
vpcV(config-vpc-domain)# peer-keepalive destination 192.168.JK.Q source
192.168.JK.P vrf vpc
```

STOP! Wait until your peer pod has completed all steps up to this point before proceeding.

Step 13 Confirm the status of the vPC peer configuration.

```
vdcP(config-vpc-domain)# show vpc
Legend:
          (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id           : JK
Peer status             : peer link not configured
vPC keep-alive status   : peer is alive
Configuration consistency status : failed
Per-vlan consistency status : failed
Configuration inconsistency reason: vPC peer-link does not exist
Type-2 consistency status : failed
Type-2 inconsistency reason : vPC peer-link does not exist
vPC role                 : none established
Number of vPCs configured : 0
Peer Gateway             : Disabled
```

```
Dual-active excluded VLANs      : -
Graceful Consistency Check     : Disabled (due to peer configuration)
Auto-recovery status           : Disabled
```

Step 14 Check the vPC keepalive link. Do not continue to the next task before you verify that the vPC peer keepalive status is alive.

```
vdcP(config-vpc-domain)# show vpc peer-keepalive

vPC keep-alive status          : peer is alive
--Peer is alive for           : (54) seconds, (92) msec
--Send status                  : Success
--Last send at                 : 2013.04.17 15:13:49 384 ms
--Sent on interface            : Eth4/D
--Receive status               : Success
--Last receive at              : 2013.04.17 15:13:48 877 ms
--Received on interface        : Eth4/D
--Last update from peer       : (0) seconds, (940) msec

vPC Keep-alive parameters
--Destination                   : 192.168.JK.Y
--Keepalive interval            : 1000 msec
--Keepalive timeout             : 5 seconds
--Keepalive hold timeout        : 3 seconds
--Keepalive vrf                 : vpc
--Keepalive udp port           : 3200
--Keepalive tos                 : 192
```

Activity Verification

You have completed this task when you attain these results:

- You have used the show commands to verify that the vPC keepalive link is up.

Task 3: vPC Peer Link

In this task, you will configure the vPC peer link between the Nexus 7000 VDCs.

Activity Procedure

Complete these steps:

Step 15 In your Pod VDC create a port-channel interface containing Ethernet 4/C.

```
vdcP(config-vpc-domain)# feature lACP
vdcP(config)# interface ethernet 4/C
vdcP(config-if)# switchport
vdcP(config-if)# switchport mode trunk
vdcP(config-if)# channel-group JK mode on
```

Step 16 Verify port channel status.

```
vdcP(config-if)# show port-channel summary
Flags:  D - Down          P - Up in port-channel (members)
        I - Individual    H - Hot-standby (LACP only)
        s - Suspended     r - Module-removed
        S - Switched      R - Routed
        U - Up (port-channel)
        M - Not in use. Min-links not met
```

```
-----
Group Port-      Type      Protocol  Member Ports
```

```

Channel
-----
JK    PoJK(SU)    Eth    NONE    Eth4/C(P)

```

STOP! Wait until your peer pod has completed all steps up to this point before proceeding.

Step 17 Make this port channel your peer link.

```

vdcP(config-if)# interface port-channel JK
vdcP(config-if)# vpc peer-link
Please note that spanning tree port type is changed to "network" port type on vPC
peer-link.
This will enable spanning tree Bridge Assurance on vPC peer-link provided the STP
Bridge Assurance
(which is enabled by default) is not disabled.

```

STOP! Wait until your peer pod has completed all steps up to this point before proceeding.

Step 18 Check the global vPC consistency parameters.

```

vdcP(config-if)# show vpc consistency-parameters global

```

Legend:

Type 1 : vPC will be suspended in case of mismatch

Name	Type	Local Value	Peer Value
STP Mode	1	Rapid-PVST	Rapid-PVST
STP Disabled	1	None	None
STP MST Region Name	1	""	""
STP MST Region Revision	1	0	0
STP MST Region Instance to VLAN Mapping	1		
STP Loopguard	1	Disabled	Disabled
STP Bridge Assurance	1	Enabled	Enabled
STP Port Type, Edge BPDUFilter, Edge BPDUGuard	1	Normal, Disabled, Disabled	Normal, Disabled, Disabled
STP MST Simulate PVST	1	Enabled	Enabled
Allowed VLANs	-	1	1
Local suspended VLANs	-	-	-

Step 19 Check the vPC status. Do not continue to the next task before you verify that peers have formed adjacency.

```

vdcP(config-if)# show vpc

```

Legend:

(*) - local vPC is down, forwarding via vPC peer-link

```

vPC domain id           : JK
Peer status             : peer adjacency formed ok
vPC keep-alive status  : peer is alive
Configuration consistency status : success
Per-vlan consistency status : success
Type-2 inconsistency reason : Consistency Check Not Performed
vPC role                : primary
Number of vPCs configured : 0
Peer Gateway           : Disabled
Dual-active excluded VLANs : -
Graceful Consistency Check : Enabled

```

```
Auto-recovery status          : Disabled
```

```
vPC Peer-link status
```

```
-----  
id   Port   Status Active vlans  
--   -  
1    PoJK   up     1  
-----
```

Activity Verification

You have completed this task when you attain these results:

- You have used the show commands to verify that the vPC peer link is up and the VPC status is OK.

Task 4: vPC Configuration and Optimization

In this task, you will configure the vPC between the Cisco Nexus 7000 Series Switches and the Cisco Nexus 5000 Series Switches in your peer pod.

Activity Procedure

Complete these steps:

Step 20 Create the following VLANs and SVIs on your Pod VDC and N5K-X.

```
vdcP(config)# feature interface-vlan  
vdcP(config)# vlan P0,Q0  
vdcP(config-vlan)# interface vlan P0  
vdcP(config-if)# ip address 172.16.P0.7P/24  
vdcP(config-if)# no shutdown  
vdcP(config-vlan)# interface vlan Q0  
vdcP(config-if)# ip address 172.16.Q0.7P/24  
vdcP(config-if)# no shutdown
```

```
N5K-X(config)#feature interface-vlan  
N5K-X(config)# vlan P0,Q0  
N5K-X(config-vlan)# interface vlan P0  
N5K-X(config-if)# ip address 172.16.P0.5P/24  
N5K-X(config)# no shutdown  
N5K-X(config-vlan)# interface vlan Q0  
N5K-X(config-if)# ip address 172.16.Q0.5P/24  
N5K-X(config)# no shutdown
```

Step 21 On N5K-X create a port channel and add both uplink ports that go to your VDC and your peer pod's VDC.

```
N5K-X(config)# feature lacp  
N5K-X(config)# interface ethernet 1/a-b  
N5K-X(config-if-range)# switchport mode trunk  
N5K-X(config-if-range)# channel-group P
```

Step 22 Check the state of the port channel. The ports illustrated in the output below will depend on your VDC/Pod.

```
N5K-X(config-if-range)# show port-channel summary  
Flags:  D - Down          P - Up in port-channel (members)  
        I - Individual    H - Hot-standby (LACP only)  
        s - Suspended     r - Module-removed  
        S - Switched      R - Routed  
        U - Up (port-channel)  
        M - Not in use. Min-links not met
```

Group	Port-Channel	Type	Protocol	Member	Ports
1	PoP(SD)	Eth	NONE	Eth1/a(I)	Eth1/b(I)

Step 23 Create two port channels in your Pod VDC, one going to each Nexus 5000 Series switch (P is your Pod number and Q is the peer Pod number).

```
vdcP(config)# interface ethernet 4/A
vdcP(config-if)# switchport
vdcP(config-if)# switchport mode trunk
vdcP(config-if)# channel-group P
vdcP(config-if)# interface ethernet 4/B
vdcP(config-if)# switchport
vdcP(config-if)# switchport mode trunk
vdcP(config-if)# channel-group Q
```

Step 24 Configure vPC IDs on the port channel interfaces. Keep the vPC ID number the same as the port channel number. Although it can be any value, the values must match on the vPC peer (the other Pods VDC). For simplicity, it is recommended to keep the values simple to make troubleshooting easier.

```
vdcP(config-if)# interface port-channel P
vdcP(config-if)# vpc P
vdcP(config-if)# interface port-channel Q
vdcP(config-if)# vpc Q
```

STOP! Wait until your peer pod has completed all steps up to this point before proceeding.

Step 25 Check the vPC status and consistency parameters for your vPC. Note the VLANs may differ depending on the VDC/Pod. You may have to wait for your peer to catch up to this point.

```
vdcP(config-if)# show vpc
Legend:
          (*) - local vPC is down, forwarding via vPC peer-link
```

```
vPC domain id           : JK
Peer status              : peer adjacency formed ok
vPC keep-alive status   : peer is alive
Configuration consistency status : success
Per-vlan consistency status : success
Type-2 inconsistency reason : Consistency Check Not Performed
vPC role                 : primary
Number of vPCs configured : 2
Peer Gateway             : Disabled
Dual-active excluded VLANs : -
Graceful Consistency Check : Enabled
Auto-recovery status    : Disabled
```

vPC Peer-link status

id	Port	Status	Active vlans
1	PoJK	up	1,P0,Q0

vPC status

id	Port	Status	Consistency Reason	Active vlans
--	----	-----	-----	-----

```

P    PoP    up    success    success    1,P0,Q0
Q    PoQ    up    success    success    1,P0,Q0

```

Step 26 Check the port channel status on N5K-X.

```

N5K-X(config-if-range)# show port-channel summary
Flags:  D - Down          P - Up in port-channel (members)
        I - Individual    H - Hot-standby (LACP only)
        s - Suspended     r - Module-removed
        S - Switched      R - Routed
        U - Up (port-channel)
        M - Not in use. Min-links not met

```

```

-----
Group Port-      Type      Protocol  Member Ports
Channel
-----
P    PoP(SU)    Eth      NONE      Eth1/a(P)  Eth1/b(P)
-----

```

Step 27 Configure the peer switch feature on your Pod VDC. Ensure that your peer Pod VDC has also completed this configuration.

```

vdcP(config)# vpc domain JK
vdcP(config-vpc-domain)# peer-switch

```

Step 28 Ensure that the interfaces are operational and confirm connectivity between the N5K and your VDC.

```

N5K-X(config-if)# ping 172.16.P0.7P source 172.16.P0.5P
PING 172.16.P0.5P (172.16.P0.7P) from 172.16.P0.5P: 56 data bytes
64 bytes from 172.16.P0.7P: icmp_seq=0 ttl=254 time=1.316 ms
64 bytes from 172.16.P0.7P: icmp_seq=1 ttl=254 time=0.865 ms
64 bytes from 172.16.P0.7P: icmp_seq=2 ttl=254 time=1.007 ms
64 bytes from 172.16.P0.7P: icmp_seq=3 ttl=254 time=7.161 ms
64 bytes from 172.16.P0.7P: icmp_seq=4 ttl=254 time=9.586 ms

--- 172.16.P0.7P ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.865/3.986/9.586 ms

```

Step 29 Disable the link to your VDC (Ethernet 1/a) and test connectivity again.

```

N5K-X(config)# interface ethernet 1/a
N5K-X(config-if)# shutdown

N5K-X(config-if)# ping 172.16.P0.7P source 172.16.P0.5P
PING 172.16.P0.5P (172.16.P0.7P) from 172.16.P0.5P: 56 data bytes
64 bytes from 172.16.P0.7P: icmp_seq=0 ttl=254 time=1.316 ms
64 bytes from 172.16.P0.7P: icmp_seq=1 ttl=254 time=0.865 ms
64 bytes from 172.16.P0.7P: icmp_seq=2 ttl=254 time=1.007 ms
64 bytes from 172.16.P0.7P: icmp_seq=3 ttl=254 time=7.161 ms
64 bytes from 172.16.P0.7P: icmp_seq=4 ttl=254 time=9.586 ms

--- 172.16.P0.7P ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.865/3.986/9.586 ms

```

Step 30 Re-enable the uplink to your VDC and disable the uplink to your peer VDC.

```

N5K-X(config-if)# interface ethernet 1/a
N5K-X(config-if)# no shutdown

```

Step 31 Confirm connectivity again to your VDC.

```
N5K-X(config-if)# ping 172.16.P0.7P source 172.16.P0.5P
PING 172.16.P0.5P (172.16.P0.7P) from 172.16.P0.5P: 56 data bytes
64 bytes from 172.16.P0.7P: icmp_seq=0 ttl=254 time=1.316 ms
64 bytes from 172.16.P0.7P: icmp_seq=1 ttl=254 time=0.865 ms
64 bytes from 172.16.P0.7P: icmp_seq=2 ttl=254 time=1.007 ms
64 bytes from 172.16.P0.7P: icmp_seq=3 ttl=254 time=7.161 ms
64 bytes from 172.16.P0.7P: icmp_seq=4 ttl=254 time=9.586 ms

--- 172.16.P.2 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.865/3.986/9.586 ms
```

Activity Verification

You have completed this task when you attain these results:

- You have used the show commands to verify that the vPC appears in the port channel database and that traffic is passing over the different physical interfaces.